1981 BUYERS' GUIDE

The broadcast industry's comprehensive product directory
High marks in everything

The ratings are in on our ST Series AM/FM Broadcast Consoles—and they're number one. They rate high for versatility, reliability and overall excellence.

But we know that even the finest products can be made better—that's why we've introduced the new ST Series II. These new consoles incorporate even more features to insure greater capability and performance.

The new ST consoles offer a series of modular frames that can be equipped to meet your specific needs. A wide range of input, output and signal processing modules is available to cover your present requirements and provide for future expansion.

At ADM we're never content to stand still—the new ST Series II consoles are impressive proof of that. We're so confident of their excellence that they're backed by an exclusive 5-year warranty.

Contact us now! ADM Technology, Inc.—The Audio Company—16005 Sturgeon, Roseville, Michigan 48066. Phone (313) 778-8400. TLX 23-1114.
SM85

a studio quality condenser microphone that's not "studio bound"

This new high technology Shure microphone will change the way people think of condenser microphones. The SM85 is designed especially for on-stage, hand-held use. Its sound is unique—far more tailored to the special needs of the vocalist: sizzling highs and a shaped mid-range for superb vocal reproduction, and a gentle bass rolloff that minimizes handling noise and "boominess" associated with close-up use. Ultra-low distortion electronics make the SM85 highly immune to stray hum fields. An integral, dual-density foam windscreen provides built-in pop protection.

What's more, the SM85 Condenser Microphone must pass the same ruggedness and dependability tests required of Shure dynamic microphones. As a result, the SM85 sets a new standard of reliability for hand-held condenser microphones.

The SM85 is extremely lightweight, beautifully balanced—it feels good, looks good on-stage, on-camera, on-tour. Ask your dealer for a demonstration of the new SM85, or write us (ask for AL664) for full details.

SM85
Cardioid Condenser
Hand-Held
Professional Microphone

Circle (2) on Reply Card
FCC update

Case study: The Ohio Educational TV Network
By Willis I. McCord, director of engineering, Ohio Educational TV Network, Columbus, OH

Plant tour: Hitachi Denshi's Broadcast Equipment Plant
By Bebe F. McClain, president, B.F. McClain Productions, Asheville, NC

The AES convention replay
By Bill Rhodes, editorial director

Part II
State-of-the-art FM audio: A practical guide
By Robert Orban, chief engineer, Orban Associates Inc., San Francisco, CA

Field test report: Vanguard videotape editor
By Dick Scott, president, Scott Video Systems, Tampa, FL

Digital technology revolutionizing sound recording
By 3M

The First Class ticket
By John M. Cummuta, operations manager/chief engineer, KNEI AM-FM, Waukon, IA

Understanding FM crosstalk measurements
By Dennis Ciapura, general manager of telecommunications, Greater Media, East Brunswick, NJ

Music series becomes production challenge

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NEXT MONTH

The October issue of Broadcast Engineering will focus on technology management for radio and television and the rewards for broadcasters in their profession.

Dennis Ciapura, general manager of telecommunications, Greater Media, will address the subject of how engineers and station managers keep up with the rapid technological advances in broadcasting and how they integrate new techniques into their operations.

BE's second annual engineering management salary survey will reflect salary trends in radio and TV broadcasting. The results will include changes in the fringe benefit packages for top broadcast personnel, plus selected comments on compensation trends from the industry.

The equipment roundup for October will feature ENG microwave systems.
We could have just added bigger reels to make a great three-hour VTR. But we didn't.

We built the HR-300 from the ground up with a new heavy-duty tape transport system designed to handle the stress of larger, heavier 14" three-hour reels. The result is a one-inch production VTR with a three-hour capability—and the technology required to meet those extended production demands.

The HR-300 includes all the exclusive Hitachi features found in our popular HR-200: retracting tape guide for ease of threading; "Pro" tape path for longer tape life; instant head replacement that lets you change all six heads in less than three minutes; slow-motion 1/4 REV-2X Fwd and full audio and video confidence.

This full-production machine can handle all VTR editing functions, allowing for insert, assemble and split edits. And the HR-300 can accommodate all reel sizes from spot to three-hour, making it as versatile as it is hard working.

For video cassette duplication, for delayed network feeds, for film to tape transfer, the HR-300's three-hour continuous record and playback capability is ideal.

Every advanced component has been planned as an integral part of the HR-300's design, making it a one-inch VTR with a lot more than just three hours of capability.

Or, to put it another way, it's not just our big reels that make the HR-300 such a big deal. It's Hitachi know-how. And trying to duplicate that expertise adds up to spinning reels.

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Circle (3) on Reply Card
All Wireless Microphones Are Not Created Equal

This One is a Telex

Wireless mics aren’t new, and sometimes it seems as if all systems are basically the same. However, Telex and its Turner and Hy-Gain divisions have combined their 100 years of cumulative experience in microphone, antenna and rf development to produce a DUAL DIVERSITY WIRELESS SYSTEM THAT COSTS AS LITTLE AS SINGLE ANTENNA INSTALLATIONS. The FM receiver can be operated with one or two antennas. When two antennas are used, a unique automatic phase summation network (patent applied for) provides superb dual diversity reception.

The Telex wireless sounds as good as a hard wired mic, offers plenty of options and is economically priced. If you’re interested in a wireless system that is more than equal—write us today for full specifications.

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Circle (4) on Reply Card
The Leader
Sync/Test Generators.
Every important feature for under $2,000.

Precise NTSC sync/test pattern generators.
Leader's LCG-400 series sync/test generators provide accurate reference signals for any off-the-air broadcast or non-broadcast operation. Available in either multi-burst or sweep marker configurations, the LCG-400 provides EIA and full-field color bars as well as staircase, raster (in eight colors), window, convergence and cross-hatch test signals...plus gen-lock capabilities and a host of auxiliary outputs. As a matter of fact, Leader's sync/test generators do virtually everything the $4,000 generators do...except cost as much.

A network-proven 50 MHz oscilloscope.
The Leader LBO-517 oscilloscope makes accurate and detailed measurements. It offers sensitivities of 1 mV to 10 MHz and 5 mV to 50 MHz. Two main and two auxiliary channels can be displayed on main and delayed time bases (8 traces) simultaneously while intensifying the delayed portion. Composite triggering provides stable viewing of two asynchronous inputs. Positive, stable triggering on composite video signals, at either H or V rates, is automatic. Leader's new dome-mesh 20 kV CRT assures bright, clearly defined displays, even at the highest or lowest sweep rates. All for under $2,000.

The Leader Vectorscope is unique.
Only the Leader LVS-5850 NTSC Vectorscope offers CRT-generated phase/amplitude targets that are as bright and clear as the vectors themselves. Now you can easily verify NTSC Vectors in darkened control rooms. And, electronically generating the targets eliminates non-linearity errors caused by CRT aging. You can mount it in your existing console, view it from any angle or distance, and be confident that what you see is what you've got.

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Evaluation units.
A history of high reliability permits Leader to provide a generous two-year warranty (even on the CRT)...backed by factory service depots on the East and West Coasts. Evaluation units are available to all qualified customers.

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780 SERIES
RAM TIME PROGRAMMERS $1200 to $1500

When more than eight events, the 780 Series RAM Time Programmings are the most cost-effective way of dealing with the problem. They are flexible, easy to use, and provide 32 events (selectable to 98) in 4%, instead of rack space.

780 Series units operate from the power line, with a backup crystal time base and 72 hour backup battery (4%, integral part of the equipment).

- Eight digit real time display when when selection is made to the time base 781, 784, 787, 789, 787, seven digits for ES 780 and 3 digits for ES 781.
- A two digit display of "Next Event" number.
- A two digit display of "Next Event Time" when ES 781, 784, 787, or 789 is specified, and a display is off when ES 781, 784, 782 or 787, or 788 is specified, and a display of a four digit display when ES 785, 786, or 788 is specified.
- All displays are 3 red light emitting diodes.
- Controls, mounted below the displays, consists of an "On-Off" Switch used when it is necessary to prevent the program temporarily.

Time Setting Controls—All recessed to avoid accidental bumping:
- "Display"—the displays can be observed by adjusting the control during a power outage. The unit will continue to operate but the displays will be blanked to conserve battery energy.
- "Event Select"—a two decade thumbwheel, used to set the event number when arranging the sequence of events.
- "Event Time Select"—an eight or four digit thumbwheel, used to enter the event time in the memory. The thumbwheel will be bleached by the sent number of the unit specified.
- "Run-Feed-Enter"—this push button is actuated to enter data into the memory.

Output: an a digital "Run-Feed-Enter" position whenever requiring access or reading data or printing.

STANDARD UNITS

- Eight Digits of Programming Capacity.
- ES 780—10 Days, 10 Hours, Minutes, Seconds
- ES 781—10 Days, Hours, Minutes, Seconds
- ES 782—10 Days, Hours, Minutes, Seconds
- ES 784—10 Days, Hours, Minutes
- ES 787—10 Days, Minutes
- ES 788—10 Days
- ES 789—10 Days

TAPE TIMERS

ES 1296 $128

For Off-Air taping, or operating tape recorders when nobody is there, ESE has created the 1296.

The ES 1296 is a six digit, 11 hour clock with LED displays and a programmable, 300 watt, 117V AC outlet on the rear.

There are four push-button controls (Fast, Slow, Set and Reset), and a four position selector switch.

The ES 1296 Master Clock is used to set time of day and recorder start time. When the recorder is turned on, the clock is automatically set to the Fast, Slow, and Set modes.

The Master Clock can be used as a Master Clock for other ESE systems. The Recorder Clock can be set to any minute in 30 minutes.

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The Recorder Clock can be set to any minute in 30 minutes.

ES 1372 $200

The ES 1372 is similar to the ES 1296, except that it has two timed AC outlets. AC power is applied to outlet "A" at the start time and day selected and remains on for 118 minutes and 53 seconds. AC power is applied to outlet "B" after 60 minutes of power has been applied to outlet "A" and remains on for 78 minutes and 53 seconds. All other specifications of the ES 1296 apply.

Bon Time and Temperature Master basically the same as ES 1296, but with gas discharge displays, panel mounting and separate serial BCD outputs for time and temperature.

Dimensions: 2 1/2" High x 19" Wide x 3 1/2" Deep.

ACCESSORIES

ES 152 IMPULSE DRIVER Plugs into the ES 160 chassis, can drive 20 Impulse Clocks designed so that, if power fails, impulses always come on with the same polarity when power is restored.

ES 160 REMOTE DIGITAL IMPULSE DISPLAY Similar to the ES 161 except that the ES 160 absorbs its own count from an ESE Master Clock, or any ESE product containing the ES 167 serial time code generator. and displays it on bright red .3" LED's.

ES 161 REMOTE DIGITAL IMPULSE DISPLAY In the ES 161 except that it does not absorb its own count from an ESE Master Clock, or any ESE product containing the ES 167 serial time code generator. and displays it on bright red .3" LED's.

ES 168 JUMBO "1 CLOCK DISPLAY Features six digits of one inch displays in 12 or 24 hour format. Receives serial time code input from any ESE Master Clock or ES 160. Specifications: 11.5" High x 8 1/2" Wide x 2 1/2" Deep.

ES 169 CONSOLE MOUNT TIME AND TEMPERATURE Master Basically the same as ES 1296, but with gas discharge displays, panel mounting and separate serial BCD outputs for time and temperature.

Dimensions: 2 1/2" High x 19" Wide x 3 1/2" Deep (Wall Mount). $322

ES 181 REMOTE DIGITAL DISPLAY Decodes serial time data and displays six digits of time on a single gas discharge display. In the ES 181 except that the display is specified to be a single gas discharge display. $250.

ES 188 JUMBO 1" CLOCK DISPLAY Features six digits of one inch displays in 12 or 24 hour format. Receives serial time code input from any ESE Master Clock or ES 160. Specifications: 11.5" High x 8 1/2" Wide x 2 1/2" Deep.

ES 1911 TIME AND TEMPERATURE MASTER Basically the same as ES 1296, but with gas discharge displays, panel mounting and separate serial BCD outputs for time and temperature.

Dimensions: 2 1/2" High x 19" Wide x 3 1/2" Deep.

MASTER CLOCKS

ES 180 Mounted in a 5 1/2" relay rack panel and chassis, displays six digits of time information on 3" LED displays. In 12 hour format.

ES 190 Three second per minute accuracy, standard output is serial BCD, CMOS compatible, and can drive ES 161, 166, 171, 991 or 992 Remote Displays without buffering. All inputs and outputs are through successful output. $195.

Dimensions: 5 1/2" x 10" x 2 1/2" Deep. $190

ES 191 One second per minute version of ES 190. $179

ES 190 The ultimate in accuracy! Similar to ES 160, with special circuits for receiving and decoding a 1000 Hz tone at the start of each minute. The decoder output resets the second switches on the clock each minute except the last minute of every hour. These tones are transmitted by radio Station WWV, with an oscillator accuracy of ±1 part in 10. ES 190 has an antenna and internal WWV receiver with audio output. Displays are 3" red LED's. Serial Output: 4" high x 19" Wide x 17" Deep.

Dimensions: 5 1/2" x 10" x 2 1/2" Deep. $190

ES 191D-miniature economical Master ES 190 (12 Hr) and ES 194 (24 Hr) are con- nected through ES 191D Miniature Time Code Reader to provide the output needed to drive Remote Serial Displays ES 161, 166, 171, 991 and 992 Displays. Dimensions: 2" high x 19" wide x 3 1/2" deep.

ES 164 TIME AND TEMPERATURE MASTER Basically the same as ES 190, but with gas dis- charge displays, panel mounting and separate serial BCD outputs for time and temperature.

Dimensions: 2 1/2" High x 19" Wide x 3 1/2" Deep.

ES 1296 $128

ES 251 $250

ES 251 SMPTE TIME CODE READER ES 251 is a six digit SMPTE Time Code Reader displaying Hours, Minutes, Seconds. Receives the standard SMPTE Time Code Input through standard BNC connector, converts it into six digits of clock time.

Dimensions: Aluminum Case 2 1/2" x 4 1/2" x 7 1/2" Wide. $250

ES 252 SMPTE TIME CODE READER: Exactly the same as ES 251, but displays Minutes, Seconds and Frames.

ES 253 SMPTE TIME CODE READER: Similar to ES 251 and 252, but displaying Hours, Minutes, Seconds, Frames, Inches, Minutes, 100ths of Inches, 1000ths of Minutes, Seconds, and Frames, using 7 segments.
**ES 112/124**

**DIGITAL CLOCK $150**

ES 112 (12 hr.) and ES 124 (24 hr.) are solid state digital clocks. They provide a 6-digit time display at 1/10 second intervals. The 6-digit clock is good for any counting or display applications. The ES 124 clock can be used with other ESE clocks and timers.

Anne 1/10 second interval display

Display: Six digits of time (hours, minutes, seconds)

Dimensions: 2 1/2" High x 8 1/4" Wide x 3 3/4" Deep

**ES 142/144**

**DIGITAL CLOCK THERMOMETER $200**

ES 142 (12 hr.) and ES 144 (24 hr.) are solid state digital clocks. The temperature sensor on 30 ft. cable included.

The display shows temperature and 3 digits of time (hours, minutes, seconds) every 20 minutes. Displays are high temperature or low temperature, 100 degrees F to 0 degrees F.

Display: Six digits of time (hours, minutes, seconds) and temperature

Dimensions: 2 1/2" High x 8" Wide x 6" Deep

**ES 240/241**

**DIGITAL THERMOMETER**

ES 240 DIGITAL THERMOMETER is calibrated for -40 to 220 degrees C. Display is planar dimensions: 2 1/2" High x 8" Wide x 6" Deep

**ES 270 IRIG B TIME CODE READER $350**

The ES 270 TIME CODE READER has been designed to be an economical solution to the problem of receiving and displaying IRIG B time code.

The ES 270 TIME CODE READER has a 10 input Digital Audio Time Code Generator/Reader, capable of receiving any DC time code, and outputting the coded information to an external tape recorder. The ES 270 TIME CODE READER is a stand-alone unit and can be used with any tape recorder.

**ES 301/302**

**100 MINUTE UP/DOWN TIMERS $289**

ES 301 is a four digit, one hundred minute timer. It can be used to control any machine which requires a simple timer. The ES 302 is a four digit, one hundred minute timer with memory, allowing it to set the clock to the correct time of day, switch to timer mode, then switch back to the correct time of day, and finally reset. The ES 302 timer can also be used to set the clock to the correct time of day, switch to timer mode, then switch back to the correct time of day, and finally reset.

Display: Four digits of time (hours, minutes, seconds)

Dimensions: 2 1/2" High x 8" Wide x 6" Deep

**ES 510L**

**FOUR DIGIT 60 MINUTE TIMER $156**

ES 510L is a four digit, 60 minute timer. It can be used to control any machine which requires a simple timer. The ES 510L timer can also be used to set the clock to the correct time of day, switch to timer mode, then switch back to the correct time of day, and finally reset.

Display: Four digits of time (hours, minutes, seconds)

Dimensions: 2 1/2" High x 8" Wide x 6" Deep

**ES 303/304**

**JUMBO CLOCKS AND TIMERS**

ES 303 is a 1/16 inch display. ES 304 is a 1/4 inch display. Both are available in 60 minute, 120 minute, and 240 minute versions. The ES 303 and ES 304 are used to control any machine which requires a simple timer. The ES 303 and ES 304 can also be used to set the clock to the correct time of day, switch to timer mode, then switch back to the correct time of day, and finally reset.

Display: Jumbo display of time (hours, minutes, seconds)

Dimensions: 2 1/2" High x 8" Wide x 6" Deep

**ES 206 VIDEO TIME AND DATE GENERATOR/READER $555**

The ES 206 VIDEO TIME AND DATE GENERATOR/READER has been designed to be an economical solution to the problem of receiving and displaying IRIG B time code.

The ES 206 VIDEO TIME AND DATE GENERATOR/READER has a 10 input Digital Audio Time Code Generator/Reader, capable of receiving any DC time code, and outputting the coded information to an external tape recorder. The ES 206 VIDEO TIME AND DATE GENERATOR/READER is a stand-alone unit and can be used with any tape recorder.
First Class License eliminated

The FCC has eliminated the First Class Radiotelephone Operator’s License. The license was required for people who installed, repaired, maintained and supervised radio and TV broadcast transmission equipment. The license was obtained by passing an FCC examination covering broadcast rules and regulations and broadcast technology.

The examination issued for the first class was thought to be obsolete as well as costly. The applicant’s understanding of the portion of the exam that relates to practical operator abilities was believed to be best determined by a hands-on approach, using actual broadcast equipment.

By eliminating the license, present holders of all classes of commercial operator licenses or permits (with the exception of the Marine Radio Operator’s Permit) are allowed to perform all operating and maintenance duties at broadcast stations. This includes persons with limited technical training who had previously performed the basic operating procedures. Station licensees bear the responsibility for evaluating the competence of technical personnel.

What was once the Second Class Radiotelephone Operator’s License will in the future be called the General Radiotelephone Operator’s License. In order to qualify for the general license, applicants will be required to successfully complete the requirements embodied in the current second class license. Once this procedure goes into effect there will not be any further issuance of the First or Second Class Radiotelephone Operator Licenses—only the General Radiotelephone Operator Licenses. Upon renewal, persons holding either the first or second class licenses will receive the General Radiotelephone Operator License. The commission will release a public notice when the General Radiotelephone Operator Licenses are ready to be issued. (General Docket 20817)

The relaxed licensing requirements for radio operators of AM, FM and TV broadcast stations adopted by the commission in the Fourth Report and Order in Docket 20817 became effective on August 7, 1981.

Chairman Fowler testifies at House Oversight Hearings

In his first appearance before the House Oversight Hearings, FCC Chairman Mark Fowler recently established five specific objectives toward which the commission would devote its energies. They are:

- To create, to the maximum extent possible, an unregulated, competitive marketplace environment for the development of telecommunications;
- To eliminate unnecessary regulations and policies;
- To provide service to the public in the most efficient, expeditious man-
The Compact 22. Priced to keep the competition on its toes.

Our 22-foot mobile unit gives you big production capability at a price that's easy on the purse.

With four cameras and three VTRs, it's versatile enough to handle large or small productions with ease.

Precision engineered to knock down equipment set-up time, the Compact 22 enables you to go from one performance to another and still maintain the highest production standards.

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**FCC update**

- To promote the coordination and planning of international communications, which assures the vital interests of the American public in commerce, defense and foreign policy;
- To eliminate government action that infringes upon freedom of speech and the press.

Fowler stated that the FCC could not accomplish regulatory objectives under the current statutory framework. His staff is reviewing its functions in light of this framework and has been requested to recommend to the commission any legislative amendments that would make the FCC more efficient and responsive to the public interest.

Fowler said, “The commission will present...this fall a comprehensive legislative package and work in close cooperation with the Congress to secure the passage of legislation necessary to achieve regulatory objectives we have established.”

**Use of TV aural subcarriers authorized**

The FCC has amended Part 73 of the rules and regulations to authorize the use of subcarrier frequencies in the aural band of TV broadcast transmitters. The commission revised the rules to meet the expanding use of electronic newsgathering (ENG) techniques in TV news programming. This was done to facilitate coordination and cueing between stations and the field crews operating ENG equipment.

A station using this technique would mix transmissions from the station to the field crew with the audio portion of its broadcast signal, which is the frequency subband used for sound transmissions within the station’s assigned channel.

The commission will not require licensees to submit any specific filing or request authorization to begin using the subcarriers. The rules will, however, require that sufficient aural transmitter performance measurements be taken while the subcarrier is in operation to show compliance with the noise and sub-channel to main channel crosstalk specifications. Records of the transmitter changes and measurement procedures and results are to be retained in station files. If a station’s aural transmitter is not readily adaptable to subcarrier operation, the licensee should consult with the manufacturer. Amendment of Part 73 of the rules was effective August 28, 1981.

**Emergency shutdown rule proposed**

On April 13, the National Aeronautics and Space Administration (NASA) told the FCC it was receiving severe interference to its space shuttle’s landing site. The interference was caused by TV electronic news gathering (ENG) equipment which, although meeting FCC standards, was nonetheless causing harmful interference due to the extremely sensitive equipment NASA was using. (Operators of the equipment stopped using it voluntarily and the interference was eliminated before the shuttle landed.)

The FCC is concerned about situations in which it might be necessary to act on a moment’s notice, which would not allow time to seek voluntary cooperation, to eliminate interference to vital communications. A rule was proposed giving the commission power to temporarily suspend the operation of interfering equipment until the emergency has passed. The chief of the commission’s Field Operations Bureau would have the authority to administer the rule. The proposed rule would only be used when an immediate threat to life or property exists and when offending users do not cooperate promptly to eliminate the interference themselves.
"ONE INCH" AUDIO FROM NEVE.

There is one audio mixer that complements the new 1" VTRs. Designed for both production and post production needs, the Neve 542 Series is available in 8 models with 6 to 16 inputs, including a truly portable Ni-Cad powered 8 input suitcase mixer. With Neve's superior quality and support at an affordable price, you can be assured that your audio productions will do justice to your new (or existing) TV and video facilities. Please call or write today for Neve's comprehensive TV audio console information package.

Model 5422
Suitcase Mixer
Ni-Cad powered

Model 5442
Table Top Mixer

Partial Listing of Recent 542 Range Customers:
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Telemon • Teletronics • TPC • WEAM • Wickreworks • Windsor
WNEW-TV • WTAE • WXXI

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Neve Electronics International Ltd. Cambridge House, Melbourn, Royston, Hertfordshire, SG8 6AU England Tel: (0763)60776
Rupert Neve GmbH 6100 Darmstadt Friedberger Straße 114, West Germany Tel: (06151)81764

Circle (8) on Reply Card
Xinhua news agency joins NEXIS news research service

News of China and the world, as reported by Xinhua, will soon be available in NEXIS, the international electronic news library.

Xinhua is the official news agency of the People's Republic of China. Founded in 1931 and China's official news agency since 1949, it is one of the world's largest wire services. The Xinhua file in NEXIS will include stories from the agency's world report. The bulk of the reporting will be political and diplomatic. Other subjects covered will include China's economy, industry, agriculture and foreign trade.

NEXIS is a computer-assisted research service that allows users sitting at video display terminals to search rapidly and efficiently through a large data base of stories—all in full text—from general and business news media.

French government supports videotext marketing programs

The new French government recently announced that it would pursue recent videotext and teletext successes in the United States.

Louis Mexandeau, French minister of Post Office, Telecommunications and Telediffusion, cited the adoption of the Antiope standard for broadcast teletext tests being conducted on the West Coast by CBS, NBC, Group W (Westinghouse Broadcasting Co.) and KCET-TV, the positive results achieved recently in May with regard to a compatible standard between Antiope, Telidon and AT&T, and the orders obtained in the United States and Europe by French interactive videotext terminal manufacturers as the reasons for success.

Broadcast museum opens

The Texas Broadcast Museum opened May 16, 1981, in Dallas. The museum covers 100 years of broadcast-related history, including antique cylinder phonographs and victrolas, radios from the '20s, early TV sets and 30 different kinds of phonograph records. Also, there is a detailed recreation of a '40s radio station, which works; and a replica of a 1957 TV station that includes four black and white cameras and one of the first videotape recorders.

British Telecom launches first world videotext service

British Telecom launched Prestel as a world videotext service recently in the Netherlands, Sweden, West Germany, Switzerland, Australia and Hong Kong, marking the end of the market trial. Prestel will be launched in the United States later this year. It has been a commercially operating service in the United Kingdom since 1979, providing easy access through TV sets and telephone lines to a worldwide computerized database.

Prestel users worldwide, including Shell, Unilever and IBM now have access to closed user group facilities for intracompany transfer of information; to business-oriented information on shipping from Lloyd's of London and commodities prices in London, New York and Chicago, from Intercom Videotex. Also for the first time, users will be able to access the 185,000-page business and consumer database, available until now only in the United Kingdom.

TELEX
A For Communications Behind The Scene

AUDIOCOM, The closed circuit intercom for small, large, portable or fixed installations at concerts, stage productions, film or TV studios, stadiums or race tracks, industrial or public safety applications. AUDIOCOM belt packs or wall mount stations can be “daisy-chained” by the dozens over five miles without degradation in signal quality or strength. AUDIOCOM interfaces with other sound systems and telephone circuits. AUDIOCOM includes headsets, mics, cables, switchboards, signalling kits, even battery packs for remote locations; the complete intercom system for communications behind the scene.

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For over 30 years Tektronix has been a vital force in the television industry. We've been first with much of the testing, measurement and monitoring equipment that has helped raise broadcast signal quality.

We're doing the same for television systems in business and industry. Video has become the key to communication that combines cost-effectiveness and visual impact.

What we've done for others we can do for you.

From a single camera and recorder, many users have launched company-wide video networks. If you're ready, we're ready to help with the all-important task of testing, timing, measuring and monitoring your video quality. All with reliability, accuracy and ease. And at a cost that makes your investment an exceptional value.

These products belong in your picture.

We helped pioneer the waveform monitor, the vectorscope and the test signal generator, all shown here. Built into your system, they help build up your image—and eliminate costly, inconvenient re-takes.

And as your system grows, Tektronix will be there with products to fit new needs. All backed by a worldwide service network and proven technical support.

We'll show you.

Our factory-trained Sales Engineers can give you more information about these and other television products from Tektronix. Contact our nearest Field Office (listed in major city directories) or call toll-free, 800-547-6711 (in Oregon, 800-452-6773.)

Tektronix, Inc. P.O. Box 4828 Portland, OR 97208
Conferees reach compromise on radio regulation

At noon on July 27, after five days of debate and negotiation, Senate and House budget reconciliation conferees concluded an agreement on radio regulation for inclusion in the budget bill.

Senate Republicans fought for definite license terms and deregulation for radio. House Democrats refused to accept deregulation as part of the budget bill. Finally, faced with the deadline for completing the budget, a compromise was formed.

The following items were agreed upon:

- 7-year license terms for radio
- No license fees

- Lottery for new competing license applications
- Language to prohibit or discourage malicious or frivolous petitions to deny
- 5-year license term for television.

Bocock elected NRBA regional director

Because of a tie-vote in Region VII, NRBA has held a special run-off election for that region. The winner of the 2-year term is Jim Bocock, manager/radio of WSIX in Nashville, TN. Bocock is the former owner of WARV in Warwick, RI and was general manager of WXL/WRNL in Richmond, VA.

NAB requests hearing on DBS

The NAB recently petitioned the FCC to hold a hearing on the application of the Satellite Television Corporation (STC) of the Communications Satellite Corporation (COMSAT). "Many of the momentous issues raised by STC's proposal for DBS service have never been faced by the commission," NAB said. "They deserve the fullest possible airing before the commission sets a new course in national telecommunications policy."

The NAB detailed the broad-based legal and economic barriers that prevent the FCC from granting STC's application. Not only does Section 307(b) of the Communications Act bar the authorization of a non-local broadcast service such as STC plans to provide, but, NAB said, COMSAT's statutory charter, contained in Section 305 of the Communications Satellite Act of 1962, limits COMSAT to operating as a common carrier.

STC's proposed system, NAB said, would adversely affect the public by jeopardizing local TV stations, particularly subscription TV stations, and

The Ultimate PORTABLE RECEIVER for wireless microphones

Vega offers the most advanced portable receiver in the industry. The Model 66 provides operation superior to the highly successful Vega Model 58 x 67, but in a rugged single unit that is much smaller. (Dimensions. W 5.4" x H 1.3" x D 8.25") Designed for the professional sound user, the 66's compact size makes it suitable for mounting to leading portable recorders, both audio and VTR's. The unit operates from either internal 9V batteries or an existing D.C. voltage source. Contact Vega for complete specifications on this exciting unit.
JVC's Professional Video Dealers want you to compare the newest member of the KY family of 3-tube color cameras to any other camera you may be thinking of...and to others you may have eliminated because of their high prices.

**COMPARE PERFORMANCE:**
The KY-2700 holds registration specs to a tight 0.1, 0.2, and 0.4%, for crisp clean pictures. That's stability!
The KY-2700 has dual-edged vertical and horizontal contour correction for the detail and sharpness you require, 500 lines resolution, and for virtually noise-free video, 54db signal to noise. That's performance!

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

**COMPARE VALUE:**
No other professional 3-tube color camera can match these specifications at a price even near the KY-2700. That's a pleasure. Compare it at your JVC Professional Video Dealer NOW!
For more information, call toll-free 800-821-7700, Ext. 7005.
(in Missouri, 800-892-7655, Ext. 7009.)
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41 Slater Drive, Elmwood Park, NJ 07407
Available in Canada from JVC Canada, Inc., Ontario.

© 1981 US JVC Corp. TV reception simulated

The new KY-2700 performance. And much more.
That's a lot.
D.C. Servo Drive Runs Smooth Steady Cool

Of course, it’s Telex/Magnecord

Telex Magnecord broadcast cart machines run cool and steady. So cool no ventilation is required, so steady not even voltage or frequency fluctuations will alter their speed. Thanks to our dc servo flutter-filter drive. Completely immune to RFI and EMI, it meets or exceeds all NAB standards and is suited for local or remote/automated operation.

Standard features at no extra cost.
- An edit pushbutton to add stop cues in playback and omit stop cues in record
- LED indicators show end of tape, status and secondary/tertiary cue tones
- Front panel headphone jack
- VU meters for each channel

Convenient, Flexible
MC-Series is field convertible from mono to stereo, or play to record. Optional remote controls simply plug in.

Four broadcast cart machines to choose from in the Telex/Magnecord MC-Series - all made in U.S.A. and affordable. Write for detailed information.

Quality products for the audio professional

NAB supports congressional decision

Vincent T. Wasilewski, NAB president, applauded a recent Congressional budget reconciliation conference vote on communications matters. The unanimous vote by House and Senate conferees includes an extension of a radio station’s license term from the present three years to seven years, and the extension of a TV station’s license from three to five years.

“The National Association of Broadcasters is extremely heartened by this action,” Wasilewski said. “This is an important step toward our overall goal of full First Amendment freedom for broadcasting.”
"the Controller" is a microprocessor based editing system designed to operate with most 3/4-inch and 1/2-inch VCRs without any modifications. Simple, rugged, and reliable, it provides you with outstanding performance and features, in a variety of configurations at an attractive price. A 2-year unconditional guarantee assures your uninterrupted use of the product. Furthermore, you may satisfy your future production growth with our 100% trade-in provision towards the purchase of any of our "Executive" line of advanced editing systems.

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

Circle (14) on Reply Card
Elcon Video Cassette Cleaner and Evaluator

Are your new, 3/4 inch cassettes sometimes below "Master Stock" quality? Are you throwing away serviceable cassettes? If you're finding out too late about your stock, or want to be sure about the quality of your cassette inventory, you should take a new look at your 3/4 inch cassettes with the Elcon EA 750 Cleaner/Evaluator.

Features

1. Three front panel illuminating LED displays identifies the location of video dropout, upper edge and lower edge damage.
2. Quick and accurate tape grading into categories such as "Master stock," "Standard Quality," "Dub Quality," achieved with user calibrated push buttons.
3. Electronic evaluation—essential for dropout evaluation.
4. Fully automatic—easy to operate.
5. Clean recorded tapes to remove temporary dropout.
6. Fast—certify a one-hour cassette in 6 minutes.

For information, please contact
Television Equipment Associates
Box 393
South Salem, NY 10590-0393
Phone: 914-763-8893

Centro orders 15 Ampex VPR-2Bs

Ampex Corporation has announced that it has received an order to deliver 15 VPR-2B helical scan VTRs valued at more than $1 million to Centro Corporation, San Diego, CA.

Centro, a wholly owned subsidiary of Skaggs Telecommunications Service, specializes in the design engineering and construction of mobile and studio production systems. The Ampex VPR-2Bs will be built into the studios and mobile vehicles to be located throughout the United States.

The Ampex VPR-2B is an advanced version of the VPR-2 that offers a reverse slow motion capability together with other new features and improvements. The newest option of the VPR-2B allows true-frame playback in stop motion. The true-frame playback option doubles the resolution in still frame and can achieve dramatic picture improvements in many instances.

RCA Corporation, Columbia Pictures to market home video

RCA Corporation and Columbia Pictures Industries Inc. recently announced the formation of a joint venture for the marketing of home video entertainment programs throughout the world, excluding the United States and Canada.

Under the new arrangement, the joint venture will develop a worldwide organization, with offices in principal countries, to market existing and future theatrical and TV programs produced by the participating organizations and other producers, as well as original productions created specifically for the home video market.

RCA Records' video music programs and RCA "Select-aVision" programs will also flow through the venture. The venture will handle all formats for home video, including various cassette and disc systems. RCA Records' international subsidiaries will provide sales and support services to the joint venture's branch operations in major markets around the world.

Intelsat establishes full-time TV relays

INTELSAT has established a new service for full-time international TV relays.

INTELSAT is the 106 member-country organization that owns and operates the global satellite system that provides about two-thirds of the world's international transoceanic telecommunications and virtually all overseas television relays. The INTELSAT system today provides virtually 100% of the world's overseas television relays.

The new service will cover channels of between 18 and 36MHz and will be available on either global, hemispheric or spot beam transponders.

Rank Cintel Mark III to receive Emmy

The Rank Cintel Mark III Flying Spot Telecine—a machine process that simplifies the conversion of motion picture film to video—has been selected to receive an Emmy for outstanding achievement in engineering development. The award will be presented Sept. 12 at the Emmy Awards Banquet at the Los Angeles Bonaventure Hotel.

The Mark III has the capability of producing a positive picture from negative film, which yields much improved resolution and picture contrast.
Facts from Fluke on low-cost DMM's

Our new 4½-digit bench/portable: You've never seen anything like it.

Take a close look at the face of this instrument. Notice anything new? If you just realized you've never seen words on a low-cost DMM display before, you're on the right track.

This is the new 8050A from Fluke, the lowest priced 4½-digit multimeter available that uses microprocessor technology.

The legends on the LCD are clues to what makes the 8050A unique.

dB: You're right. The 8050A delivers direct readouts in dBm, referenced to any of 16 impedances. Use the "REF Z" button to scroll through the memory and locate the zero dBm reference you need, then set it and forget it. No more tedious calculations or conversions.

REL: For relative references in the dB mode or offset measurements in all other functions. Lets you store any input as a zero value against which all others are automatically displayed as the difference. Another timesaving convenience.

HV: Just a reminder when your input is over 40V, so you won't forget about safety while in the dB or relative modes. Of course there's much more to the 8050A. True RMS measurements to 50 kHz. Conductance for measuring resistance to 100,000 Megohms and leakage in capacitors, pcb's, cables and insulators. Diode test, 0.03% basic dc accuracy and full input protection. Plus a large family of accessories. Just $369 U.S.

For all the facts on the versatility and value of the new 8050A, call toll free 800-426-0361; use the coupon below; or contact your Fluke stocking distributor, sales office or representative.
The VPR-2B Edge. Smooth as Silk Slow Motion.

The VPR-2B. Its intelligent design and creative editing give you the edge. But we didn't stop there.

The Ampex edge really comes through with our smooth as silk slow motion! The VPR-2B's special effects—forward and reverse slow motion as well as still pictures—are as smooth and free of distortion as anything you'll find in videotape production.

This flawless performance comes from our AST™ tracking system option. After all, we invented the AST using a flexible bi-morph strip to optimize head-to-tape contact over the entire deflection range.

Include Our Slow Motion Controller and Cue Locator for the Ultimate in Special Effects. All From Ampex.

Two accessories from Ampex can really make a difference in your total production capabilities. And each are top performers in the Ampex tradition.

Take our STC-100 Multipoint Search To Cue. Its memory can store up to 99 auto cue points or 99 still recordings for quick recall. In addition, the STC-100 can store its memory on tape for recall by another STC-100 in another location.

Now add our SMC-100 Slow Motion Controller and you've got remote speed control for operations like normal speed playback, variable slow motion in forward and reverse, freeze frame, variable speed shuttling, and automatic cue point.

The Ampex Edge. It's experience. It's design excellence. It's performance when and where you need it.

And there's only one place to get it. Call your Ampex representative today.

Get the Ampex Edge.

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401 Broadway, Redwood City, CA 94063
415/367-2011

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The Master Control Room line monitor racks with switcher control.

Tom Fetters and Paul Rediger check out the setup of an RCA TR60 VTR.

Automation CRT with display and keyboard.

Mobile earth station at Network Operation Center for the network interconnection with PBS.

Case study:

The Ohio Educational TV Network

By Willis I. McCord, director of engineering, Ohio Educational Television Network, Columbus, OH; and Carl Bentz, technical editor

The Ohio Educational Television Network Commission is a state agency with the responsibility for ensuring the orderly, efficient growth of educational television throughout the state of Ohio, and of providing a high quality ETV off-air signal to all Ohio residents. The project involves working with the multiple licenses of 12 ETV broadcast TV stations for program dissemination via a microwave interconnect system; a single massive tape duplication center and statewide program library; a program development system for statewide use; and a subsidy that enables an adequate broadcast schedule for all citizens, regardless of the relative size and/or financial well-being of the station serving a particular area of the state.

Development and scope

The project was funded by the Ohio General Assembly in 1969. Work on the facilities began in 1970 with the construction of six new transmitting plants. That same year, the Network Operations Center (NOC) in Columbus was established and equipped and a system of duplex microwave communications was created with the 12 transmitter/remote origination studio facilities that comprise the network. Translators fill areas not adequately covered by the principal stations, so that signal is available over 41,000 square miles to a population of 10,700,000—75% of which is urban. Computerization handles the bulk of programming traffic control with an extensive automated machine control system. Finally, the network provides program services 17 hours a day, 365 days per year and is available to all areas of the state. The programming from the Ohio Educational Television Network exceeds 22,000 hours fed by microwave per year.

The state of Ohio is served by 12 UHF educational broadcast TV stations:

Akron WEAO/49 210kW ERP
Alliance/ WNEO/45 1820kW ERP
Salem WOUB/20 470kW ERP
Athens WOUC/25 550kW ERP
Cambridge WCET/48 2000kW ERP
Cincinnati WVIZ/16 1170kW ERP
Dayton WPTD/16 2000kW ERP
Lima/ Bowling Green WBGU/57 740kW ERP
Oxford WPTO/14 740kW ERP
Portsmouth WPBO/42 525kW ERP
Toledo WGTE/30 1000kW ERP

Several factors determined the size of the transmitting plants: the size of the area to be served, city populations, coverage comparability desired with other stations and cost considera-
Two Assignments

Canon J13 x 9B IE plus Canon J25 x 11.5B IE and your camera

Two assignments, one location. For example, get great action shots of a football game and also get player interviews at half-time. You can do it with one cameraman and one camera—like the one shown here—with Canon's amazing EFP lenses. Here's how:

Mount your J25 x 11.5B IE on a tripod at your principal location. Its 2/3" system was designed specifically to work with ENG cameras, yet this lens provides a 25-to-1 zoom ratio, power zoom and focus, automatic iris and the image quality you'd expect from a Canon broadcast lens. Another choice is the Canon J20 x 8.5B E, with a 20-to-1 zoom ratio. (Both these lenses have built-in extenders, too.) With your ENG camera attached, you've got full capability.

Detach your camera from the fixed lens, mount the famous Canon J13 x 9B IE and head for the locker room. You've got a 13X EIE lens now and can move about freely for your interview shots. The J13 x 9B IE is unsurpassed as an ENG lens, with Cable Drive and auto iris capabilities plus built-in extenders and auxiliary wide-angle and telephoto accessories available as well.

Electronic Field Production is a reality. A practical reality because you don't have to send two crews or even two cameras to a single location if all you really need is one ENG camera and two Canon lenses. And, costs notwithstanding, sometimes you just don't have enough cameras to go around. Selecting the right combination of Canon lenses could actually double the utility of the ENG cameras you already own. And that's something even your accountant can appreciate!

Find out more. Use the coupon or write on your letterhead for the facts on the Canon J25 x 11.5B IE and J20 x 8.5B IE lenses, as well as our popular J13 x 9B IE. We'll also be happy to arrange a practical demonstration for you. A very practical demonstration!
RAMKO AUDIO CONSOLES

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If you're under the impression all audio consoles are more or less alike, then you haven't seen Ramko's exciting "silent series" of 14 different models. Stereo and mono, and available in any input/output configuration you could possibly need, Ramko has pioneered many innovative features such as total D.C. control of all mixing and switching functions, solid-state balanced inputs and outputs, full-range input gain selects, switch selectable muting on all inputs, solid-state V.U. meters, and plug-in modules and I.C.'s.

Everything we manufacture is, and always has been, shipped on a two week trial basis and warranted for a full two years. On some of our industry standard consoles, four years! Write or call collect today for full information on the products that are engineered for your bottomline.

Ohio ETV

The number of stations has been influenced by the area of the state, geographical distribution of the cities, transmitter plant considerations, the need to reach every citizen, and budgetary constraints.

Towers for the stations, ranging from 400 to 1200 feet AGL in height, are designed for minimum twist and sway because high gain, narrow beam antennas are sometimes used. For stations where ERP may seem much lower, the tower height places the average antenna height at a point above average terrain to put "predicted" signals on a par with stations of a much greater ERP, but with lesser antenna heights.

Regulations

Part 73 of the FCC Rules and Regulations states certain maximum ERP (effective radiated power) limitations: 100kW for low VHF channels; 316kW on high VHF frequencies; and 5000kW for UHF broadcasters. Signal ranges for the maximum power levels with a nominal 1000 feet average antenna height tend to show the relative handicap suffered by the UHF operator. Yet, using more nominal (and affordable) power levels will show that while the UHF 2000kW level does not yield a Grade B coverage commensurate with VHF stations having maximum power facilities, city grade and Grade A signal ranges compare favorably with the VHF values. An assumption must be made that the public is willing to use proper receiving antennas with orientation in the direction of the transmitting antenna. An on-going effort is needed to educate the viewers on reception of the signal. (Complaints have been received from viewers attempting to obtain the signal while using loop antennas on receivers in houses with aluminum siding.)

The network transmitters are either 30 or 60kW units. The 60kW transmitters employ two 30kW rated klystrons in the final amplifiers. All klystrons are operable in either aural or visual service. Based on 1977 prices, the cost of a 30kW remote-controlled transmitting plant with a moderate gain antenna on a 1000-foot tower was estimated at $882,000. The ERP of the plant falls at about 600-700kW. For a 60kW plant with similar equipment, costs would be about $1,149,000 for 1000-1250kW ERP. The 100-110kW remote-controlled transmitter, with a high gain antenna at 1250 feet would cost $1,291,000 and provide 2000kW ERP.

Field measurements

Field strength measurements were
VERSATILITY, RELIABILITY AND LOW DISTORTION. THAT'S WHAT THE TRANSDYNAMIC™ PROCESSOR IS ALL ABOUT. IT TEAMS WITH AUDIO & DESIGN'S EXPRESS OR COMPEX LEVEL CONTROL AMPLIFIERS TO CREATE A SUPERIOR TRI-BAND SYSTEM. IT FEATURES:

- TWO INDEPENDENT PROGRAM CHANNELS, FOR STEREO OR DUAL MONO PROCESSING.
- FIELD TUNABLE BAND-SPLITTING FILTERS (6 OR 12 dB PER OCTAVE PHASE COMPENSATED CURVES).
- SEPARATE CONTROL OF THE COMPRESSOR ATTACK, RELEASE AND RATIO FOR EACH BAND.
- WIDE BAND VCA LIMITER AT THE SYSTEM OUTPUT FOR ABSOLUTE OVERMODULATION PROTECTION.
- SELECTABLE 0, 25, 50 OR 75µS PRE-EMPHASIS IN THE CONTROL CIRCUITS (NOT THE SIGNAL PATH) OF THE OUTPUT LIMITER.
- ADJUSTABLE PEAK MODULATION ASYMMETRY FOR AM OPERATIONS.
- SWITCHABLE HIGH AND LOW PASS FILTERS THAT ATTENUATE EXTRAPANICD INPUT SIGNALS AND CONTOUR THE SYSTEM BANDWIDTH.
- SENSIBLE SET-UP ADJUSTMENTS WITH LED BAR GRAPH PPM METERS.
- TAMPER-PROOF SOLID STATE AUDIO SWITCHING CIRCUITRY.
- NO MYSTERIOUS EPOXY "BRICKS" OR "SECRET PARTS".

NO MATTER WHAT YOUR FORMAT, THE TRANSDYNAMIC SYSTEM IS THE CLEAR CHOICE FOR YOUR SOUND. AN AUDITION IS THE ONLY WAY TO FULLY APPRECIATE THE TRANSDYNAMIC. CALL TODAY, TOLL-FREE 800-426-6170 FOR FURTHER INFORMATION. SYSTEM INSTALLATION BY FACTORY PROFESSIONALS IS ALSO AVAILABLE.
Ohio ETV

made from all 12 ETV stations to prove compliance with specified and published coverage information and to determine where translators might be needed to fill nulls due to adverse terrain and low received-signal areas beyond Grade B contours. The surveys followed TASO techniques on eight radials inside and through the predicted Grade B contours (T6602 Standard). Many of the measurements were made under case conditions of dense foliage at predetermined locations in and around certain cities where radical variations in terrain or man-made obstructions were encountered.

Having established appropriate translator locations, a computer study of channel frequencies was conducted to comply with FCC separation constraints. Required tower heights for specific areas and sites were submitted to the FAA to obtain a determination of “no hazard to air navigation.” In addition, a narrative was prepared for the Environmental Protection Agency that considered such effects as tree removal and effect on soil and drainage, impact on wildlife, proximity of state or national recreational areas and game preserves, farmland taken out of productive use, and any adverse aesthetic effects. Once all the requirements were fulfilled and applications filed with the FCC resulted in construction permits, ten transmitters were placed to fill coverage nulls—three at 100W output and seven at 1000W. The sites use Bogner B16U antennas, which offer power gains of 22.6dB over a dipole (15.7dB over Isotropic). Some directional antennas are used to conform to the area coverage needed. In areas of favorable topography, reception of good quality signals has been obtained with battery-operated portable receivers and ordinary whip antennas. The 100W translators provide pictures six feet above ground level at 16 miles distance; 1000W units extend the coverage to 20 miles.

The translators, all products of EMCEE (Electronics, Missiles and Communications Inc.), have operated in remote locations, unattended, with satisfactory service. Reliability has been exceptional and coverage exceeded design expectations. As a result, plans are under consideration for additional sites, one 100W and one 1000W. In addition, at some locations in the state with mountainous topography, where UHF signals cannot serve a large enough area to justify construction (or operation) of the 100 or 1000W systems, 10W units are being considered for future use. Until decisions are made, however, cable TV systems carry the ETV signals into a number of areas where off-air reception is problematic.

A note on translator operation is in order. Perspective ETV translator applicants should be aware of the increasing interest in low power television on UHF channels. When the translator is operated on an assigned commercial channel, or on a waiver, the channel must be relinquished if it is subsequently assigned for commercial operation. With a sizeable investment in equipment the ETV operator is in an untenable situation, unless he...
For a fast start, no other studio camera comes close to the HK-312. It comes all ready. Just unpack it and it'll give you superior performance the first time. And, it'll keep working. The HK-312 helped establish Ikegami's reputation for legendary reliability.

The HK-312 is also an extremely stable camera that doesn't require time consuming adjustment. Add the optional computer setup and you can trim your daily checkout time even more—to less than a minute. Computer setup that has already proven itself at many leading stations.

The HK-312 includes all the essentials for superior picture quality and performance. High resolution. Superb colorimetry. Plus an excellent signal-to-noise ratio. And with Ikegami Triax, you can extend the normal 500 meter cable length to 1500 meters with no compromise in picture quality.

One simple demonstration will show you why so many networks and leading independents are convinced that the HK-312 is the finest studio camera ever built.

To get started, contact Ikegami.

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Ohio ETV

is able to locate another acceptable channel assignment. The conversion of the translator to another UHF channel involves retuning the transmitter and receiver oscillators and in most cases will require replacement of receive and transmit antennas, at a considerable cost. The importance of employing a well-qualified consulting engineer and legal advisers becomes obvious.

Microwave linkage

A full duplex microwave communications system is the backbone of the Ohio Educational Television Network, interconnecting seven major cities and nine state universities with the operations center in Columbus. The microwave system encompasses 2220 miles of microwave paths, 95 licenses, and 32 terminal/repeater locations. Frequencies involved lie in the 2, 7 and 13GHz bands. Most of the equipment is by Parsons and is completely solid state, featuring dual conversion receivers that allow operation with closely spaced RF channels and reduce interference susceptibility. Other features include balanced or unbalanced inputs and outputs, ease of tuning within each band and inter-changeability of parts.

The aural portion of the TV signal (with 15kHz bandwidth) occupies a 6.7MHz subcarrier above the baseband video carrier. A double sideband suppressed carrier at 7.5MHz handles a maintenance orderwire system. The orderwire is a four channel party line multiplexed signal for engineering coordination, communications and program coordination from the operator at a remote site to the Network Operations Center (NOC). Alarms from all repeaters and terminals are received at the center. In addition, teletype interconnection is accommodated by the multiplexed channels. Considerable expansion capability exists for added message services and “DATE” stereo or multichannel audio circuits.

The alarms from the microwave system terminate in a display monitor panel at the NOC. That panel allows the duty operator to be aware of any transmitter power drop (3dB or more), automatic frequency control variance, loss of video, unmodulated signals, receiver carrier drops (to 5dB above receiver threshold), total loss of signal, temperature, primary power failure, battery voltage low, excessive building temperatures, tower beacon or sidelight failures, and building intrusions.

System design involved a comprehensive computer study to ensure
Nobody knows better than production engineers how important equipment flexibility is in the efficient use of SMPTE Time Code. So Datametrics listened to engineers, and designed a comprehensive line of time code equipment to meet every need.

Rugged portable code readers. Highly legible displays. Low-profile readers and generators. Even comprehensive systems that incorporate complete generate, read and video display capabilities in one compact case. Datametrics has the package you need, but that’s only the beginning.

Even our most cost-effective units incorporate features you’d expect to find on higher priced models.

For example, Datametrics’ lowest cost studio code reader offers video insertion capabilities for monitor viewing and code burn-in to work print. And we added options that offer even greater flexibility ... at lower cost.

But we didn’t stop there. Datametrics leads the industry in innovative features that greatly extend the potential of time code. Our newest code reader offers automatic segment duration calculation. Video titling capabilities. And it decodes and displays Time and User data ... simultaneously.

Contact Datametrics. From basic time code management to the most technically advanced computer-compatible systems, we make time code work to your advantage. Time after time after time.

Ask for a free copy of the new SMPTE Time Code Handbook, and learn how to make more effective use of time code in your facility.

Datametrics Inc
340 Fordham Road, Wilmington, MA 01887
Tel (617) 658-5410/TWX 710-347-7672

Circle (24) on Reply Card
**Ohio ETV**

The plan uses dual conversion receivers with high performance antennas using crossed polarization. As a result, co-channel frequencies are transmitted and received on the same tower in some cases. A study of weather and atmospheric conditions in the state for the last 50 years was of considerable value in establishing tower heights and path lengths to minimize weather related outage possibilities, specifications based on EIA standards RS250B. The link system has a design reliability of 99.99%.

Studies were conducted along 25 microwave paths ranging in length from a few miles to 33 miles. Path clearance was based on an earth radius of $K = 1$ and a first Fresnel radius of $F = 0.6$. All paths were calculated for fade margins of at least 40dB unfaded receiver carrier levels and are to be less than -38dBm. The fade margin is referenced to 33dB peak-to-peak video signal RMS EIA weighted noise ratio at the receiver output.

The microwave system has been quite reliable, requiring minimal maintenance. Morning fades are infrequent. The 13GHz links, one over

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**Table: Video Link RF Channel Frequencies**

<table>
<thead>
<tr>
<th>System</th>
<th>RF Channel Frequencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>NorthEast</td>
<td>No notes: All frequencies are center channel transmit and in MHz.</td>
</tr>
<tr>
<td>NorthWest</td>
<td>No notes: All frequencies are center channel transmit and in MHz.</td>
</tr>
<tr>
<td>South</td>
<td>No notes: All frequencies are center channel transmit and in MHz.</td>
</tr>
<tr>
<td>SouthWest</td>
<td>No notes: All frequencies are center channel transmit and in MHz.</td>
</tr>
</tbody>
</table>

Notes:
1. All frequencies are center channel transmit and in MHz.
2. All repeaters are 13 MHz except those on the NOC to WCET link which is baseband.

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The MTR-10 Series

Bridging the gap between the new technology and old reliability, they're the logical extension of the innovative technology built into our multichannel MTR-40. The new MTR-10 series gives the professional unprecedented control:

- Measurable and audibly discernible performance improvements. More than steps and buzzwords, balanced engineering and a balanced approach with internal square/flat wave generation and electronically balanced I/O with fixed coupled outputs. Send us your heads for maximum accuracy and long life.
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- Unmatched production features — exclusive multiple multiformats, reverse-play, standard alignment level presets, and dual-mode variable-stereo. Other features include control-tailed wind, preset markers, bias switching, three speeds and AES, NAB, and IEC selectable. Both include return-to-zero and offer an optional tape shuttle.

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Intercom and modular audio equipment

OHIO ETV

20 miles long, have not been rained out. During the 1977 blizzard the system remained in operation (some locations on backup battery), though some of the UHF primary stations were off the air because of ac power failures. No redundancy is available in terms of hot microwave standby equipment. A further study is, however, in progress for remote controlling of IF switching at relay points, to allow shunting around an out-of-operation link location in order to maintain system service.

The NOC

The Network Operations Center (NOC), adjacent to Ohio State University in Columbus, OH, serves as a routing and distribution facility for the affiliated ETV broadcast stations throughout Ohio. The central system element of the facility is the solid state routing switcher, accommodating 30 inputs, selectable to any of 30 output channels. All output channel line selector pads allow selection expansion for a future growth to 99 inputs. The selectors provide source-on-line and next up indications. A take button allows an operator to place the preview source immediately on the line or to provide a preroll of tape with an automatic delay of ten seconds before the on-line switch. Audio drop removes program audio from the source to the line; audio mix implements a 50% reduction in level for multisource mixing. A VU meter indicates effects of the 6dB level control of on-line audio. All operations of the switcher are under binary-coded decimal control for automation from the network computer. As an adjunct to the master routing switcher, another unit allows selection of 18 different sources for viewing in conference rooms or offices in the NOC building.

Because one foot of coaxial cable can contribute to a visible flesh tone error of two degrees, careful consideration was given to color error prevention. Potential problems exist when 20 or more video sources are being switched and routed. The sources—videotape, film islands and video processors are color timed. Selection of a supplier for switching facilities requires close attention to the care given by the manufacturer toward such timing problems through the switching matrix itself. The degree of accuracy should be less than one degree of error, for example, less than 0.77 nanoseconds. A concerted effort was made to achieve this accuracy factor throughout all areas of the Network Operations Center. All incom-
PEIRCE-PHELPS, FOR EVERYTHING FROM MINI-VANS TO MAXI-STUDIOS

We just supplied a compact news van to Warner Amex in Mesquite, Texas. And an on-air production studio to WWAC-TV in Atlantic City. Now we'd like to do something for you. Call or write and tell us what you need.

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Ohio ETV

Broadcast Engineering
Our new M SERIES puts PM-2000 performance within your reach.

Yamaha's PM-2000 mixer has established itself as an industry standard. Our new M Series mixers maintain that standard of performance—with the features, price, and size to meet your demands.

The M Series makes an excellent choice for live sound reinforcement main or submixers, as well as for theatrical, church, and broadcast uses.

The M508 and M512 are identical, except the M508 has 8 input channels and the M512 has 12. Both have 5 outputs and 4 mixing busses. And both have, in the PM-2000 tradition, generous headroom, ultra-low noise, ultra-high gain, and tremendous flexibility.

The M916 has 16 input channels, 19 outputs and 11 mixing busses for more complex demands. You will feel the PM-2000 heritage in the M916's smooth control. And see it in the logical layout. And hear it in the performance.

It's all part of the M Series aim—to put PM-2000 performance well in hand. Visit your Yamaha dealer for more information or write: Yamaha, Box 6600, Buena Park, CA 90622. In Canada: 135 Milner Ave., Scarb, Ont. M1S 3R1. Because you're serious.
Introducing the only 3/4" time code editing system that performs 20 automatic edits from multiple sources. The Panasonic 700 B-2 Series Time Code Editing System.

Now Panasonic adds a new dimension to the speed and accuracy of time code editing with our new 700 B-2 Series Time Code Editing System. The AU-700 editing recorder, the AU-A70 programmable editing controller, and the AU-J10 multiple source adapter. Together they let you do what other time code editing systems don't: Perform up to 20 automatic, multiple-source insert and assembly edits. And the 700 B-2 Series is packed with outstanding performance features.

The precision of direct drive.

Check out the excellent stability and precision of the AU-700's direct-drive video head cylinder and capstan servo motor. The superb performance and durability of our crystal-oriented HPF™ heads. All combine to produce an outstanding picture with horizontal resolution of 260 lines color, 330 lines monochrome and S/N ratio of 46 dB color, 50 dB monochrome. You'll also get an edit with less video noise because video head switching has been moved to the vertical interval so it never shows up in the picture. At the same time, we incorporated DUB IN and DUB OUT connectors with separate Y/C signals and a flying erase head. And to keep that good-looking picture looking good, all circuitry is mounted in a durable annealed aluminum die-cast chassis.

The speed of microprocessors.

Another touch of ingenuity is the AU-700's microprocessor controls. Designed to work perfectly with the AU-A70 editing controller, they give you the speed, accuracy and versatility of full-logic, mode-to-mode switching. The AU-700 will accept SMPTE time code on a separate track or on audio track one as well as standard CTL pulses. And its electronic
digital tape counter displays LED readouts of CTL pulses in minutes and seconds—even in fast forward and rewind.

**Multiple source versatility.**

With our AU-A70 editing controller not only can you generate and read time code pulses, microprocessors let it perform up to 20 time code edits automatically. Add an AU-J10 multiple source adapter and it will accept inputs from two source decks and one live line plus perform A/B rolls. Microprocessors also let you automatically go to specific tape locations. You can also search both ways at speeds of 1/20X, 1/5X, 1X, 2X, 5X plus pause with picture. Other features include program check, program exchange, insert programming and overflow indication. For editing convenience, separate address time and lap time indicators are included. The AU-A70's error codes pinpoint any procedural errors to avoid incorrectly programmed edits. The AU-A70 can also be used with any Panasonic solenoid-operated ¾" and ½" VHS™ decks. For worldwide versatility, there is a built-in voltage selector that is compatible with 100V / 120V / 220V / 240V AC, at either 60 Hz or 50 Hz.

**Total service capability.**

When it comes to servicing and maintaining the 700 B-2 Series, Panasonic backs you with a full network of B-2 dealers, equipped with total service capability. Each has the parts and technical expertise that professionals require. For further information, call your nearest Panasonic office:

- Northeast—(201) 348-7620
- Southeast—(404) 923-9700
- Midwest—(312) 364-7936
- Southwest—(214) 258-6400
- West Coast—(213) 655-1111


Panasonic VIDEO SYSTEMS DIVISION

Circle (32) on Reply Card
Ohio ETV

programs they desire to receive directly from the PBS network, what programs they wish recorded for future airing, and what library programs they want to use. The NOC computer merges the affiliate schedules to arrive at a master composite schedule, flagging any conflicts or overload problems, should they occur.

The operator of master control may use a CRT terminal to modify the schedule including changing, deleting or inserting events, as well as assigning specific machines to meet the requirements. A split display shows the operator what is on air and what is up next. The format shows time, duration, source, ID source, recording machines, program origin, program code and stations receiving the program. The second portion of the split lets the operator view and manipulate past and future events, observe logs from the traffic center, call alternate lists of events for insertion as needed, or retrieve an automatic sign-off procedure.

As the schedule day proceeds, the computer at Master Control automatically sets VTRs to record or playback, pre-rolls machines and airs events as scheduled. Under computer control, the switcher reflects preset sources and program indicators for each station, signals what is on-air for each station and what is up next. Also as events air, a printer logs the events.

**Baseband allocation.**

**Automation computer system.**

**MONEY IN THE BANK!**

When you increase efficiency, cut down time and improve the quality of your broadcast, you put money in the bank. RUSSCO does it and shines with the quick-starting MARK V Vari-Speed turntables, our audio mixers, phono preamps and power and distribution amplifiers. What's NEW is the RUSSCO all metal Tone Arm...Solid, Smooth & Reliable! The NEW 4 channel TEL-A-MOTE Remote Mixer is the sportscaster's small dream machine that ties up perfectly with the NEW T112 Studio Equalizer / Coupler that greatly improves the sound of remotes & talk shows. The NEW MA220 Stereo Monitor Amp gives you separate level & tone controls for each channel. Call Barbara Gaudin for catalog sheets with great specs and Low prices.

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*Manufacturer’s suggested retail price, Model 941, Model 942, $270.

Ohio ETV

exactly as they appear on air. Another terminal at the center displays diagnostic information and verifies whether the system is or has been working correctly. Though quite involved, the automation system functions efficiently with minimum maintenance.

Future plans

In addition to the statewide educational network, the Ohio ETV Network Commission recently began operation of a medical microwave link facility providing full duplex interconnection between Ohio State University Medical Center, three hospitals in Athens and Holzer Hospital in Gallipolis, OH. The facility allows for medical conferencing and continued medical education. Plans are considered for expansion of the medical system to a statewide medical network linking all medical schools in Ohio.

Another study is underway for location of a satellite up and down link at the network operation center to allow ETV programming origination in Ohio to be carried nationally by the Westar PBS satellite transponders. Consideration is being made of digital video and audio developments and their possible enhancement of the Ohio network services. Laser beam and fiber-optic transmission capabilities and adaptability to the transmission and distribution service offer interesting possibilities of the future. Other state agencies, investigating use of TV distribution of training programs and a means of reducing travel costs, look toward the Ohio Educational Television Network for guidance. Current plans also include researching applications of teletext within the Ohio Educational TV Network.
You want great picture quality. You get it with the new Toshiba PK-60 ENG/EFP camera. Beautiful pictures, even in the most difficult lighting situations. You also get a whole range of features that will make you think the PK-60 was designed by one of your colleagues.

Super light weight—at just 9.2 pounds, it's the lightest broadcast color camera in the world.

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And specifications that will make the chief engineer think you're brilliant.

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Write or call for details. Toshiba America, Inc. Broadcast Electronic Systems Division, 292 Gibraltar Dr., Sunnyvale, CA 94086, (408) 734-9172.
Plant tour: 
Hitachi Denshi's Broadcast Equipment Plant

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

Although Hitachi Denshi has three factories that are involved in the production of video equipment and tri-electrode tubes, this tour will concentrate only on Koganei Works located on the outskirts of Tokyo. Koganei Works manufactures broadcast cameras and 1-inch type C VTRs.

Hitachi is comprised of 40 consolidated subsidiaries, known as the Hitachi Group, and about 460 non-consolidated subsidiaries. Hitachi Denshi, one of the leading consolidated subsidiaries, manufactures broadcast video systems, radio communications systems and information processing systems.

The initial research and development for these products originates from Hitachi Central Research Laboratory, the heart of six laboratories, which services all Hitachi subsidiaries.

Other companies within the Hitachi Group develop and produce many of the electronic components used in manufacturing the broadcast equipment at the Koganei Works. Some parts that are supplied by other Hitachi divisions come to Hitachi Denshi with a certificate stating that each has been tested. Otherwise, all incoming parts are tested before being used in assembly.

Electronic parts, sheet metal and ingots are the basic raw materials that come in the back door to be transformed into broadcast cameras and recorders. Separately, electronic parts go through an electrical assembling process and the sheet metal goes through a mechanical machining process. Eventually they come together for system assembly. At that point, the electrical circuit boards and machined parts are assembled, then extensively tested before packing and shipping.

Keeping these two separate processes in mind, it is possible to see how broadcast cameras and recorders are merged for final assembly by Hitachi Denshi.

Editor's Note: Occasionally Broadcast Engineering will take its readers on a journalistic tour of broadcast equipment manufacturing facilities. The first of these special reports is filed by the author on her trip to Japan following NAB'81. A companion report, an interview with the president of Hitachi covering technological trends in broadcasting, is scheduled for our October issue.

The intent behind these reports is to give our readers an insight into the companies that provide equipment to the industry. We will also cover some of the people in those organizations that make their products possible.

We would like to have some feedback from you to help decide whether or not to continue this special series. If you want to see more tours, circle 321 on the reader service card; if you don't find the series helpful, circle 322.

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Equipment typically rack-mounted for operation, storage or transportation comes in many standard sizes. So does the Rack-Pack. Eleven sizes to be exact, in EIA-RETMA dimensions ranging in rack height from 5.37 inches to 24.625 inches.

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Rack-Pack’s stack on interlocking ribs. They become a modular work station in any environment and are extremely secure.

When you make the Rack-Pack your standard instrumentation case, you close the lid on shipping worries. Your equipment arrives as it left, in top condition. With Rack-Pack you get more than just the best case around, you get peace of mind. Thermodyne has it all, product, price and a delivery capability that will make you smile. Case closed.

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Plant tour/electrical

circuit board, this automatic parts inserter is used. The parts are packed on strips of paper rolled up in boxes, which permits the inserter claw to pick them off individually. The carriage holding the various boxes of parts moves according to the computer's instructions. Each part is therefore moved up and aligned with the board, picked up by the claw, and inserted into the board. This is all done rapidly and can proceed virtually unattended.

Board soldering
When the board contains all of the needed parts, it is passed through a solder bath in which all the parts are soldered simultaneously. The board first goes through a bath to remove any dirt that might result in a bad solder joint; then it travels down a path to a pool of molten solder. The board is treated with solder resist where no soldering is desired. The result is a clean, evenly soldered circuit board—accomplished in a few seconds.

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You'll find that sound ideal for both program line enhancement and production use. The Orban 111B is the reverb of choice for the demanding broadcaster—it gives the polished, professional touch to your in-house spots and promos. Call your local Orban dealer today and find out more about the practical, professional 111B.

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Currently, we're the only company with the breadth and depth of line to serve the earth station market with coaxial cable, waveguide, arc antennas up to five meters (1.2, 1.8, 2.4, 3.0, 3.7, 4.6 & 5.0 m). To get the complete picture, call or write Prodelin, Inc., Box 131, Hightstown, NJ 08520, (609) 448-2800.
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Photo: ChronTrol's rack mount model, one of many products for satellite communications, broadcasting, security systems, and industry.

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Circle (42) on Reply Card

Plant tour/electrical

In this heated room for hours, the parts undergo similar stress as what they would receive from days of operation. Both VTR and camera parts are held at 50°C to shorten the test time and find any failures. Many problems are eliminated by doing this in the parts stage instead of waiting until the entire product is assembled. The individual boards undergo a series of tests before they proceed to assembly.
INNER VIEW 3:
A closer look at Conrac Monitors

Comb Filter Separator:
Resolution Solution at 3.58 MHz.

Conrac's Comb Filter Separator delivers the high resolution needed for today's high performance camera and taping equipment. It removes color information from the composite video signal without the luminance loss in the 3.58 MHz region produced by notch filters.

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Conrac Quality:
Computer-controlled for the 80's.

The implementation of a failure analysis documentation system has become an essential new tool in the quality factor. This system provides the capability of daily test analysis from four different product test and inspection areas. The net results are improvements in product quality and long term reliability.

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Comb filter separator and computer-controlled quality are just two ways Conrac technology can save you time and money.

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Circle (43) on Reply Card

Quality you can take for granted.
Plant tour/mechanical

Computer-controlled machining

One-inch VTR pieces such as the head drum assembly and main chassis are drilled out with great precision by a computer-controlled drilling machine. Various sizes of holes must be drilled into each metal drum. (At the top of the machine, you can see the large selection of drill bits.) The computer (right) dictates which bit will be rotated along the track and delivered to the drill. The operator unloads the drum after the drilling is finished. Some other parts used are still machined by operators at lathes.

Mechanical sub-assembly

Although many phases of the manufacturing process are highly computerized, there are still some steps that can only be done by hand. Assembling the head drum is one of the most critical steps in the production process. Many components must be expertly installed, often using a microscope to ensure proper alignment.

Mechanical parts testing

All parts that are sub-assembled must undergo a series of tests to assure they meet specifications. The

---

4 Models—8 and 10 mixer dual stereo with rotary or linear faders • Transformer Balanced Inputs and Outputs • 3 Inputs Per Mixer—internal pads allows mic/line selection on the same mixer • Two 4-Input Auxiliary Input Selectors—may be assigned to any mixer • Pre-fader Pushbutton Cue—in addition to normal CCW fader cue position • LED Status Indicators—color coded to aid in instant identification of function selectors • Momentary or Continuous Remote Control Contacts—internally selectable, also controls optional digital timer reset/start • Full Metering Capability—two meters standard, up to four meters and/or digital clocks and timers optionally available, all meters provided with LED peak indicators • Gain Selectable Microphone Preamps—provided with center tap access for phantom condenser microphone power, processor input/output port with buffer amplifier for outboard compressors, limiters, etc. • Programmable Muting Logic—internal pin-programmed matrix allows any selection of monitor and cue muting for the first five mixer positions • Pushbutton Aural Phase Test • Announcer's Microphone Intercom-Air Selector • Full Dual Channel Operation—independent program and audition assignment pushbuttons • Five Monitor Driver Outputs—four muted, one non-muted • All Mixers Switch-Selectable to Mono or Stereo • Ground-Plane Techniques Used Throughout for Increased RF Immunity • Selectable Internal or External Master Level Controls • Accessories and Options—mono mixdown, high impedance (cassette) line input plug-ins, reference oscillator/line input plug-in, additional microphone input plug-ins, digital clock, digital timer, linear faders.

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From the beginning, you'll appreciate Studer performance. You'll notice the solidity of the transport, the smoothness of the tape-handling, and the positive feel of the control mechanisms. And you'll hear the sonic clarity you expect from a Studer.

Soon you'll grow accustomed to the features: three speed (15/7.5/3.75 or 30/15/7.5 ips) operation, quartz PLL capstan drive, servo controlled spooling motors, real time counter with plus or minus readout, fader start, dump edit, and auto repeat. Improvements on the B67 MKII include locking tension sensor arms and better head access for easier edits. Full remote and vari-speed available as options.

Finally, as the months turn to years, you'll gain great respect for the B67 MKII's thoughtful design and meticulous Swiss craftsmanship.

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Video Delay Lines

ALLEN AVIONICS Video & Pulse Delay Lines replace 75 ohm coaxial cable, provide a more suitable method of achieving precise short delays. The units reduce size, weight, installation costs, and save time and effort in making delay changes.

Part No. | Delay Range (Nano-Sec.) | Delay Steps (Nano-Sec.) | Method of Variation | Maximum Insertion Loss @ 100 KHz (db) | Amplitude Flatness At Any Delay Setting (100 KHz to 5.5 MHz) (db) | Max Rise Time (Nano-Sec.) | Package Size (Inches)
--- | --- | --- | --- | --- | --- | --- | ---
VAR005 | 3-7 | Continuous | Trimmer | 20 | 25 | N.A | 3 x 1 1/2 x 1 1/2
VAR011 | 0-11 | Continuous | Trimmer | 20 | 25 | N.A | 3 x 2 1/2 x 1 1/2
VP0010 | 0.10-5 | 5 | Toggle | 15 | 2 | 3 | 4 x 2 x 1 1/2
VP0127 | 0.12-7 | 1.0 | Toggle | 15 | 3 | 14 | 4 x 2 x 1 1/2
VP0255 | 0.25-5 | 1.0 | Toggle | 15 | 2 | 16 | 4 x 1 1/2 x 1 1/2
VP0317 | 0.317-5 | 2.5 | Toggle | 15 | 3 | 20 | 4 x 2 x 1 1/2
VP0635 | 0.635 | 5.0 | Toggle | *50 | 4 | 25 | 4 x 1 1/2 x 2 1/2
VP1100 | 1.100 | 10.0 | Rotary | 1.25 | 4 | 30 | 4 x 1 1/2 x 2 1/2
VP1270 | 1.270 | 10.0 | Toggle | *500 | 4 | 30 | 4 x 1 1/2 x 2 1/2
VP2075 | 2.075 | 25.0 | Toggle | *500 | 5 | 40 | 5 x 4 1/2 x 3 1/2
VS0315 | 0.315 | 5.0 | Strap | 25 | 4 | 28 | 5 x 2 1/2
VS0635 | 0.635 | 5.0 | Strap | 50 | 5 | 32 | 5 x 2 1/2
VS1275 | 1.275 | 5.0 | Strap | 1.25 | 5 | 32 | 5 x 3 1/2
VS2075 | 2.075 | 25.0 | Strap | 2.50 | 5 | 40 | 6 1/2 x 3 1/2
IMPEDEANCE: 75 ohms.
Pulse Distortion: Less than 4% with an input pulse rise time of 20 nanoseconds.
Working Voltage: 100 volts maximum.
Return Loss: 20db minimum. 15db minimum for VP2075 & VS2075.
Delay Tolerance: 5% or 1 nanosecond, whichever is greater.

VIDEO FILTERS: NTSC Lowpass, Band Reject & Bandpass are our specialties.

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"It's about time."

TDM-8000
Audio Time Compressor

The TDM 8000 allows recorded audio material to be played back at faster rates than at which it was recorded, with the original pitch remaining unchanged. Its patented technology allows the TDM 8000 to handle the most complex program material, with the lowest possible distortion and minimum listening fatigue. You'll find the TDM 8000 will be invaluable for compressing video taped segments, first run movies, records, commercials, interviews, etc., to fit pre-determined time frames. And audience retention will actually be improved.

If you've been thinking that it's about time someone produced a truly workable and practical time compressor, the time has come for you to look into the TDM 8000.

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Circle (46) on Reply Card

Plant tour/assembly

head drum assembly is checked for roundness, and the diameter must be consistent or the part is rejected. Each day the tolerances are recalculated to account for changes in room temperature and humidity. These critical tolerances are recorded on a list that follows this product through to the final testing stage.

INTEGRATED SOUND SYSTEMS, INC.
29-50 Northern Blvd., Long Island City, NY 11101 (212) 723-8400
A Subsidiary of The VSC Corporation
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Circle (46) on Reply Card
Eighteen Continental superpower transmitters use EIMAC megawatt tetrodes for long life and reliability.

On the air now.
Continental Electronic's new superpower broadcast transmitters are on the air at four overseas sites providing extended coverage and 24 hour operation.

These rugged transmitters provide a fully modulated carrier output of one or two megawatts. Each transmitter bay employs one EIMAC X-2159/8974 tetrode as a carrier tube and a second X-2159/8974 as a peak tube. An EIMAC 4CW25,000A serves as a driver and three 4CW25,000As are used in a cathode follower class-A modulator stage.

Fourteen transmitters are now in service and four more will follow shortly. This speaks well for Continental's transmitters design and for their choice of long life EIMAC power tubes.

Contact EIMAC today for tomorrow's transmitter.
Follow Continental Electronics selection of EIMAC power tubes for your next transmitter design. From VLF to VHF, make EIMAC your choice. For full information write Varian, EIMAC Division, 301 Industrial Way, San Carlos, CA 94070. Telephone (415) 592-1221. Or contact any of the more than 30 Varian Electron Device Group Sales Offices throughout the world.
Plant tour/assembly

The assembly process is a complex one that involves the integration of machined parts and assembled electrical boards. At one time, the cameras and VTRs are built. Although several operators are involved in this stage, many assembly steps are performed by one operator. Thus, the production of broadcast equipment is not done in a typical assembly line fashion, but rather on an individual basis.

Systems adjustment/testing

Although testing is done after each step in the manufacturing process, all have not been shown. The results of these tests culminate in the production phase known as adjusting and testing. Here, for the first time, the completely assembled product is turned on and checked. Myriad minute adjustments must be made. A book full of checklists must be attended to item by item. The 1-inch VTR will have to move through five stations to check out all functions. Here the servo system is being checked, with the computer printing out the diagnosis. Next, the VTR will move to the audio test area and then to areas for testing other functions. Computers are also used to set up and adjust the cameras, and days are spent adjusting and testing each unit thoroughly.

thermal cycling

Every completed camera and

All the versatility you need:

Inovonics' MAP II and 215 satisfy all of your needs for multiband or broadband audio processing in AM or FM broadcast, audio production, or TV/film situations.

For multiband processing, MAP II's gentle 8-band compression, gain-riding A.G.C., and absolute peak controller for AM or FM make it the most versatile "single package" processor in the industry.

And our new 215 broadband processor combines three very affordable options in one package: a slow A.G.C., a smooth, average-level compressor and an AM or FM absolute peak controller.

Select all three, and the 215 stands alone as your complete audio-processing system. Or, select only the options that will complement the equipment you already have. For instance, the 215 chassis accepts MAP II's removable peak controller for split studio/transmitter operation.

Together — or separately — Inovonics' 215 and MAP II give you all the audio-processing versatility you need — at a price you can afford.

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Campbell, CA 95008

Telephone: 408 374-8300

Circle (48) on Reply Card

Broadcast Engineering September 1981
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...if you’re dedicated to picture excellence — specify Plumbicon* TV camera tubes.

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Plant tour/assembly

The recorder is put through cycles of temperature extremes. VTRs are taken from -20°C to 50°C and cameras are taken from -20°C to 45°C. The obvious reason for doing this is to simulate the worst conditions in which the end user might be called upon to operate the equipment. The units are placed inside a sealed chamber, put into operation, and then monitored by test equipment. After this process, the equipment is tested again. Some units are taken below -30°C, depending on the customer's requirements.

Final testing

All cameras are checked with video monitors and readouts from test equipment. During the final testing, each camera is set up in a small studio-type area complete with lights, registration charts and colorful props. The operator sees the image on the monitor and checks that against waveform monitors, vectorscopes and other test gear. The recorded images of the VTRs are checked on the monitor and on a VTR Tape Tester. Using this instrument, the operator can actually take a look under a microscope at the recording on the tape and verify that the VTR is recording correctly according to the SMPTE Type C format specifications.

These are the actual words that hundreds of professional end-users and dealers have used to describe their HME experience.

Who are our users? Academy Award-winning Hollywood mixers, network audio engineers and sound men for Broadway and Las Vegas productions. We'll send you a users list with product literature on request.

Once they tried our systems and compared them to the other wireless microphones, they bought HME. Call Dale Scott and ask for a demo. We know you'll buy an HME system too.
SIX OUTPUTS!

FR-660 MOUNTING FRAME
- Two rack units.
- Two plug-in power supplies.
- Looping inputs.
- Any mix of up to ten amplifiers.

FR-661 MOUNTING FRAME
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Full compatibility with 600 Series mounting frames and amplifiers.

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Leitch Video Inc., 1051 Clinton Street, Buffalo, N.Y. 14206
Tel: (716) 852-1535

Circle (52) on Reply Card
Plant tour/assembly

Packing/shipping
Cameras and VTRs are individually packed for shipping. By this time, there is a considerable investment in each unit. Numerous checklists accompany each camera or recorder because each will be individually checked out again when it reaches its first destination (for example, an Hitachi Denshi US import office) and again when it reaches its final destination (for example, an Hitachi Denshi sales/service location).

This is the final step in the manufacturing, but two supporting functions at the Koganei plant are worth mention.

Production engineering & research
Each plant has its own production engineering department. It is here that new ideas and designs are incorporated into the actual production process. Hand-drawn drafts of printed circuit boards are transferred to the computer where discs store various components libraries, as well as programs. The computer determines the optimum layout and makes the actual transparent original films that can later be used for production of printed circuit boards.

Also at the Koganei Works is an IC research area. In a special “clean” room, researchers test and develop new parts. By doing this at the plant site, new ideas can be incorporated into production models that are pulled off the line and used as test models.

“The Missing Link to Reliable Cart Music Reproduction Has Been the Cart...Not the Cart Machine.”

I’ve been using the Audiopak AA-3 at various stations for over two years, with gratifying results.

The AA-3 is capable of studio master music reproduction with excellent stereo phase stability.

It is durable and reliable in performance throughout its long life.

In my opinion, the AA-3 is the best cart we’ve tested.”

Elliott Klein
Corporate Director of Engineering, Buck Owens Broadcasting Group
Chief Engineer, KNIX AM & FM, Phoenix, AZ
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The Research Group
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Circle (53) on Reply Card
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Circle (54) on Reply Card
The AES convention replay

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

In the broadcast industry, audio has historically been treated as a means to an end, while, in the recording and sound reinforcement industry, audio is the end. However, as the state-of-the-art audio used by broadcasters improves with each passing year, the gap between broadcast audio and professional audio becomes narrower and the happenings at the Audio Engineering Society (AES) Convention become more important to broadcasters.

This year's West Coast Convention at the Los Angeles Hilton was one of the best and the following is a summary of some of the show's highlights that are of particular interest to BE readers.

For those who are using the Studer A-80 tape decks, Kdisc has introduced a plug-in improvement, the Kdisc 2572. This replacement output amplifier card reduces distortion by a factor of at least 10, improves signal-to-noise ratio by 10dB and increases the slew rate 16 times. Kdisc demonstrated the device by feeding test signals through a switch to either a standard card or the 2572 while monitoring the performance on a distortion meter and scope. This acid test graphically demonstrated the performance improvements that the little...
Just when everyone had their eyes wide open to the outstanding line of Ikegami broadcast and production color cameras, Ikegami introduced its color and B&W monitor line, engineered with the same innovative technology as its cameras. A great tradition of eye-opening continues with precision, quality and beautiful images.

The Ikegami color monitor line consists of the High Resolution Series RH Color Monitors and the High Performance Series 8 Color Monitors. The High Resolution Series RH Color Monitors are available in the 14" TM-14-2RHA and the 20" TM-20-8RH. Both provide precision color reproduction at 600 plus lines for professional studios, control rooms, remote vans, etc., and feature a high resolution CRT with High Density Dot Matrix, a switchable comb filter in the decoder, and the AFPC (Automatic Frequency Phase Control) system to maintain exceptional color reproduction. Both models are rack-mountable, with the TM 14-2RHA featuring plug-in circuit boards for easy maintenance.


The E&W Monitors are engineered to the same exacting Ikegami standards and are available in Triple 5", Dual 9", 5", 9", 12", 17" and 20" sizes.

Ikegami's Eye-Openers are available at most dealers. For details and additional information, contact Ikegami Electronics (USA) Inc., 37 Brock Ave., Maywood, NJ 07607, (201) 368-9171; West Coast: 19164 Van Ness Ave., Torrance, CA 90501, (213) 328-2814; Southwest: 350 North Belt East, Suite 223, Houston, TX 77060, (713) 445-0100; Southeast: 522 So. Lee St., Americus, GA 31709, (912) 924-0061.
plug-in device offers to owners of A-80 series machines. Shure is offering the new SM85 for close-up work. Introduced for the first time at the AES Convention, the SM85 is specially designed to reduce mechanical noises and boominess in hand-held applications, while delivering a clean midrange with a little peak at about 10kHz for crispness.

Orban Associates Inc. did not have anything new to show at AES, but the company plans to introduce a TV version of the 8100A Optimod by the first quarter of 1982. This should be good news for TV broadcasters because station techniques become more important as the audio quality of hardware, distribution systems and customer receivers improves. No model number has yet been assigned to the new unit, and official specifications are not ready, but the TV version will essentially be the same as the FM version, without the stereo generator. The gated AGC will also operate differently. The gain returns to -20 rather than -10 so that film chain noises during program pauses are not obtrusive. A prototype is being field tested in the San Francisco area and results thus far are impressive.

Otari showed its new MTR-10 2- and 4-channel mastering recorders, which offer super fidelity and unusual flexibility. Of particular interest to broadcasters are some of the built-in digital features designed to facilitate rapid testing. The machine contains built-in sine and square wave generators, as well as a special test function in which the machine goes through its various tape handling modes for quick functional testing on a daily basis.

Sontec exhibited limiters and digital cutter control equipment. Some broadcasters have undoubtedly wondered why Sontec has not adapted some of this equipment to FM broadcast application. Burgess McNeil, president of Sontec, said that the company would offer a high quality FM limiter featuring dc coupling where possible, polypropylene capacitors and the latest low T.I.M. active devices.

Inovonics demonstrated its line of acoustic test instruments. One device that may be of particular interest to broadcasters is the Model 500 acoustic analyzer. This unit packs a pink noise source and 30 one-third octave bands of graphic display into a 7.7kG package. The device provides a rapid means of acoustic testing, including reverberation analysis, and

3M documents digital TV spot
A documentary videotape demonstrating SMPTE compatibility of 3M's digital audio recorder, synchronized with its "C" format videotape recorder, was shown for the first time at the Audio Engineering Society convention at 3M's demonstration suite.

The 17-minute tape, entitled "The Day It Came Together," documented the creation of one of the first network TV commercials produced with digital audio. The audio was recorded at Sound 80 Studios in Minneapolis, using a 3M 30-channel pre-mix digital audio recorder.

The SMPTE-compatible system used a standard controller and a small prototype VCO box designed by 3M.
CREATIVITY TAKES FLIGHT ON AMPEX VIDEO TAPE.

BROADCASTERS AND PRODUCTION COMPANIES DEPEND ON AMPEX TAPE.

From videotape equipment to the video tape itself, broadcasters and production companies throughout the world depend on Ampex. High quality, durability, reliability, and prompt service are just some of the reasons.

Ampex 175 Highband Quadruplex Video Tape has proven itself under every conceivable type of operating condition within every video standard. Excellent color performance, low drop-outs, and a tough durable formulation with low headwear are features which have contributed to this dependability.

And now Ampex 196 High Energy Broadcast Helical Video Tape has been specifically engineered to fill the increasing needs of a particularly demanding group of video professionals—those who have chosen one of the new broadcast helical VTRs.

No matter what your video tape needs are, there’s an Ampex video tape for you. And, once you’ve tried Ampex tape, you’ll see why broadcasters and production companies have grown to depend on Ampex.

AMPEX

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Circle (57) on Reply Card
There's nothing fancy about the Knox K50. It's reliable; it's economical; it's basic; the simplest machine we make. Come to think of it, it does have an independent preview channel... and shadow-edged characters... and a flash function... all as standard features. Maybe it's fancier than we thought.

A DIVISION OF COMPUTER OPERATIONS, INC

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Circle (58) on Reply Card

AES

provides an instantaneous overview of electronic equipment response. This kind of test equipment is put to good use for tape deck alignment because a change in high frequency response due to a bias adjustment is immediately apparent, and quick correction for the new curve is possible. The Gotham audio display of EMT broadcast products attracted a lot of attention at the show. The company

AES/Los Angeles Site of Major Audio Exhibits

Traditionally, the AES Technical Meeting and Exhibit provides a forum for manufacturers to bring their equipment to the attention of broadcasters and recording specialists. An early list of these exhibitors appears on Pages 28-32 of the April issue of Broadcast Engineering.

To illustrate how companies prepare for this show, BE took a look at what one firm, Eventide Clockworks, exhibited in Los Angeles:

- H949 Harmonizer: features pitch change, time compression/expansion, delay, reverb effect, flanging, time reversal and repeat. Options for the H949 include: mono or polyphonic keyboards; remote control board; and the PTC945 Precision Tape Controller to provide a time-squeeze system for audio, video and film producers.

- BD955 Broadcast Digital Audio Delay Line: offers memory capacity to delay signals up to 6.4 seconds; incorporates a special "catch-up" feature to eliminate need for a taped jingle or announcement.

- SO2016 Programmable Effects Processor: features reverb, Digi-plex echo, chorus effects, full bandwidth delay—16kHz, selective band delay, flanging and phasing, classical digital filters, full stereo operation, software subscription service and user-interactive controls. Many manufacturers exhibited impressive products at the AES show. The exhibitors will be glad to provide detailed data sheets upon request. You may request material by using the exhibitor list from your April issue and addressess/phone numbers from the September BE Buyers' Guide.

AES

Do it with style. Better still, do it with three styles. Knox calls it Multifont, and it's built into each Mod-16 character generator.

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

It's just one of the features standard with every Mod-16. It's also by Knox. Plain enough?

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62
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Today, one out of every two broadcast cartridge machines purchased worldwide is an ITC Premium Line machine. Now, four new features make this first-choice line an even greater value.

Improved Frequency Response
The head is new. The open-faced design is cylindrically shaped rather than hyperbolic. MuMetal laminations are surrounded by epoxy filler impregnated with alumnum oxide particles for shielding and durability. Core windows are wider than conventional designs. The end result is greatly improved frequency response without low end humps and bumps.

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True center pivot design. Azimuth, zenith and height adjust independently. Locking one does not affect the others. Steel ball pivots and longer azimuth arms permit finer tuning.

Improved Tape-Head Alignment
New cartridge positioning system assures precise, rigid alignment of tape to head even when insertion is hurried or careless.

Long-Life Pressure Roller
The 525K pressure roller offers twice the pulling power and extended life. Tolerates common cleaning chemicals. Holds its durometer even in high humidity.

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Circle (60) on Reply Card
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Up to 24 Inputs □ All Inputs & Outputs Balanced □ QM-8P, 4 Stereo Channels standard, 0, 2 or 6 optional □ QM-12P, 4 Stereo Channels standard, 0, 2, 6, 8 or 10 optional.

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Pressure molded fiberglass transit cases, valise cases and extra-heavy-duty cases... lightweight, incredibly durable protection for your delicate electronic equipment. Now available in shorter lead times from our stock case catalog... 62 standard sizes from 9.8 X 5.5 X 5.0 inches up to 30.25 X 26.25 X 28.0 inches...

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Circle (61) on Reply Card

AES

provided construction details of the rugged EMT 948 broadcast turntable with its massive deck and plug-in electronics. The preamp accepts either moving magnet or moving coil cartridges and provides state-of-the-art performance.

One of the most impressive systems available for review was the Matsushita electronic digital audio recording system, marketed in the United States by Technics, featuring 0.05% distortion and more than 90dB of dynamic range. It could easily reproduce anything that one could find to feed into it. The Technics R & B series professional speakers continued to impress auditioning audio engineers with their flat response and clean reproduction. Their relatively small size makes them ideally suited to broadcast monitoring applications requiring high performance speakers.

The new Audtronics' 200 series on-air broadcast mixing console was displayed along with one of its large recording studio cousins, which made it look diminutive by comparison. However, it boasts better performance than many much larger and more expensive boards. Distortion is typically less than 0.04% and the line input signal-to-noise ratio is 83dB with a minimum of 30dB of head room.

White Instruments Inc. featured an attractive display of the company's one-third octave analyzers. For those desiring greater resolution, the White system 200 signal analyzer is available in a one-sixth octave version. The system 200 is an extremely flexible test instrument with eight non-volatile memories to allow accumulation of maximums and easy photographic documentation.

The equipment mentioned here represents a sampling of items at the AES meeting that will have a special appeal for broadcasters. Each attendee could find many more items on display at the show applicable to his or her broadcast station. There is no substitute for being there, so this review might encourage you to attend future conventions. The next show is scheduled for Oct. 30 – Nov. 2 at the Waldorf-Astoria in New York.

If there is any criticism of the AES convention, it has to be the lack of facilities for doing critical monitoring of equipment demonstrated at the hospitality suites. In many cases, exhibitors attempt to “out blast” each other, thus producing about a -40dB acoustic noise floor, making it impossible to hear the low distortion and noise characteristics of the equipment on display. Soundproofed listening environments for the equipment demos would be highly desirable.
Leddicons assure you dynamically faithful pictures over a long life, and they are rugged.
That is why Leddicons are used in virtually every country, and by the major networks and television camera manufacturers worldwide.
If you want to improve your image, call or write for all the facts about our 2/3", 1" and 30mm Leddicon tube family.
Also ask about our Vidicons... the image standard for color telescine.
On July 29, 1981, an estimated 800 million viewers around the world watched the Royal Wedding ceremony of Lady Diana Spencer and his Royal Highness Charles Philip Arthur George, Prince of Wales.

I shared in the excitement of those viewers, however, the pageantry thrilled me for reasons beyond the glamor of the event. Eleven days before the wedding, I traveled the route from Buckingham Palace to St. Paul's Cathedral, observing the setup to be used for TV coverage. Later, when a camera shot was shown on the screen, I knew where the camera had been positioned. Because of this, the ceremony merely added action to the stage making the Royal Wedding an exciting review of beautiful London and the cathedral.

My only surprise was at the end of the ceremony when the cameras showed a glimpse inside Buckingham Palace. This was the first time the world had viewed the Palace's chambers on television.

Even the sophisticated technology of cameras could not duplicate the beauty of the cathedral; there is no way to capture its magnificence on camera. To walk its aisles and side chapels is to stroll through England's history. Its beauty must be seen on location to be fully appreciated.

Teletext and captioning
But I was not in England to see preparations of the Royal event. I was invited by the British Consulate General to visit English companies to research the British advances in teletext and captioning for the hearing impaired. Although it was not expected, it turned out to be a combination of the three (the wedding, teletext/viewdata and captioning). Through coverage of the event, they were all linked to advance the technology for broadcasters and the public.

During my tour of England, I visited with people involved in all aspects of the teletext/viewdata and captioning technologies. Upon returning to the United States, I followed up this research by visiting with Field Electronic Publishing and WFLD-TV 32 in Chicago. In England, I saw maturing teletext and viewdata industries along with rapid acceptance of the British Teletext and Prestel-type technologies forming in Europe and Scandinavia. In Chicago, I saw adaptation of the British teletext development to US needs, on an experimental basis.

MICS THAT DON'T JUST MEET INDUSTRY STANDARDS BUT SET THEM.

The two mics shown here are obviously as different as a transistor is to a transformer. One is the smallest type we make, the other the largest. One goes on camera, the other off. Yet the Sony ECM-50PS lavalier mic and the Sony C-76 shotgun (both with conventional battery and phantom power source operation) have one thing in common. Sound engineers throughout the world consider them the standard of excellence.

So before you buy your next lavalier or shotgun mic, we ask you: "Would you rather have the microphones made by a follower, or the microphones made by a leader?"
For the acoustician, the broadcast engineer, the recording and maintenance engineer, the audio educator/student, the audio manufacturer, the professional audio distributor, literally anyone who needs precision audio instrumentation to do a myriad of jobs can benefit by owning UREI's 2000 Series instruments.

The foundation of the 2000 Series consists of two plug-in mainframes: The Model 200 K-Y Recorder for hard-copy graphs, and the Model 201 for use with scopes or existing X-Y recorders. Add to either of these rugged mainframes the following plug-in test modules:

- Model 2000 Frequency Response Module (shown in 200 X-Y Recorder)
- Model 200 Level & Frequency Detector Module
- Model 2019 D.C. Input Module

Add to either of these modules the following accessory modules:

- Model 20 Warble Generator
- Model 21 Mic Preamp/Warble Generator

With the proper combinations of these easily set-up components, the audio engineer can perform hundreds of vital technical evaluations.

To name just a few:

- Acoustical room analysis
- Loudspeaker measurements
- Tape recorder measurements
- Equalization and filter measurements
- Telephone line measurements
- Delay line, cartridge/stylus, optical/magnetic head and complete audio systems measurements

Check out the inexpensive, precision Series 2000 building-block audio analysis system. It could be handling the majority of your audio measurements and telling you things you need to know.

From One Pro To Another — Trust all your audio requirements to UREI.
Teletext/viewdata

Together with some exciting and innovative plans.

In this report, the first of a series on the emerging teletext and viewdata, I merely want to touch on the highlights of the research conducted. Succeeding reports will cover details of work completed in England and in Chicago that illustrate how these technologies may shape the future of broadcasting and business communications.

Resources visited

The status of teletext/viewdata

Field Electronics Publishing (FEP) in Chicago has a qualified staff, is well equipped and foresees a bright future for US teletext. Signals go out over station WFLD-TV32 in Chicago. Experiments will soon include full-field teletext.
No excuses

In EFP or ENG, getting the shot is everything.

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

The more than 2,000 HL-79's in service today have set new industry standards for low light level performance, well-balanced handling and unprecedented reliability. But Ikegami never rests. Now, the best ENG camera is even better. The improved HL-79D Series features an advanced FET preamp that (depending on your choice of tubes) will deliver a 2 to 3 dB gain in signal-to-noise ratio. The HL-79D Series is available in four new, application-matched configurations that include high resolution diode-gun or low capacitance diode gun tubes.

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

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

Technologies in England have been gained through nine years of development. Now both fields are maturing remarkably fast, but in significantly different ways.

Broadcasters and researchers

My research efforts encompassed works in progress at the following organizations:

- Southampton University—developing equipment for captioning for the hearing impaired and researching techniques to optimize subtitling for end users.
- BBC—creators of the CEEFAX teletext data base for channels BBC-1 and BBC-2.
- London Weekend Television—creators of ORACLE, the independent TV teletext data base soon to begin commercial trials.
- British Telecom Research Laboratories—the "Bell Labs" of England, the brains behind equipment and techniques for the British Prestel system.

Manufacturers/consultants

I also researched the following manufacturers and consultants, who had works in progress:

- Alpha Numeric Keyboards—equipment developers for the Stock Exchange viewdata systems.
- Jasmin Electronics—equipment developers for Prestel viewdata systems.
- Mullard Ltd.—developers of the LSI chips that make teletext and viewdata systems practical, including the French Antiope system.
- Philips Croydon—manufacturers of teletext consumer TV sets.
- Thorn Consumer Electronics—manufacturers of teletext consumer sets.
- VG Electronics—developers of viewdata equipment.
- Logica—consultants and equipment developers to spearhead worldwide adaptation of teletext and viewdata technologies, with strong activities in the United States.
- Bernard Rogers—technical consultant to the British Department of Industry in matters regarding teletext.

Commercial data bases

These commercial data bases were researched:

- Vehiext—data base operated by the Birmingham Post and Mail newspaper.
- Finnert—data base in London specializing in financial data.
- Prestel—data base operated by the British Post office.
- Eastel—data base in Norwich serving the farming industry.
- Sealink—data base tabulating schedules of the firm’s commercial ships.
- Stock Exchange—operators of its own financial data base.

Much more information will be presented about the involvement of these organizations in developing the British teletext and viewdata technologies as this series continues.

Highlights

The Royal Wedding, teletext, viewdata and captioning for the hearing impaired— all tied together in an interesting manner. No other event in recent history has so sparked worldwide interest as has the Royal Wedding, with the possible exception of the astronauts landing on the moon. Riding on this high level of public interest, operators of Prestel, CEEFAX and ORACLE carried up-to-the-minute schedules of wedding events for their viewers.

In terms of captioning for the hearing impaired, both BBC and ITV carried the wedding procession with real time subtitles. This marks only the second use in history of real time subtitles, the first being for Reagan's inaugural Address. Different techniques were used by the two networks for this work, and the equipment used will be detailed later in this series.

In terms of industrial maturity, the growing acceptance of British teletext and viewdata technologies is impressive. By the end of this year, about a quarter million home receivers are expected to be equipped with teletext decoders. Most of these will be built-in, but there is a reasonable market for adaptor devices for existing sets as well.

October has been designated Teletext Month in England to commemorate the industry's achievements and to further acquaint the public with the system's features.

In this country, enthusiasm is high in Chicago for the success and public acceptance of teletext. Although it started late, Field Electronic Publishing (FEP) is gearing up to provide a viable service, and bold experiments are planned to spur growth.

As this issue goes to press, FEP is planning full-field teletext experiments for mid-August, the first tests of this type.

In the coming series on teletext/viewdata, Broadcast Engineering will expand on worldwide technological developments. Readers may wish to express their thoughts on these new and rapidly evolving fields. Those wishing to do so should address comments to our Teletext Editor, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212 for inclusion in the series.
For the second year in a row, Scotch® 479 won the award for the best picture of the year in a test of one-inch video tapes.

We scored well in all of the twelve categories tested, but especially well in the categories that commonly represent picture quality: color dropouts, high frequency dropouts, chroma noise, signal-to-noise ratio and stop motion.

These were scientific, quantitative tests, conducted as you would conduct them yourself, with no room for brand bias. The meters didn't play favorites. The standards were the same for every brand tested. And we tested every brand.

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Our quality has always been consistent from the first replay to the last. In fact, our sophisticated binder and oxide coating are more advanced than the binders and oxides on some quad tapes. They had to be advanced to meet the special durability demands of one-inch video production.

So choose Scotch 479 for your one-inch video production. You'll find it looks good from repeated mastering all the way through post production. And we've seen the test results to prove it.
This concludes an article on state-of-the-art FM audio by Robert Orban. Last month the article provided information on disc reproduction, tape and audio system considerations. This section focuses on production practices.

The role of the production studio varies widely from station to station. If the production studio is used only for creation of spots, promos, IDs, etc., then quality requirements are considerably relaxed compared to a production studio in which programming is transferred from disc to tape or cart. Our discussion centers on the latter case.

Choosing The Monitor Loudspeakers

The production studio monitor system is the quality reference for all production work, and thus, the air sound of the station. Considerable care in choice of equipment and its adjustment is necessary to assure a monitor sound that can be relied upon.

The loudspeakers are the single most important influence on quality. They should be chosen to complement room acoustics. In general, a production studio is fairly small, and bookshelf-sized speakers must be used because of space limitations.

It is desirable to assess the effect of equalization or other "sweetening" on small speakers to make sure that excessive bass or high frequency boost has not been introduced. Such equalization errors may sound spectacular on big, wide-range speakers, while sounding terrible on small speakers with limited frequency response and power-handling capacity.

The Auratone Model 5C Super Sound Cube is the most common speaker used in the recording industry as a small-speaker reference. I recommend that every production studio be equipped with a pair of these speakers and that they be used regularly to assure the production operator that his work will sound good on table and car radios.

The main loudspeakers should be chosen for high power-handling capacity, low distortion, high reliability and long-term stability, controlled dispersion (omnidirectional speakers are not recommended), good tone burst response at all frequencies, lack of cabinet diffraction, relatively flat axial and omnidirectional frequency response from 40-15,000Hz, and physical alignment of drivers such that if all drivers are excited simultaneously by an impulse, then the resulting waveforms arrive at the listener's ears simultaneously (sometimes called phase-linearity).

Some feel that the professional bookshelf-sized monitors do not meet all of the criteria and that certain audiophile speakers are more accurate. An informed choice can be made by reading the loudspeaker reviews in High Fidelity and Audio magazines. In my opinion, the loudspeaker reviews in the underground publications are useful food for thought (and usually amusing to read) but entirely too subjective and unscientific to be relied upon as a sole guide for choosing a speaker.

Ultimately, the reviewers must be corroborated by your own listening tests. Your local discount hi-fi em-

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FM audio

porium is not the place; the high-line audio salons tend to have more knowledgeable and helpful salespeople as well as better listening conditions.

Loudspeaker Location

The bass response of the speakers is strongly affected by their location in the room. Bass is weakest if the speaker is mounted in free air, away from any walls, and strongest when it is mounted in a corner. The corner location is probably against a wall at least 18 inches from any junction between walls. If the bass response is weak at this location because the speaker was designed for wall-junction mounting, it can be corrected by equalization.

It is important that the loudspeakers be mounted so as to avoid acoustic feedback into the turntable, as this can produce a severe loss of definition and muddy sound.

Loudspeaker Equalization

The performance of any loudspeaker is strongly influenced by its mounting location and room acoustics. Provided that room acoustics are good, the third-octave real time analyzer provides an extremely useful means of measuring any frequency response problems intrinsic to the loudspeaker, and of partially indicating problems because of loudspeaker placement and room acoustics.

By their nature, the third-octave measurements combine the effects of direct and reflected sound and may be misleading if room acoustics are unfavorable. Problems may include severe standing waves, reverberation time that is not well-behaved as a function of frequency, insufficient number of normal modes (Eigen-modes), lack of physical symmetry and a number of other problems which, if discussed in adequate detail, would fill several magazines.

There is a technique of measuring the loudspeaker/room interface, called Time-Delay Spectrometry (TM), which provides much more information about acoustic problems than does the third-octave real time analyzer. A certain number of sound contractors are now licensed to practice this technique, which is used primarily in tuning recording studio control rooms. The cost may be prohibitive for a small- or medium-sized station, particularly if measurements reveal that acoustics can be improved only by major modifications to the room.

Thus, the third-octave real time analyzer is probably the best com-
promise for the typical radio station. If the station does not have a third-octave real-time analyzer and pink noise source, these can usually be rented from a local sound contractor or instrument rental house. To obtain meaningful results from the analyzer, the calibrated microphone that comes with it should be placed where the production engineer's ears would ordinarily be located. Each loudspeaker should be excited in turn with pink noise, and the acoustic response observed on the analyzer. To obtain meaningful results from the analyzer, the calibrated microphone that comes with it should be placed where the production engineer's ears would ordinarily be located. Each loudspeaker should be excited in turn with pink noise, and the acoustic response observed on the analyzer.

I recommend the use of a dual-channel third-octave or parametric equalizer to tune the monitor system. The equalizer should be adjusted per manufacturer's instructions to obtain a real-time analyzer readout that is flat to 5kHz and rolls off at 3dB/octave thereafter. (A truly flat response is not employed in typical loudspeakers and will make most records sound un-naturally bright and noisy.)

If the two channels of the equalizer must be adjusted differently to obtain the desired response from the left and right channels, this indicates room acoustic problems or poorly matched loudspeakers. The match is easy to check; just substitute one loudspeaker for the other and see if the analyzer reads the same.

It is revealing to move the microphone over a space of two feet or so while watching the analyzer to see how much the response changes. If the change is significant, then room acoustic problems or very poorly controlled loudspeaker dispersion is indicated. In this case, you should measure the response at several positions and average. (There are devices called microphone multiplexers available to do this automatically. They require the use of several microphones, and they average the microphone outputs in a phase-insensitive way.) Although it is permissible to adjust left and right equalizers differently below 200Hz, they should be set close to identically above 200Hz (to preserve stereo imaging), even if this results in less than ideal curves indicated on the third-octave analyzer. In this case, the limitations of this analysis technique (as described previously) are coming into play.

Other Production Equipment
My general comments on disc reproduction, tape and electronic quality apply equally to the production studio. It is preferable to install audiophile-quality phono cartridges, arms and turntables here, and to be certain that one person has responsibility for production quality and for making sure that the record playing equipment is not abused. The use of a single production director will also help achieve a consistent air sound, which is an important contribution to the big-time sound desired by many stations.

Although some people still swear by certain classic vacuum-tube power amplifiers (notably those manufactured by Marantz and McIntosh), the best choice for a monitor amplifier is probably a medium-power (100W/channel or so) solid-state amplifier with a good record of reliability in professional applications.

It may be tempting to dust off an old Gates or RCA vacuum-tube or low-powered solid-state power amplifier and place it in service as an economy measure. Don't. And do not use the monitor amplifiers built into your console either; they are usually so underpowered that considerable clipping will occur at high (but not dangerous, painful or unrealistic) monitor levels.

Production Practices
The following represents my opinion on production practices. I am aware that certain stations operate...
FM audio

Under substantially different philosophies, but I feel that the recommendations below are rational and offer the best hope of achieving consistently high quality.

1. Audio processing should not be applied in the production studio. A good on-line processor provides all the processing necessary. Any further compression is not only undesirable, but also is likely to be very audible. If the production compressor has a slow attack time (thus producing overshoots that can activate gain reduction in the on-line processor), it will probably “fight” with the on-line processor, thus yielding air sound that is substantially worse than one might expect given the individual sounds of two units.

2. Substandard recordings may be “sweetened” with equalization to achieve tonal balance more typical of the best current product. However, excessive treble boost (to achieve a certain sound signature for the station) must be avoided if 7.5ips tape is used, because the tape is subject to high frequency saturation because of the high frequency boost applied by the recorder’s equalization network.

Substantially more freedom can be obtained by using a combined compressor/limiter/HF limiter between the output of the production console and the input of the tape recorder or cart recorder. By adjusting the input attenuator on this device such that broad-band gain reduction never occurs when the console VU meters are peaking normally, only high frequency control will ordinarily occur, thus preventing high frequency tape saturation without adding unwanted broad-band compression. However, the broad-band compressor will come into play to prevent tape overload if the console output level is peaked too high.

3. A compandor-type noise reduction system should be used on all taped material (see section on tape).

4. Even greater care than that employed in maintaining on-air equipment should be used in production studio maintenance, because quality loss here will appear on the air again and again. The production director should be acutely sensitized to audible quality degradation and should immediately inform the engineering staff of any problems detected by ear.

5. Ideally, tape machines with noisy motors should be installed in alcoves under soffits, surrounded by acoustic...
treatment to prevent motor noise from leaking into the production microphone. In the real world of budget limitations, this is often not possible. Even in an untreated room, it is possible to use a directional microphone, such as a figure-of-eight, and to place the noisy machine on the dead axis of the microphone. Choosing the frequency response of the microphone to avoid exaggerating low frequencies will help. In particularly difficult cases, a noise gate or expander can be used after the microphone preamp to shut off the microphone except during actual speech.

Audio processing can be profitably applied to the microphone channel to give the sound more "punch." Suitable equalization may include gentle low and high frequency boosts to "crispen" sound, aid intelligibility and add a big-time quality to the announcer. But beware of using too much bass boost; it can degrade intelligibility. Effects such as telephone and transistor radio can be achieved with equalization, too. Octave-band graphic equalizers offer a good compromise between cost and flexibility in this application. For ultimate flexibility and power, a parametric or parametric/graphic equalizer can be installed.

The "punch" of production material can often be enhanced by tasteful application of compression to the microphone chain. But avoid using an excessive amount of gain reduction and excessively fast release time, lest room noise and announcer breath sounds be exaggerated to grotesque levels. (This problem can be minimized if the compressor has a built-in expander or noise gate function.)

The close-micing customary in the production studio can exaggerate voice sibilance. Also, many women's voices are sibilant enough to cause unpleasant effects. If high frequency equalization and/or compression are applied, sibilance will be further exaggerated.

These problems can be effectively controlled by means of a dedicated deesser located after all other processing in the microphone chain. If the deesser has a built-in mic preamp, it may make installation easier.

This article has touched only the surface of the techniques necessary to achieve audio quality in FM broadcast comparable to a typical high-end home stereo system. Because of the built-in limitations of the FM medium, audio quality equal to that delivered by state-of-the-art audiophile equipment from top-quality discs or master tapes cannot be achieved, even if the signal entering the input terminals of the processor lives up to that quality level. This fact provides a useful guide to evaluating the cost effectiveness of any equipment and/or techniques that are proposed to improve quality. In particular, it leads to the conclusion that today's high quality IC opamps are ideally suited as amplification elements in broadcast. Compromises in disc playback and tape are far more likely to be audible on the air, and extreme care must be used.

Maintaining a high level of on-air quality is a difficult task, requiring continued dedication and cooperation between air talent and engineering. With the constantly increasing quality of home receivers and stereo gear, the results of such dedication and cooperation are more and more easily perceived by the radio audience. One suspects that in the future, FM will have to deliver a state-of-the-art signal in order to compete successfully with the many other program sources vying for audience attention including videodiscs, digital audio, subscription television, direct satellite broadcast and many others.

The future belongs to the quality-conscious.

---

Engineers praise Auditronics' 200 Series on-air console because it's built like a military computer with a module/motherboard design that eliminates unreliable point-to-point wiring. They praise the 200 because they can install and maintain it while comfortably seated. They praise its +30 dBm output capability. They praise its Hall-effect/CMOS silent switching that reduces failures to virtually zilch. And they praise its drop-in design that makes module replacement a two-minute pleasure. If you'd like to know what else engineers praise about the Auditronics 200 Series on-air console, circle reader number or call 3750 Old Getwell Road, Memphis, TN 38118 (901) 362-1350 Circle (77) on Reply Card
Field test report: Vanguard videotape editor

By Dick Scott, president, Scott Video Systems, Tampa, FL

Datatron model SL2100E switcher is slaved to the Vanguard for dissolves and wipes. The Vanguard has total control over the switcher and automatically sets it up for the programmed effect when either a preview or actual edit is made.

In April 1980, Scott Video Systems Inc. was contracted by Video Productions Ltd., (VPL) for system design, purchase of equipment, installation and maintenance of a new production facility in Tampa, FL. Post-production editing was to be the primary service offered by the company, so the system had to be competitive with other production houses across the country. Because there were a number of good editors on the market, it was no easy task to decide which editor was best.
suited to meet the needs of VPL.

I looked at the editing systems offered by major manufacturers at the 1980 NAB show and narrowed the choice according to price tag specifications and delivery time. I needed a system in a given price range that could control three Sony BVH-1100 1-inch videotape machines, could interface to a switcher, and could use SMPTE time code. Delivery had to be possible within two or three months. The final decision was to buy the Datatron "Vanguard," which stayed within the allotted price range, controlled up to four play and one record VTR machines, allowed the required switcher interface, used SMPTE code for frame accuracy, and promised delivery within the specified time.

Some of the features offered by Vanguard that helped VPL make the decision included capability of changing machine sequences easily by pushing a few buttons on the keyboard, auto-assemble, scratch pad memory, programmable postroll, preroll and reaction times, as well as edit-out time exchange.

The Vanguard system arrived within a couple of weeks of the delivery date set at the time of purchase. The equipment, well-packaged, arrived undamaged. Datatron's policy

This is a view of Video Productions Ltd.'s editing suite. In the foreground are the Datatron Vanguard and SL2100E switcher along with the disc drive unit and teletype that are used for storing and saving an edit list. In the background are the Datatron time code generator and time code readers in the rack between the three Sony BVH-1100 type "C" 1-inch videotape machines. The Vanguard controls the Datatron switcher and all three Sony tape machines. The mainframe for the Vanguard is just out of sight in the bottom of the rack. The three racks on the left in the background contain all the system support equipment (DAs and sync generators). The center of the three racks contains the electronics for the American Data studio switcher and 10 routing switchers.

This view of the VPL system shows the RCA console on the left. The master monitoring equipment is shown on the right side of the console, and two of the three Ikegami HL79A camera control units and monitoring are on the left side.

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Station owners buy Auditronics' 200 Series on-air console because they know over 99% of all Auditronics broadcast consoles ever built are still in active, everyday service. Owners buy Auditronics because they know they can hire better on-air people if they give them state-of-the-art equipment to work with. They buy Auditronics consoles because we can ideally equip everything from a 250-watt daytimer to a major network facility, including on-air, production and remote truck models. They buy Auditronics because they know the 200 Series console will outlast its competitors and be worth more at resale. If you'd like to know more about why station owners buy Auditronics, circle reader service number or call

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Vanguard requests that the customer does not break the seal on the boxes, because Datatron sends a field engineer to unpack, install and check out the system. For VPL, Datatron sent several engineers, because the system involved serial number 1 in the field, and they wanted to make certain things went well.

The installation proceeded smoothly until, on the second day, the main program chip blew. Some lint picked up by the blowers and forced into the card nest across wire wrap pins created a static buildup that damaged the chip. The factory air-shipped a new device to cure the problem. However, because there are no filters on the blowers, this remains a source of potential problems. Lint and dust can (and do) build up inside the unit. The best solution, beyond adding filters, is to keep the unit in a clean environment and to take it apart routinely for cleaning.

Although I don’t like having serial number 1 of anything, this equipment has caused fewer problems than some equipment available on the market for years. This demonstrates good quality control and the fact that the Vanguard is an expanded version of the Datatron "Tempo," which has been in production since late 1975. There are continual improvements being made even over the last few months, with several features now offered that were not available on the original model. The most noteworthy are slo-mo editing and the delayed source effect. [Datatron holds the registered trademark on the Smart-Scan program, which includes these two features.]

**Smart-Scan**

On a recent trip to the Datatron factory, I was given the chance to evaluate Smart-Scan with a hands-on editing session. The Vanguard system was attached to two Sony BVH-1100 and one Hitachi HR-200 type C machines, and was interfaced to a Grass Valley switcher. When using slo-mo editing, the play VTR goes into the "learn mode" at the edit-in time. In the learn mode, every motion made by the keyboard Varascan control level is stored in memory. Speeds (from 1/30 to 2 times play forward and 1/30 to 1/2 speed reverse), as well as direction, are memorized. When the operator previews or performs the edit, every move made manually is repeated exactly the way it was performed during the learning. But if you do not like what you did the first time, you can instruct Smart-Scan to "relearn" until the proper action is achieved.

Freeze-frame editing is available as well, but is actually a less complex procedure because all the VTR has to do is go into the freeze mode at the edit-in point. The freeze, however, can only be held, using a BVH-1100, until the machine times out and drops tension on the tape—approximately 3-3½ minutes, which is more than adequate for most freeze-frame applications. And if it is not, you can exchange the recorder times and add to the "still" for as long as necessary. Because I was pleased with the operation of Smart-Scan, I plan to incorporate that feature into the VPL system in the future.

The delayed source effect allows the operator to make one less edit when going from a cut through a dissolve. The operator programs in the delay from the cut edit-in time to the dissolve point. For example, if 10 seconds are needed on the "A" play machine before a dissolve to the "B" machine is desired, the 10-second delay time is programmed into the system. The procedure previously took two edits, one to get to the dissolve and the second to include the dissolve. Delayed source effect saves editing time.

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"Our Sony BVE-5000 editing system is unbelievably reliable," says Randy Cohen, vice president and editor for Broadway Video.

"Amazing that Sony could come up with a state-of-the-art computerized system on its first try," Cohen continues. "And because it's specifically designed for one-inch, it lets me do more with my equipment than other editors."

Broadway Video is both a production and post-production facility in New York City. Its recent credits include "The Best of Saturday Night Live," major political campaigns, promos for the cable network Showtime, and a variety of industrial shows.

"The BVE-5000 worked right out of the box and has been performing flawlessly ever since. With no problems of any kind. Unlike some other systems, whose manufacturers wait for customer complaints to get the bugs out, instead of thoroughly testing their equipment before it's sold.

"With its simplified keyboard, the BVE-5000 is
Easier to use, too. It has saved me 25% to 50% of the time other systems require. And since you don't have to be mechanically oriented to use it, the editors can be artists rather than technicians.

"Other advantages include variable search, dual audio, vertical interval time code. And the ability to interface with a wide variety of switchers.

"I'll be buying more Sony equipment in the future. Because there are enough reasons for indigestion in this business without machines that hiccup and burp."

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Sony is a registered trademark of Sony Corp.
Vanguard

Another feature of the new program, auto-exchange, will automatically exchange the edit-out time of the record VTR or play VTR at the end of each edit to an edit-in point for the next segment. This may be selected from the keyboard. Auto-
FUJINON ENG/EFP and BCTV lenses...to improve your image.

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For the new VTR/Cameras, Fujinon is first again, including two new full-featured, lightweight lenses for ⅛-inch format.

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Vanguard

exchange and delayed source effect are part of the same program included with the slo-mo editing Smart-Scan program. Although the program has been installed in the VPL system, giving the company's equipment all the up-to-date programming of the latest Vanguard systems, slo-mo editing does require some additional circuit cards as well as the program change.

A further update in the original machine is the capability of using either disc or teletype to dump a program without making wiring changes. The original equipment accepted only one or the other. The feature for either output is now standard on new units. The dump may be made on industry standard ASCII punched paper tape, on a hardcopy printer, floppy disc or through the RS232C TTY interface. Previously stored information can be read into the editing system from any of those sources as well.

Factory support

After installation, I looked for factory support. Datatron has performed well in this area also. The field engineers will try to help by phone, but if that does not work, a field engineer is usually on his way the same day. The company has lived up to its warranty, and in some cases surpassed it. There have been very few problems with the Vanguard system at VPL and the down time of the system totals approximately one hour in eight months of operation. That hour involved an intermittent in the keyboard. The factory replaced the entire keyboard.

Another important factor is documentation. The manuals supplied with Vanguard are more than adequate. The operations manual is excellent. Every aspect of operation is explained in detail. Schematics are fairly complete, but there is no theory of operation or alignment procedures. The only adjustments to be made in the Vanguard deal with machine control. Because the system may be used with many different types of machines (more than 40 different makes and models of 2-inch quad, 1-inch Type C, ¾-inch cassette and multi-track audio, as well as the Rank-Cintel flying spot scanner), the factory has not printed alignment procedures for the interface cards. This is somewhat understandable, because they may change with machine changes. However, the customer should be provided with the alignment procedure for the interface cards used with a particular system. (Datatron promises to correct this situation.)

System limitations

So far I have pointed out what I like about the system. Now, for the few problems I have found. The major difficulty is in color framing when making dissolves and wipes. Vanguard color frames the record machine, but it will only sync the players. This may cause H-shifts when doing dissolve or wipes, because a 50/50 chance exists of hitting the proper color frame on each player. The technology is available to solve the problem if the designers will work on this single big-

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gest flaw in the entire system.

There is a way of getting around these H-shifts and getting the machines color framed properly. The procedure, suggested by Thom Belford, a field engineer for Datatron, involves several test edits to determine a frame relationship between the editor, the record VTR and play VTRs. First, a time coded tape is placed on the record machine. Then a cut insert is made, preferably using color bars. The duration of the edit is not critical. After exchanging the record edit-out time, another cut edit is made to the same color bar source. If, while playing back the edited cuts, an H-shift occurs, it means the editor and record VTR are not on the same frame. This is corrected on the Vanguard by going into utility mode and changing the system to the other frame. Once the editor and record VTR are aligned, the relationship will not change as long as a continuously time coded tape is recorded. Should the tape on the recorder be stopped while recording, then restarted, the relationship will need to be re-established.

Next, the frame relationship must be made between the play VTRs and the Vanguard. The first step is to make a dissolve of at least 30 frames from the color bar source to the “A” play machine. Replay that edit. If an H-shift is noted, you must add or subtract one frame to the “A” VTR edit-in time. A shift may not appear on the first edit, but one may show up during the next edit. Once the “A” machine is set, make a dissolve between the “A” and “B” play machines after noting the odd- or even-frame relationship between the record and “A” VTRs. If, on the last edit between record and “A” (with no shift occurring) the record VTR had an odd frame number while the “A” machine exhibited an even number, that relationship must be maintained between those two machines during the session. If the dissolve between “A” and “B” shows a shift, add or subtract a frame on the “B” machine code. As long as a relationship is maintained between the three machines (even-odd-even, odd-even-odd) there should be no problem. If one is changed, however, the other two must also be changed. And if either play VTR is stopped and restarted while being recorded, the relationship may need to be re-established. Datatron is working toward a solution to the problem, but until they solve it, this trial-and-error system works.

In all fairness to Datatron, the color frame H-shift is an industry-wide problem, not a fault of the Vanguard editor. Most of the fault lies in the fact that there has been no standardization by SMPTE on a color frame pulse location. When SMPTE arrives at a standard, then the manufacturers will be able to solve the difficulties with color framing.

The other problem I have found with Vanguard is in the use of the time code. The fact that audio track time code is used, rather than a vertical interval code, means that you must be careful in the jog mode to avoid developing slack on the tape. If slack occurs, the time code may become erroneous. The operator must go back and pick up the code again. Although this is not a big problem, more careful handling of the tape is required than if vertical interval time codes were used.

The bottom line

These problems are the only real difficulties I have found with the entire system. Other problems could occur with another installation using different tape machines and switchers.

But I imagine the bottom line to any field report would have to be: Would I make the same decision today that I made a year ago? My answer would have to be “Yes.”

The Vanguard system covered in this field report is manufactured by Datatron Inc., 2942 Dow Avenue, Tustin, CA 92680. Comprehensive literature on the system may be obtained by writing Datatron directly.

———

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Digital technology revolutionizing sound recording
by 3M

The struggle for a digital standard may forestall digital instrumentation for broadcasters for some time. However, on the recording front, use of digital audio progresses. At the 69th Audio Engineering Society meeting in May, special sessions were devoted to this advancing technology. During this event, 3M demonstrated multi-track editing using 30-channel (32-track) digital audio recorders and its electronic editing system.

The following is a view by 3M on how digital audio technology is beginning to revolutionize the sound recording industry. If technology runs true to form, this trend should be an indicator for the future for broadcasters.

Digital audio recording, with its capability of capturing the greatest dynamic range of sound while eliminating the distortion and noise previously inherent in tape recording, has begun to have a major impact upon commercial sound recording.

Adaptation of computer technology to the audio recording process provides clarity and sound purity unattainable through conventional analog technology, according to Clark Duffey, market development manager for 3M's professional audio equipment.

3M has manufactured analog recording equipment for about 15 years and commercial magnetic recording tape for more than 30 years. In 1977, after four years of solo research and two additional years of joint research with British Broadcasting Corporation (BBC), 3M became the first company to market multi-track digital recording equipment for studio use.

Digital use today
Today these recorders are used throughout the United States, Europe and Japan. Many of the 30 US recorders are located on the West Coast. In the Los Angeles area, recorders are installed in and/or rentable from Record Plant, Warner Brothers Records, Walt Disney Productions, Westlake Audio and Yamaha R&D Labs. They are also available from Audio Video Resources, San Francisco. Sound Ideas and Peter Scharf Communications in New York City have multi-channel 3M equipment, as does Universal Recording Corporation in Chicago. About 25 recorders are in use in the United Kingdom, France, Germany and Japan.

The first album to employ 3M equipment was released in December 1978 by Sound 80 Studios, Minneapolis—Copland's "Appalachian Spring," recorded by the St. Paul Chamber Orchestra. The prototype unit was experimentally used to back up direct-to-disc sessions. The digital tapes were judged of superior sound quality to the disc masters, so the record was produced from the digital tapes. The classical disc was nominated for three Grammy Awards and won Best Chamber Music Performance.

Some of the recording artists and groups who have used the 3M system include: Herb Alpert, Chicago, Christopher Cross, Ry Cooder, Billy Joel, Gordon Lightfoot, Kenny Loggins, Linda Ronstadt, Bonnie Pointer, Rod Stewart and Paul Williams. Many

3M Digital update*

Fifteen recorders have been installed during the past six months (number of recorders follow name of country or city): Universal Recording, Chicago (2); Disney Productions, Los Angeles (2); WED Enterprises, Los Angeles (1); Polar Music Studios, Sweden (2); Onkyo House Studios, Japan (2); Studio Comunica tari, France (2); Studio 10, France (2); and Boney M. Studios, Germany (2).

Four international studios will receive recorders soon: Studio Master One (for digital cutting only), Dentsu Studio, Boney M. Studios and Bauer Ton Studio, Germany.

"Parallax!"—the first digital multi-track recording of an opera—was released in April by Polygram. It was recorded on 3M's 32-track recorder in late 1979 by Herbert von Karajan, with the Berlin Philharmonic Orchestra, the chorus of the Berlin Opera and leading soloists.

Nine digital recorders have been purchased in Germany during the past year. Boney M., a well-known German pop group, has purchased three machines for its own studios, Bauer Ton Studio is well-known for producing German folk music and jazz. Dentsu Studio is most popular for rock recording, especially live concerts.

Digital classic
Issac Stern's 50th Anniversary Celebration album, recorded by CBS Master Sound, has become one of the largest selling digital classics.

About six TV commercials have been recorded digitally, showing an increasing interest in linking high quality audio to video. Studios involved include Sound Ideas Studios, New York City; Universal Recording, Chicago; and Sound 80 Studios, Minneapolis.

*Special issue report for AES, May 1981
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   - isolated dry contact relay closure on all inputs (2 amps at 50 v.)
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   - Two (2) used in Model B1-156.
   - Fades (or Supers), Wipes, Keys may be produced.
   - Positioner Joystick for each M/E positions patterns.
   - Pattern Modulation may be accomplished by an internal waveform generator. Modulating sources may be either (1) sine wave, (2) square wave, (3) saw tooth, or (4) an external customer generated source.
   - Mix Key and Wipe Key available.
   - Soft Wipe and Soft Key available with adjustable variations.
   - Push to Preview obtained by depressing knob on clip potentiometers (provides for M/E monitor output).
   - Wipe Mode — 3 interlocked buttons select “NOR”, “REV” or “N/R”.
   - Hard Wipe, Soft Wipe or Border can be selected with degree of softness made by “Edge” control adjustment.
   - Border may be Colorized by adjustment of “Hue” and “Luminance” control.
   - Symmetry of Pattern may be adjusted by “SYM” knob.
   - Preset Wipe Limits are set by potentiometers. “H” and “V” vertical preset limits activated by Pattern Limit button.
   - Spotlight alternate action push button produces a 6 db. level difference between “A” and “B” input channels in the “Wipe” mode. (Operates on all patterns.)
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   - Non-Synchronous Inputs. An “NS” indicator is provided. Tearing is prevented by not allowing a non-synchronous signal to be switched except at extreme position of fader handle where a “cut” transition occurs.
   - Key Input Sources may be either (1) “A” bus video for self keying, (2) preview Key bus, (3) chroma key, or (4) an external key source.
   - Key Invert selector provided to accommodate either positive or negative video as a keying source.
   - Key Fill may be either “A” video for self keying or a colorized matte.
   - Mix/Key provided a lieu of second Mix/Effects system for Model B1-154 switching system. Provides for all mix and keying functions of mix/effects system (as previously described) except for the pattern effects.

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   - Key sources: (1) Mix/Effect, (2) Chroma Key, (3) External * Push to Preview (Monitors)
   - DSK Border — black edge around insert * Shadow — black edge on right side and bottom of insert
   - Quad Split — provides four (4) variable size quadrants from eight possible sources with variable width border
   - Aux Busses — (Model 156 only) .......................... $4,100.00
   - Two remote outputs are available — remote control panel and amp required.
   - 2nd Mix/Effects Unit in lieu of Mix/Key amp in 154 .................................................. $2,650.00*
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   - Except those indicated with an asterisk.

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September 1981  Broadcast Engineering  89
Digital audio

Classical audio equipment has made digital recordings with this equipment, including the Berlin and New York Philharmonic Orchestras; the orchestras of Cleveland, Philadelphia and Minnesota; Montovani; and the Los Angeles and St. Paul, MN, Chamber Orchestras.

Digital vs. analog

Conventional analog recording, optimized to record music of the '30s and '40s, tends to distort when recording loud sound levels at either end of the frequency spectrum. The problem is especially severe when recording peak transients. The result is muddy sound lacking definition, clarity or crispness.

Advantages of digital recording include the virtual absence of tape-generated noise, coupled with nearly 94dB signal-to-noise ratio and full, uniform frequency response from 20 to 20,000Hz.

Rather than recording complex waveforms on tape as with conventional equipment, the digital system converts all information about the sound into a numerical code that can encompass the loudest to the softest sounds across the audible frequency spectrum. This is updated 50,000 times a second to produce full fidelity. Because only numbers are recorded on the tape, noise and distortion generated by the tape and electronics are virtually eliminated. In playback, the code recreates the music identically. The sound is as transparent or as full as the source.

Distortion is a significant factor because the dynamics of music have changed since conventional sound recording technology was developed. Today's music generally contains much greater sound levels at low and high frequencies. With digital technology, direct or close multiple-micing placements can better record the highs and lows of individual or amplified instruments.

Another advantage of digital recording is the lack of deterioration in signal quality, especially the absence of noise build-up on multiple-generation copies made during dubbing and mix-down. This can significantly contribute to the quality of the typical record which, after repeated combining and editing of tracks in the mix-down process, may be 20 generations from the original.

Digital recording techniques represent an improvement over the direct-to-disc process, too, because disc mastering from the digital tape permits optimization of the groove pitch and cutting amplitude for the par-
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Digital audio

ticular sound levels coming into the disc cutting lathe. In direct-to-disc mastering, a certain amount of guesswork is inevitable. The use of tape permits an automatic pitch control unit to continuously adjust the proper spacing between grooves and more than one defect-free disc master. This assures better sound quality and allows more music to be placed physically on the record. Also, less than optimum groove cutting, disc electroplating or replicating can be corrected because there is a master tape.

In addition to extra sound quality and longer playing time, digitally mastered records offer the consumer a benefit in album price. Direct-to-disc records are by necessity limited editions, as only a relatively small quantity of record pressings can be obtained from a single disc master. With digital recordings, a master tape is obtained from which additional disc masters can be made. This allows the supply of records to equal demand and enables production costs to be absorbed or spread across a larger scale.

Digital recording has the added advantage of allowing mixing and editing at a later time, which often leads to better sound balance and tonal quality, expanded composition possibilities and the elimination of performance fluffs.

3M's digital development

Engineers working to refine 3M's analog equipment concluded that the law of diminishing returns was being approached rapidly within existing technology, and that further improvements would require an entire new approach. Computer technology appeared to hold the answer to noise-free and distortionless sound, if a number of technical problems could be solved.

After four years of research and significant progress, 3M approached the BBC, an acknowledged leader in audio and video research. The BBC had pioneered in network transmission of digital signals and had also been searching for a practical method of recording the programming material it transmitted digitally. A 2-year joint research project was soon launched to further refine the 3M system.

According to Bryce McCririck, director of engineering at the BBC, 3M's system represented a major technological achievement involving several significant breakthroughs. The

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Digital audio

most notable, he said, relates to the elimination of static-like noise on digitally produced tapes caused by tape dropouts that may be present because of minute tape imperfections or contamination of the recording surface. An innovative error-correction scheme was developed to successfully counteract this primary roadblock to acceptable digital recording.

A related question was how to store the huge quantity of musical data, plus error-correction information, from a practical tape use standpoint. To put this challenge into perspective, the multi-track recorder ultimately developed by 3M engineers can store 40 million bits of information for each second of music. Thus, for a 30-minute recording, more data is stored on a 1-inch tape (72 billion bits) than on 200 rolls of standard computer tape. This accomplishment required a joint effort in tape and equipment design.

The digital equipment installed in most studios has consisted of a 32-track (30 audio channel) pre-mix recorder and a 4-track stereo master recorder. These have the same capabilities already common in studios, such as overdubbing, punch-in remote control and in-sync track-to-track recording.

3M has also developed an electronic digital editing system and preview delay units for use in cutting record masters. The editing system permits precise, smooth multi-track edits and promises to expand the creative potential of the music editor.

Cross-fade capability, subsequently added to all 3M recorders, assures smooth transitions during punch-ins, punch-outs and editing, regardless of where edit points are selected. Aesthetic musical judgment is the only criterion and, because editing is an electronic copying process, each proposed edit point can be auditioned—a complete edit previewed and refined by as little as one millisecond—without physically altering the original.

Reactions to digital

Industry reaction to the digitally recreated sound has been excellent, according to Duffey, who predicts that 30 to 40% of studios will employ digital technology within five years.

What are studio reactions? Lee Herschberg, director of recording and

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Digital audio

Digital audio engineering, Warner Brothers Records, said after using the 3M system to record and master several albums, “We hadn’t been aware of how much was lost with analog recording. What’s more, there is basically no generation loss in making copies or mix-down. Digital has also made some operations easier.”

Tom Jung, former Sound 80 chief engineer said, “The striking thing is the purity of digital sound, the complete absence of anything foreign between the artist and the music. The intensity of sustained low notes, faithfully re-created transients and totally preserved overtone structure can’t be duplicated.”

Chris Stone, president of the Record Plant said, “Digital provides clarity we never thought we’d hear on tape and represents a new vista in sound recording. The advantages are readily apparent even to consumer ears. Digital recording is definitely the method of the future... and it’s here today.”

Digital for consumers

Although digitally recorded masters are increasingly providing greater quality for today’s hybrid records, the ultimate future consumer benefit will be home digital disk or tape systems to fully re-create the music of these masters in the living room.

When 3M announced and first demonstrated digital sound in November 1977, its ultimate impact upon the home appeared to be about 10 years in the future. But, the excitement that digital sound has produced at the studio has given the impetus, and emerging electronics much of the means to accelerate the time schedule. The latest prediction is that home digital equipment may be available from several manufacturers by 1982.

Digital audio is also increasingly being used to heighten the impact of video productions, because consumers want high quality sound and digital audio offers at least 30dB more than normal first generation audio from a video recorder.

Digital audio technology, the first real change since Edison invented the phonograph, will increasingly improve the quality of records and movie soundtracks, broadcast and cable TV programming and commercials. The coming of video and digital audio discs promises to hasten digital audio’s revolution of sound recording.

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Following is a summary of test data compiled from the final test measurements made on a 50-input by 50-output audio/video switching matrix sold to Capital Cities' Houston outlet KTRK-TV. We invite comparison of these test results with our published specs and with the published specs of routing switchers manufactured by others.

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The First Class ticket

By John M. Cummuta, operations manager/chief engineer, KNEI AM-FM, Waukon, IA

The First Class Radiotelephone License was eliminated effective Aug. 7, 1981. Can small market radio stations resist the temptation to reduce their concept of engineering quality to ON THE AIR/OFF THE AIR?

In its explanation of the rationale behind the elimination of the first phone, the FCC described the operator requirements as an engineering overkill. The FCC cited the remarkable improvements in equipment reliability since the inception of the deceased regulations and painted a simple picture of a complex industry.

Although they may have a reasonable argument, considering the prostitution of the license by the "quickie courses," there are two potential problems that do not fall equitably across the industry: The distribution of the modern, reliable equipment is heavily in favor of the larger markets; and the lack of competent engineering support is mainly evidenced in the smaller radio markets where older, less reliable equipment collects. It is there, at broadcasting's understructure, that one of the common disagreements about the consequences of the license removal occurs.

Chris Payne, assistant to the vice president of engineering for the National Association of Broadcasters said that he thought the benefits of the first phone elimination could lie mainly with small market stations, because of their inability to attract technical people to their staffs. Now they will be able to hire outside of radio broadcasting if they wish, he said.

Payne said that businessmen could now choose their own levels of quality in broadcasting. They could spend less money for engineering if they wanted to, but would have to live with the possible consequences, such as fines given at inspection time.

The NAB is an organization of station and network owners and licensees, according to Payne, and does not represent station employees, but rather, management and ownership.

Payne said that stations could now hire people who did not have licenses for maintenance of the radio station.

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national Radio Broadcasters Association, was worried about that very thing. "There'll probably be guys who think they can get their local TV repairman...all he knows how to do is change tubes."

On the other hand, Payne said that the NAB saw this as a chance to bring in more talented people.

"We realize that they might not know anything about the broadcast rules, and in this area, we appreciate at NAB the sort of transition that may take place here. We are talking with the Society of Broadcast Engineers and we believe that we're going to work up some relationship where we will help them with their certification program," Payne said.

Payne indicated that the NAB was also working on the publication of a set of guidelines that would help employers in reading resumes and interviewing technical people.

Reviewing the realities of the small radio market and the electronics industry in general, a few problems can be seen: The local TV repairman or phone company tech is not likely to travel any great distance or burn much midnight oil preparing for SBE certification; not many electronics technicians from other industries are likely to turn down starting salaries of $20,000 plus to accept $14,000 or less at a small market radio station; and the equipment in those smaller radio operations is the most likely to be in need of attention.

This would seem to nullify the compelling reasons for the elimination of the ticket and its requirements in broadcasting, except for the fact that some people feel that the ticket did not serve any purpose.

"The first class ticket was meaningless," Voron said. "The thing is that many hundreds of people who had first class tickets didn't know any more than the do-it-yourselfer broadcast owner. They didn't know any more about what was required. I can't tell you how many times we have run into people with first class tickets that don't know a tube from a capacitor."

Many small market radio station operators do their own maintenance. This could lead to problems if they misinterpret the elimination of the first phone requirements and its associated assurance about modern equipment reliability as saying that anyone who knows something about electronics could keep them in legal standing. The elimination could also be misconstrued as a slacking off of the technical requisites. It is possible that non-technical operators could let critical parameters drift or leave them in the hands of someone who may...
First Class

know electronics, but who lacks
cognizance of what the FCC expects
from a broadcast station. If so, the
results could degenerate to chaos.
"If they perceive this as a relaxation
of the standards," Voron said, "what
you say is indeed going to happen. But
of course this is not a relaxation of the
standards. The station still has to per-
form like it always has and the guys
who were not conscientious about it
before are not going to be conscien-
tious now."

The elimination of the first phone
requirements reveals many potential
problems for the industry resulting
from just one aspect of the change.
Many first-phone positions resulted
exclusively from the regulations' re-
quirements and a good deal of these
positions will be eliminated.

The effect will be a temporary loss
of apprenticeship programs, accord-
ing to Payne, because of the trim-
ming of technical staffs of radio and
TV stations. It will become harder for
people to enter the field of broadcast
engineering because many of the
subordinate positions will be
eliminated.

The disintegration of the training
grounds afforded by the appren-
ticeship situation and the attrition of
broadcast electronics oriented educa-
tion programs (possibly because of
lack of an identifiable symbol of
achievement—the first phone) could
eventually lead to a drying up of the
pool of technical people available to
licensees at all market levels. This
could conceivably result in a situation
exactly opposite that envisioned by
those aligned with management.

According to the NAB, the intent is
to simply give managers the same hir-
ing/firing freedom in the engineering
area as they have in other depart-
ments.

"It doesn't mean that there'll be less
qualified people," Payne said. "It
doesn't mean that the salary structure
will change necessarily. It just means
that those who did not happen to go
through the FCC licensing procedure
can be considered as candidates for
jobs in engineering."

If salary incentives from other elec-
tronic industries and the loss
of prestige and the apprenticeship pro-
cess should lead to a shortage of
qualified technical people, several
things could happen.

First, the small market radio opera-
tions couldn't compete economically,
so they would be reduced to using the
local electronics talent without
cognizance of FCC broadcast re-
quirements. Secondly, that talent still
available to the broadcast industry,
especially with identifiable creden-
tials, would no longer settle for the
meager salaries prevalent in many
markets. There could be insufficient
technical talent available to the less af-
fluent markets and expensive
technical talent for those willing to
pay.

There are discussions of scholar-
ships to help prospective broadcast
engineers get education and various
organizations are combining forces to
help smooth out the transition. Never-
theless, it appears that the bottom of
the totem pole will feel most strongly
the emptiness of the void left by the
elimination of the first phone.

Will small market, and maybe some
not-so-small market radio stations fly
economy class and forgo qualified
engineering support?

"I think the answer is that in the
world of business there are lousy
hardware stores and there are good
hardware stores," Payne said, "and
presumably the lousy hardware stores
are free to be lousy if they want—and
eventually go out of business. If an
owner of a station wants to make a
choice of trying to do these things
(engineering) or to hire people who
may not be qualified to do these
things, he's giving it a try at his own
peril."

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Understanding FM crosstalk measurements
By Dennis Ciapura, general manager of telecommunications, Greater Media, East Brunswick, NJ

No other area of the FCC equipment performance regulations generates as much confusion among FM broadcasters as the crosstalk specification. Everyone knows how to test for crosstalk and most FM engineering departments do so with some degree of regularity, but the confusion persists. In fact, many stations are trying to achieve virtually impossible phase linearity for no good reason and are left feeling guilty about substandard performance when they fail.

First of all, it is important to understand that sub-to-main and main-to-sub crosstalk has nothing to do with stereo separation unless the crosstalk occurs in the stereo generator, transmission system or receiver decoder. Any phase or amplitude imbalance fed into the stereo generator will simply be reproduced at the receiver. This is not to say that accurate stereo channel balance and differential phase linearity is not important, but rather that these errors will simply be reproduced by the stereo multiplexing system and will not affect the stereo separation or the capability of the stereo generator to maintain whatever level of crosstalk suppression is possible. Figure 1 illustrates this point.

This is why popular signal processors that have internal stereo generators, such as Orban Optimods, include separate test jacks for making the stereo performance measurements. In fact, attempting to adjust a stereo generator that is being fed with test signals that do not have perfect differential phase and amplitude response will result in misadjustment of the stereo generator and less than optimum performance. Feeding the test signals from the studio console inputs may create just such a situation.

The purpose of the crosstalk measurement is to insure the integrity of the main and subchannels carrying the L+R and L-R components. In a perfect stereo generator, if exactly equal and in-phase signals are applied...
Phase and amplitude errors in this part of the system do not affect stereo separation or main-to-sub-to-main crosstalk.

Audio console

Stereo Telco or "Dual Mono" S.T.L.

Stereo generator

Composite

Transmitter

Figure 1. Highly simplified stereo broadcast system illustrating dividing line beyond which phase and amplitude balance errors noticeably affect crosstalk and separation performance.

Audio console

Note: Stereo limiters, A.G.C.s, line amps, etc. are normally a part of this dual channel segment of the broadcast chain. If a composite S.T.L. is employed, its input can be considered to be the stereo generator input.

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Marconi Instruments
Crosstalk

to the left and right inputs, there should be no L – R component whatsoever. Of course, such perfect cancellation does not occur in the real world and some L - R residual will always exist (hopefully below the -40dB level specified by the FCC). It is the magnitude of this residual that describes the system crosstalk performance. Conversely, exactly equal and 180° out-of-phase inputs should produce no L + R component at all.

The reason that the crosstalk performance within the stereo generator circuitry is so important is that the listener's receiver circuitry will assume perfect crosstalk performance in the transmission system. If it is not, correct decoding will not be possible, even if all of the other stereo generator performance parameters are perfect. Optimum stereo performance will not be achieved at the receiver.

It is important that crosstalk be minimized at all frequencies within the system bandpass. The crosstalk measurement itself is simple, but it is extremely important that it be done properly, for one incorrect procedure can render the whole test series invalid and useless.

The easiest way to provide an exactly equal L + R input to the stereo generator is to use one signal source and simply feed it into both channels. Most stereo generators are not adversely affected by simple paralleling of the inputs. This eliminates the need for any splitting components or networks. If such a network is used, it is extremely important that the components be of the highest precision obtainable. A small amplitude or phase imbalance will seriously degrade the crosstalk measurement.

Actually, a simple solid-state inverter is preferred over transformers. Several suitable designs are illustrated in Walt Jung's, IC Opamp Cookbook. However, if transformers are used, be sure that two identical, and preferably phase and amplitude matched, units are employed. Extreme linearity in the 50 to 15kHz range is most easily achieved with transformers spaced at 10Hz to 50kHz range response. A pair of UTC-21s or 111 repeat coils can frequently be found that are balanced close enough to yield 50dB or better crosstalk figures. These are expensive transformers, and unless they are already available a simple IC inverter is suggested.

Bear in mind that two elements must be closely matched to insure optimum crosstalk figures: the amplitude response and the phase response. The new 8100A Optimod has front panel facilities to allow direct connection of one of the audio channels to the main or sub carrier portions of the generator, thus providing an ideal crosstalk test condition because the validity of the measurements is not at all dependent upon perfectly matched input signals. Harris and Moseley generators have balanced inputs that lend themselves upon perfectly matched input signals. Harris and Moseley generators have balanced inputs that lend themselves simple inversion and easy testing. The correct crosstalk test procedure starts with tweaking the left or right input sensitivity control, if there is such an adjustment, for minimum L - R with an L + R input. Most stereo generators do not have input level sensitivity controls, but have internal adjustments to accomplish the same thing. If good results are not immediately obtained, the schematic should be checked to see if such an adjustment is available. Before that adjustment is made, it is critical to double check the input sources to be sure that equal amplitude and phase signals are being applied to the stereo

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104 Broadcast Engineering September 1981
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A-10: 10-11' production area, 1-2 cameras.
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B-14: 12-14' production area, 2-3 cameras.
1 studio VTR, audio console, production switcher, audio cart and reel/reel recorder, intercom, and ancillary equipment.

C-16: See illustration to right. 16' 18'.
production area, 4 cameras, 2 studio VTR's, other equipment similar to B-14.

D-22: 18-24' production area, 3-5 cameras.
1-3 studio VTR's, A/V routing switcher, 2 audio cart recorders, telephone system, other equipment similar to B-14.

Central Dynamics Corporation
The U.S. Broadcast Company for COL PHILIPS American Data

Circle (114) on Reply Card
Crosstalk

generator.

It is equally as critical to be sure that the modulation monitor is correctly calibrated. A mono FM input should produce little (-50dB or more) L-R on the stereo monitor. If not, recalibration is in order. Actually, a low frequency spectrum analysis of the baseband is best.

Start the test run at 400 or 1000Hz and then continue to test at the other standard frequencies through the passband to find out if the crosstalk figures hold up as the frequency is varied. No readjustment of input balance or internal nulling should be made as the frequency is changed. To do so is to completely invalidate the test procedure, for we know of no stereo generator manufactured to date that has a little elf installed inside with instantaneous response to make balance adjustments when program material is fed through the system.

L-R crosstalk into L+R is tested in the same way, except that one input is inverted to generate the L-R signal or the L-R circuitry in the stereo generator is fed directly. No readjustment of any stereo generator balances should be required if the circuitry and monitoring equipment is operating properly. If any such adjustments are made, the test is invalid. If L+R into L-R is good and L-R is not, spectrum analyzer inspection of the baseband is in order.

The following scenario illustrates the sequence of events that usually leads to completely worthless crosstalk measurements despite the investment of a great deal of time and effort:

The test signals are applied to the console inputs in the studio main control room and are fed through the entire system including telco or microwave STL equipment and signal processing equipment at the transmitter. A quick spot check of the L+R crosstalk into L-R reveals only 36dB of attenuation, so the engineer adjusts the signal processor input level control of one channel or the other to null out the crosstalk. This is the first problem area because what he has actually done is probably misadjusted the signal processor input sensitivity balance to compensate for slight channel balance errors in the cumulative balance of the system leading back to the test generator at the studio. Assume that the engineer intends to
make the entire program chain part of this signal source to the stereo generator and the crosstalk measurements continue.

The first measurement was made at 400Hz and after a little input level "tweaking" a crosstalk figure of -44dB was achieved, so the test continues through the other standard test frequencies. 1000Hz still looks good, about -42dB, but at 5kHz the reading is only -38dB, so the engineer once again readjusts the input level control to null out the crosstalk at 5kHz. And so the test continues with a little renulling at each test frequency until a satisfactory crosstalk test series has been completed. There are problems with these crosstalk measurements.

First of all, as we pointed out earlier, it is absolutely unnecessary to run the test signals through the entire system. They are more properly applied directly to the input of the stereo generator. It is an enormous undertaking to attempt to get an entire broadcast program chain phase and amplitude linear enough so that its irregularities do not result in dissimilar signals at the stereo generator input. This is not to say that it is not a good idea to have the frequency response of each program channel as good as it can be and the two as identical as they can be, but that is no way to test a stereo generator. The FCC rules certainly do not require such a procedure. Differences in frequency response between the channels of greater than 1dB should be avoided, because these errors in excess of 30 degrees will cause loss of high frequency response in the main channel, which is what the mono listener is hearing, and requires additional energy in the subcarrier just to reproduce the phase error. In practice though, most broadcast chains are better than that. Differential channel balance vs. frequency within .5dB and differential phase within 15 degrees is achievable and represents excellent audio performance. However, such a program chain would still be marginal with regard to measured crosstalk performance at the output of the stereo generator. Furthermore, renulling at each test frequency merely compensates for any amplitude imbalances that may exist either within the stereo generator or in the signal sources feeding the unit. This makes the crosstalk measurements for all except the first frequency invalid.
Music series becomes production challenge

Most remote productions require full use of the staff's energies and resources. One remote that was more demanding than usual was the recording of the Spoleto '81 Chamber Music Series at the historic Dock Street Theater in Charleston, SC.

Setting up the remote production studio proved to be an arduous and sometimes dangerous endeavor, according to Sam Gilliam, technical consultant to the 10-program series for the South Carolina Educational Radio. All of the recording equipment had to be carried to a projection booth up a steep iron circular staircase, which was the only access. The steps are 2 feet wide and angular, tapering off from the 8-inch center to practically nothing at the center pole. Each piece of equipment, including two Studer Revox B67 recorders, a mixer and Gilliam's personal Revox B77, had to be carefully maneuvered up the steps.

Because only five microphones were needed (three Neumann U89s for stage overhead and Martin Bookspan, the announcer, plus two auxiliary Cetec wireless units), a com-
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Music series

Impact Studer 169 mixer provided enough inputs for the job.

Also, excessive heat and humidity caused concern about the working conditions for the operators as well as for the equipment. Temperatures crept into the upper 90s with a high percentage of humidity. To add to the oppressive weather factor, the broadcast booth did not have air conditioning.

The South Carolina Educational Radio moved its entire production studio up and down this staircase for the Spoleto '81 Chamber Music Series remote. Sam Gilliam, technical consultant, carries a Studer B67.

"We were a bit concerned about recording for such a critically demanding audience under these conditions," Gilliam said, "But the master tapes all came out with superb sound quality. Our only problem was some rumble from the house air conditioning. We couldn't eliminate that entirely, at least not without risking damage to instruments from warpage and asking the audience to suffer the way we did."

The Spoleto Chamber Music Series broadcasts were scheduled for Sunday afternoons from June 7 to Aug. 9, 1981 on the NPR network. Also, Chicago's WFMT, a classical music station, plans to air the concerts under a separate arrangement. WFMT will air the original master tapes directly from its facility.
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1981 BUYERS’ GUIDE Issue
The broadcast industry’s comprehensive product directory
710 product categories and more than 865 manufacturers make this year's guide the most comprehensive yet.

- Product section begins on page 116.
- Manufacturers' addresses section begins on page 190.
- Dealer/distributor section begins on page 210.

Since our first edition of the Buyers' Guide 13 years ago, the broadcasting industry has grown tremendously in complexity of equipment and completeness of broadcast services. Just as the industry has responded to the use of new technologies—most notably the microprocessor in all phases of automation—the Buyers' Guide has responded by providing the most complete directory possible for engineers, managers and purchasing agents requiring broadcasting equipment or services. Reflecting the current healthy state of our industry, this year's Buyers' Guide has nearly 710 product categories, lists more than 865 manufacturers, and contains more than 255 advertisers. It's the result of a dedicated staff effort to make it our finest tool for purchasing the industry's hardware, software and services.

Each year, Broadcast Engineering mails extensive questionnaire forms to suppliers around the world. They are asked to identify, by special code number, every product they currently market. In the process, scores of new products and companies are added, while lines that have been phased out—and firms that have left the field—are deleted. Once amassed and assembled, these new data are processed through a unique computer operation, programmed to "read" the code numbers and assign company names and Red Listings to appropriate product headings.

Advertisers in this issue are listed in red under each appropriate product heading. These Red listings include the ad page location to serve as a direct reference to the product information you are seeking.

Broadcast Product Dealer/Distributors are listed separately in the section beginning on page 210, followed by the states they serve and the products/services they provide. If they are advertisers, their ad appears either on the page of their listing or on the facing page. A full explanation of this section appears on page 210.

Broadcast Product Manufacturers' Addresses begins on page 190. There, you will find a complete, alphabetized index of mailing addresses for all of the companies listed in the Product Directory. Additional information appears under the index listing for advertisers in this issue: the name and telephone number of the home office sales manager, followed by, in many cases, a roster of regional sales contacts for that firm.

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

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Telephone: (415) 961-7145, TWX: (910) 379-6499
Circle (136) on Reply Card

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THE ELECTRONIC NEWS ROOM BEGINS WITH DATA-PROMPTER

MULTIPLE INPUT-TERMINAL CAPABILITY: With Data-Prompter you can enter and store information on edit terminals. You can transfer information to the master terminal on call. You have full communication between terminals. The master terminal can be used to assemble your entire newscast. And its output goes directly into the prompter monitors. Communication between terminals can be set up on any twisted-pair or voice grade phone lines.

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FULL WORD PROCESSING: Data-Prompter makes it easy to write and edit text. Data-Prompter allows you to insert and delete characters, words or entire sentences. And changes on Data-Prompter can be made without re-typing entire pages.

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HARD COPY PRINTOUTS: Data-Prompter interfaces with multiple copy printers for talent copies and FCC filing.

CLOSED CAPTIONING: Line 21 closed-captioning is an integral part of the Data-Prompter system. With over 6% of the population estimated to be hearing-impaired Data-Prompter offers a potentially greater share-of-market to broadcasters and advertisers.

REMOTE SPEED CONTROL: Data-Prompter gives you variable speeds both forward and backward. The operator will pace your on-camera talent.

COMPATIBLE: Data-Prompter feeds directly into existing camera monitors and will interface with existing computer systems for archiving.

WORD WRAP: A feature that allows you to type your story from start to finish without concern for line length or word breaks.

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630 Ninth Avenue, New York, N.Y. 10036
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Telex 126191

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**$24,900**

TRADE IN YOUR OLD TBC UP TO $7,500 ALLOWANCE

Intelligent Microprocessor control.
Providing Self Test. Automatic Color Framing. Operator adjustments reduced to a minimum as the Microprocessor continually examines the nature of the input signals and adjusts the operating parameters automatically.

11 TV line hysteresis.
Will ensure that motion discontinuities due to frame deletion or insertion are not seen, even when the incoming “non synchronous” signal is very noisy, or has signal jitter.

3 Line adaptive comb filter.
An exclusive approach to Digital Filtering to provide near perfect separation of luminance and chroma, virtually eliminating crosstalk.

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Microprocessor holds last complete field until next valid vertical interval appears at the input. If no signal appears within 0.5 sec, the output can be automatically taken to black.

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Highest quality freeze frame picture available in the TV Industry.

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Used to provide line by line clock phase correction accuracy to 0.5 nanoseconds.

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

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3.1 Million BIT RAM memory.
Provides full 512 line storage. The four memory boards are identical and interchangeable.

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

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We’re Better Than Ever!

Our CG-832 is ideal as a low cost MARQUEE to promote your pay movie channel. Only our CG-832 provides these features at this low price: 8 page memory expandable to 16 pages, auto line centering, character flash, optional fixed title, LED page display, and optional color background and power failure protection.

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

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

Operating features include: auto line and page centering, word/line open and close, tab and elastic memory.

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Video Data Systems T.M.

Headquarters, Hauppauge, N.Y. (516) 231-4400
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Verify your RS-170A with a dynamic, easy to read video display that's light years ahead.

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

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And because it is viewed on a standard video monitor—any monitor—you can look at the Videoscope display and quickly relate it to what is actually happening in your system. No more looking at faint lines on scopes in dark corners. To certify your RS-170A, all you need is Videoscope. Anywhere in your plant. Light years ahead.

Want to know more about the Videoscope? Write on your letterhead for a complimentary copy of "An Accurate Method for Certifying, Timing, and Analysis of RS-170A".

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Consoles, Video Studio


Consoles, Video Portable

American Data Corp.  Beavertonics, Inc.  Central Dynamics Corp.  Crosspoint Latch Corp.  Image Video Ltd.  Ross Video Ltd.

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Model 6124 Twelve inputs (including colorizer/black). Two fully independent mix effects systems each with double re-entry. Master fade to black. Downstream keyer with matte and blink. RGB Chroma Keyer Plug compatible with AUTO DRIVE™. Price N.T.S.C. $13,700. PAL $14,700.

Model 6403 PROGRAMMABLE EDITOR-SWITCHER INTERFACE. Allows Crosspoint Latch switchers to interface directly with editors. The 6403 controls mix, wipe, positioner, pattern generator and A and B buses on one ME. Editor modules are available for Video Media editors. The 6403 interfaces with most simple editors without the use of the editor module. Price N.T.S.C. $2,750.

Model 6112 Nine inputs (including colorizer/black) four buses. Two fully independent MIX EFFECTS systems, downstream keyer with preview, matte and blink. Remote control panel. Double re-entry on each ME. Price N.T.S.C. $7,630. PAL $8,630. Encoded Chroma Keyer $1,050. Not available in PAL.


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For information on other switchers and products write to:

CROSSPOINT LATCH CORP.

95 Progress Street, Union, New Jersey 07083

Tel. (201) 688-1510

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<td>Harris Corp. Broadcast Products Div.</td>
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<td>Harris Corp. Broadcast Products Div.</td>
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<td>Hindle Semtech, Inc.</td>
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<td>Laird Telemedia Inc.</td>
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<td>Laird Telemedia Inc.</td>
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<td>Magnasine/Moviola Corp.</td>
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<td>Marconi Communication Systems Ltd.</td>
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<td>Marconi Electronics Inc.</td>
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<tr>
<td>Broadcast &amp; Communication Div.</td>
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<td>Multi-Track Magnetics, Inc.</td>
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<td>Panasonic Company</td>
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<td>Panasonic Co. Video Systems Div.</td>
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<td>Philips Corp.</td>
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<td>Phillips Corp.</td>
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<td>Products, Inc.</td>
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<td>RCA Broadcast Systems</td>
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<td>Rohde &amp; Schwarz Sales Co.</td>
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<td>Siemens Broadcast Products, Inc.</td>
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**Product Directory**

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The brightness you need to show it big

General Electric Professional Large Screen Video Projection

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

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

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

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

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

**Aerospace and Defense:** Situation displays, simulator training.

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

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

Call or write: General Electric Company, Video Display Equipment Operation, Electronics Park 6-206, Syracuse, NY 13221. Phone: (315) 456-2152.

**NEWS BACKGROUND** at WTMJ-TV, Milwaukee, is displayed rear screen by General Electric projector.

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

### GE Professional Large Screen Television Projector Specifications

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<th>Model</th>
<th>Light Output in Lumens</th>
<th>Resolution* in TV Lines per Picture Height</th>
<th>Input Power Req.</th>
<th>Scan Standards***</th>
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</thead>
<tbody>
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<td>PJ 5000</td>
<td>Open Gate Min. 550, Modulated TV, Min. 220</td>
<td>Min. Horiz. 750, Min. Vert. 300</td>
<td>Watts 1200, Volts 1600</td>
<td>525 li./60 fps, 625 li./50 fps (1)</td>
</tr>
<tr>
<td>PJ 5050</td>
<td>1250, 500, 650</td>
<td>1600, 2150</td>
<td>525 li./60 fps, 625 li./50 fps (1)</td>
<td></td>
</tr>
<tr>
<td>PJ 5800</td>
<td>550, 200, 280</td>
<td>1200, 1600</td>
<td>875 lines, 60 fps (2)</td>
<td></td>
</tr>
<tr>
<td>PJ 5850</td>
<td>1250, 500, 650</td>
<td>1600, 2150</td>
<td>875 lines, 60 fps (2)</td>
<td></td>
</tr>
<tr>
<td>PJ 5100</td>
<td>550, 200, 280</td>
<td>1200, 1600</td>
<td>1023 lines, 60 fps (2)</td>
<td></td>
</tr>
<tr>
<td>PJ 5150</td>
<td>1250, 500, 650</td>
<td>1600, 2150</td>
<td>1023 lines, 60 fps (2)</td>
<td></td>
</tr>
</tbody>
</table>

#### MONOCROME PROJECTORS

<table>
<thead>
<tr>
<th>Model</th>
<th>Light Output in Lumens</th>
<th>Resolution* in TV Lines per Picture Height</th>
<th>Input Power Req.</th>
<th>Scan Standards***</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ 7000</td>
<td>1000, 600, 750</td>
<td>800, 400, 1000</td>
<td>1350, 525 li./60 fps, 625 li./50 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7050</td>
<td>1700, 1000, 1250</td>
<td>800, 400, 1000</td>
<td>1350, 525 li./60 fps, 625 li./50 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7055</td>
<td>3300, 2000, 2400</td>
<td>800, 400, 1500</td>
<td>2000, 525 li./60 fps, 625 li./50 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7800</td>
<td>1000, 600, 750</td>
<td>800, 650, 1000</td>
<td>1350, 875 lines, 60 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7850</td>
<td>1700, 1000, 1250</td>
<td>800, 650, 1500</td>
<td>2000, 875 lines, 60 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7855</td>
<td>3300, 2000, 2400</td>
<td>800, 650, 1500</td>
<td>2000, 875 lines, 60 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7100</td>
<td>1000, 600, 750</td>
<td>800, 750, 1000</td>
<td>1350, 1023 lines, 60 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7150</td>
<td>1700, 1000, 1250</td>
<td>800, 750, 1500</td>
<td>2000, 1023 lines, 60 fps (3)</td>
<td></td>
</tr>
<tr>
<td>PJ 7155</td>
<td>3300, 2000, 2400</td>
<td>800, 750, 1500</td>
<td>2000, 1023 lines, 60 fps (3)</td>
<td></td>
</tr>
</tbody>
</table>

Line Power, All Projectors: 117 or 240 v., ± 10%, 50/60 Hz

*Resolution measurements made with wide-band video input.

**Video Input Key:** (1) NTSC or RGB. (2) RGB. (3) Wide-Band.

***For use at other scanning rates, contact General Electric (VDEO) for special application/model information.
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Orange County Elec. Int'l., Inc.
Quad Eight Electronics
RCA Broadcast Systems
Sontec Electronics
Steinbeck, Inc.
Tangent Systems, Inc.
Westrex
Wide Range Electronics

Film-to-Tape Transfer Equipment

Fernsche Inc.
Image Transform, Inc.
Impact Case Sales Ltd.
MagnaSync/Moviola Corp.
Multi-Track Magnetics, Inc.
Rangertone Research Inc.
Warren R. Smith Co.
Steinbeck, Inc.

Filters, Antenna

Allen Avionics, Inc.
BiTel Electronic Corp.
Comark Industries Inc.
Continental Electronics Mfg. Co.
The Finney Co.
G C Electronics Div. Wallace Murray
Harris Corp. Broadcast Products Div.
Kappa Networks, Inc.
Micro Communications, Inc.
Multronics, Inc.
Nutad, Inc.
Phepls Dodge Communications Co.
Shively Laboratories, Inc. Div. of Howell Labs, Inc.
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Texscan Corp.
Wide Band Engineering Co., Inc.

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Altec Lansing Int'l.
Amber Electro Design, Ltd.
Apex Systems Ltd.
Audio, Inc.
Audio & Design Recording, Inc.
Audiosar
Bayly Engineering Ltd. Member of AEG/Telefunken Group
Broadcast Controls Div. of Oil Automated Broadcast Controls
Colectron
Coherent Communications
Comark Industries Inc.
Crown International, Inc.
Datatronix, Inc.
DYMIA Engineering, Inc.
EMT-FRANZ GMBH
ESC Electronics Corp.
Frequency Devices Inc.
Gotham Audio Corp.
Harris Corp. Broadcast Products Div.
Inovonics, Inc.
Iwile Electronics, Inc.
Kappa Networks, Inc.
Micro-Trak Corp.
Microprobe Electronics, Inc.
Modulation Associates Inc.
Monroe Electronics, Inc.
Rupert Neve, Inc.
Orange County Elec. Int'l., Inc.
Panasonic Company
Pulse Techniques Inc.
QEI Corp.
Quad Eight Electronics
Richardson Sound Design, Ltd.
Rohde & Schwarz Sales Co.
Sescom, Inc.
Sontec Electronics
Spectra Sensa
Spectrum Instruments, Inc.
T T E, Inc.
United Recording Electronics Industries
VIF International
Wavetek Rockland, Inc.

Filters, Microwave

North Hills Electronics, Inc.
Tayburn Electronics, Inc.
UTE Microwave, Inc.

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United Recording Electronics Industries

Audio & Design Recording, Inc.
Robert Bosch GmbH
Broadcast Video Systems, Ltd.
Comark Industries Inc.
EMT-FRANZ GMBH
Fernsche Inc.
Frequency Devices Inc.
G C Electronics Div. Wallace Murray
Harris Audio Corp.
Orange County Elec. Int'l., Inc.
Panasonic Company
Pulse Techniques Inc.
Quad Eight Electronics
Spectra Sensa
Spectrum Instruments, Inc.
T T E, Inc.
United Recording Electronics Industries
VIF International
Wavetek Rockland, Inc.

Filters, Passive

Allen Avionics, Inc.
Andersen Labs, Inc.
Audiosar
Broadcast Video Systems, Ltd.
Coastcom
Comark Industries Inc.
Peter W. Dali Co.
Digitally Infernal Inc.
ESC Electronics Corp.
Frequency Devices Inc.
Kappa Networks, Inc.
Lightning Elimination Assoc., Inc.
Manny Microwave Corp.
Modulation Associates Inc.
Mu-De Electronics, Inc.
North Hills Elec. Int'l., Inc.
Orange County Elec. Int'l., Inc.
Panasonic Company
Pulse Techniques Inc.
QEI Corp.
Quad Eight Electronics
T T E, Inc.
Television Equipment Associates
Texscan Corp.
Varian Associates Electronic Device Group
Wide Band Engineering Co., Inc.

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United Recording Electronics Industries

Amber Electro Design, Ltd.
Andersen Labs, Inc.
Apex Systems Ltd.
Audio & Design Recording, Inc.
Audiosar
Blonder-Tongue Lab., Inc.
Comark Industries Inc.
Datatronix, Inc.

EMT-FRANZ GMBH
The Finney Co.
Frequency Devices Inc.
Gotham Audio Corp.
Kaplan Networks, Inc.
Maury Microwave Corp.
Microprobe Electronics, Inc.
North Hills Electronics, Inc.
Orange County Elec. Int'l., Inc.
Potomac Instruments, Inc.
Pulse Techniques Inc.
Quad Eight Electronics
Spectrum Instruments, Inc.
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Robert Bosch GmbH
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Electro-Fernsche Inc.
Harris Corp. Broadcast Products Div.
Harris Video Systems
MCI/Quantel
Marconi Communication Systems Ltd.

Frame/Field Storers, Floppy Disk

Arvin/Echo Science Corp.
Asaka/Shibasoku Corp.
Eiger Video
Electro-Fernsche Inc.
MCI/Quantel
Oktel Corp.

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A. F. Associates, Inc.
Central Dynamics Corp.

Frequency Standards

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Global Specialties Corp.
Maury Microwave Corp.
Rohde & Schwarz Sales Co.
Traceco Inc. Industrial Instrument Div.

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Potomac Instruments, Inc.
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Sencore, Inc.
Sescom, Inc.
Sound Technology
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United Recording Electronics Industries

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Beld Mountain Lab
Bruel & Kjaer Instruments, Inc.
DYMIA Engineering, Inc.
Exact Electronics, Inc.
ITT Components & Instruments Div.
Leatherhead Instruments Co.
Leasemetrics, Inc.
Marconi Instruments Div. of Marconi Electronics Inc.
Modular Audio Products Unit of Modular Devices, Inc.
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Potomac Instruments, Inc.
Rohde & Schwarz Sales Co.
Sencore, Inc.
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Sound Technology
Spectra Sensa
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VIZ Mfg. Co.

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VIZ Mfg. Co.

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Sencore, Inc.
Sescom, Inc.
Sound Technology
Spectra Sensa
Tektronix Inc.
VIZ Mfg. Co.
"At half CMX's price, how good can the Commander be?"

I was prepared to pay whatever it took to bring American Film Factory's facilities up to state-of-the-art standards. But I wasn't willing to just sign a blank check - so we thoroughly evaluated all the leading computer-assisted videotape editing systems on the market. I was really surprised to discover the United Media's new Commander I was capable of everything CMX could do and more - and at half the price. Half the price!

"Let me get specific - the biggest Commander advantage is complete computer control of multiple mix-effect banks for double re-entries. Sure, CMX can do that with a Grass Valley Switcher, but equipping it with E-MEM costs almost as much as the entire Commander II system.

"The other big advantage is Commander's tremendously flexible list management. Everybody has it, but Commander's degree of sophistication far exceeds the others.

"Commander offers a lot of useful features - like sync step, independent audio and video dissolve, and split audio/video edits in and out in one pass. Again, most other systems can cope with these editing needs somehow, but Commander handles them with true automation.

"Reliability is excellent - in a year of operation, we've never had a hardware failure. In fact, we've already bought our second Commander II system. Commander II is fully CMX-compatible which reassures my clients - and it's easier to use and much more versatile, which excites my editors.

"With the Commander's built-in total capability and realistic price, it's certainly the best system you can buy."

Better!

says Andy Maisner, owner of the American Film Factory, Venice, California
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Crosspoint Latch Corp.
Datatek Corp.
Dynair Electronics, Inc.
Fernsah Inc.
For A Corp. of America
Grass Valley Group, Inc.
Harris Corp. Broadcast Products Div.
Industrial Sciences, Inc. (ISI)
Jatex, Inc.
Leitch Video Ltd.
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Video Aids of Colorado
VIZ Mfg. Co.

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Lectrotech Inc.
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Link Electronics Ltd.
Marconi Electronics Inc. Broadcast & Communication Div.
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Panasonic Co. Video Systems Div.
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Leitch Video Ltd.
Lenco Inc. Electronics Div.
Marconi Communication Systems Ltd.
Marconi Electronics Inc. Broadcast & Communication Div.
Rohde & Schwarz Sales Co.
Sigma Electronics, Inc.
Video Data Systems
Vital Industries Inc.

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Aurora Imaging Systems
Central Dynamics Corp.
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Global Specialties Corp.
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Ivie Electronics, Inc.
Lampkin Lab, Inc.
Leader Instruments Corp.
Marconi Instruments Div. of Marconi Electronic Inc.
Ochip Lab, Inc.
Potomac Instruments Inc.
Rohde & Schwarz Sales Co.
Sencore, Inc.
Spectra Sonics
Tektronix Inc.
VIZ Mfg. Co.

Generators, Power (Electric Motor)

Harris Corp. Broadcast Products Div.
Lampkin Lab, Inc.
North Wind Power Co., Inc.

Generators, Power (Gasoline and Diesel Engine)

Belden Communications, Inc.
Centro Corp.
E-N-G Corp.
Harris Corp. Broadcast Products Div.
Lampkin Lab. Inc.

Generators, Power (Solar Energy)

North Wind Power Co., Inc.

Generators, Power (Wind)

North Wind Power Co., Inc.

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The technology that made Technics turntables the No.1 choice will make this Technics deck your No.1 choice.

You'll choose Technics RS-10A02 tape deck for the same reason 85 of the top 100 radio stations choose Technics turntables: The performance and reliability of Technics' quartz-locked direct drive.

Like our turntables, the RS-10A02 gives you the precision of a quartz-locked direct-drive motor. But you also get Technics' isolated loop tape transport system which optimizes tape tension to virtually eliminate signal dropout while reducing modulation noise and wow and flutter.

Studio pros will appreciate the RS-10A02's full complement of ten front-panel controls. Like playback and recording EQ adjustments, bias controls and playback and recording level calibrators. When used with the built-in test-tone oscillator, these controls will give you optimum recording performance no matter what kind of tape you use.

The RS-10A02 also has extremely durable SX Sendust heads, C logic controls and just about everything else you could want in a professional 2-track deck.

So before you buy any reel-to-reel deck, audition the RS-10A02 and see why it's your No.1 choice.

For more information on the Technics R&B Series, call 201-348-7410.

Circle (146) on Reply Card
Isaac Hersly, Equipment Planning Engineer for ABC Broadcast Operations, selected Convergence ECS-100 joystick videotape editing systems for his Network for many reasons – dependability, easy operation, affordability – But most of all, for the standard features that make these microprocessor-based editing systems top performers in the most demanding broadcast environment.

ABC uses Convergence editing equipment for ABC Network News, 20/20, sporting events, and countless other productions such as their outstanding coverage of the 1980 Winter Olympics, and the 1980 Republican and Democratic National Conventions. Hersly says, "With Convergence editing systems, expanded use of ENG camera crews is possible, and the American public sees better prime time network news."

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A rising star in broadcast television.

Quietly and unobtrusively the Fernseh star is rising. More and more broadcasters are looking to Fernseh for innovation—innovation across a broad product line that may very well be the most comprehensive in the industry.

Here are eight specific product areas. Eight ways Fernseh can help you create better television pictures. So your star can rise with ours.

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**Graphics systems.** The Compositor I™ graphics system gives you dual-channel versatility, pushbutton access to over 100 type fonts, a larger memory than any comparable system, and modularity so you can add functions when you need them. *Circle item number 287.*

**Cameras.** Unsurpassed Bosch quality is designed into every model in the complete line, ranging from the economical KCP-60 studio camera to the exciting new KCA-100 EFP/ENG camera with available fiber optics link. *Circle item number 288.*

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**Monitors.** Fernseh is giving you a choice you never had before. Our full line of color monitors now includes the superb MC-37 15-inch and MC-51 20-inch series. *Circle item number 291.*

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Judge Fernseh’s star quality for yourself. Just circle the item numbers for the product areas of your interest on the card in the back of this publication. We’ll rush literature off to you.

If you can’t wait, call right now, toll-free: 1-(800) 821-7700, Ext. 701 (In Missouri, 1-(800) 892-7655, Ext. 701.). Fernseh Inc., the Video Corporation of Bell & Howell and Robert Bosch, P.O. Box 15068, Salt Lake City, Utah 84115.

From now on, look to Fernseh.

FERNSEH

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**Note:** The text above is a sample of how the document might be represented in plain text format. The actual content is not clearly visible due to the image quality, and the text is not complete or accurately transcribed. The document appears to be a directory of electronic and communication products and services, listing various companies and their contact details and product offerings. The page is part of a larger directory, as indicated by the references to pages and sections marked as "See Adv. Page."
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Circle (143) on Reply Card
Exceptional fluid control for heavy television cameras.

O’Connor Model 150.

INFINITELY VARIABLE DRAG CONTROL.
Exceptional pan and tilt drag control is made possible with the 150’s unique varying overlap fluid control system. Between the minimum and maximum levels of drag, the drag force is infinitely variable—enabling cameramen to adjust the drag while shooting without jerking the camera in any way.

PRECISE DRAG REPEATABILITY.
Separate pan and tilt drag dial indicators are provided to aid the cameraman when precise repeatability of a motion is needed. The dials also aid in matching the tilt and pan drag for exceptionally smooth horizontal shots.

EXCEPTIONAL COUNTERBALANCE.
The 150 is counterbalanced at all times, including extreme tilt positions, making operation much easier. A 1000 in-lb spring comes standard with an optional 1500 in-lb spring also available so the 150 can handle any TV camera with all the extras up to 150 lbs.

SEALED SYSTEM FOR LOW MAINTENANCE.
Like all O’Connor fluid heads, the Model 150 is fully sealed off from all contaminants. Once the head is properly adjusted and balanced for your camera, it requires virtually no maintenance whatsoever.

EXCEPTIONAL QUALITY THROUGHOUT.
The 150 is built of lightweight aluminum and magnesium castings, weighing only 25 lbs. The pan and tilt locks are fully independent of the pan and tilt drag adjustments. The tilt range is ±45°.

THE EXTRAS COME STANDARD.
The Model 150 comes equipped with an O’Connor adjustable and removable platform with double handles. The 1500 in-lb counterbalance spring is optional. An exceptionally well-constructed carrying case is probably the only accessory your Model 150 will need.

O’Connor Engineering Labs., Inc., 100 Kalmus Drive, Costa Mesa, CA 92626 • (714) 979-3993 • TELEX 685 641
O’Connor Engineering Ltd., 14 Av. Industrielle, 1227 Carouge, Geneva, Switzerland • Phone (022) 42 79 38 • TELEX 28 449

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QUANTAFONT television production titlers are available in a product line designed to satisfy virtually any titling requirement — from limited budget industrial or educational applications to the high demands of commercial or broadcast studios. All are microcomputer based, software intensive, compact systems that provide extensive display versatility and variety. Numerous character sizes and a wide variety of resident fonts with large resident RAM memories are standard features in all systems.

The titlers as listed indicate only the basic differences between the various models. Complete feature listings and system descriptions are available from System Concepts' offices and from dealers located worldwide.

**MODEL Q-7A**

**MODEL Q-7A/R**
Rack mount electronics with remote keyboard and multiple remote keyboard capability. Display features the same as Q-7A with the addition of RS-232-C input for external data interface.

**MODEL QST**
Automatic Subtitling System. Includes a Q-7A/R production titler with EBU/SMPTE time code interface, expanded software subtitle timing and operations package, and dual disc extended memory for mass title storage. Functional as a studio production titler or automatic subtitler utilizing Q-7A display capabilities.

**MODEL Q-VII**
Commercial, industrial and educational titling features. Multiple resident fonts of large and small caps and true upper and lower case characters. 20 character size selection of all fonts. NANOLOG* character resolution. Colorized characters, backgrounds and graphic separators. Full borderline and shadow edge selections. Self-contained keyboard and electronics. Optional international accents and custom logo capability.

**MODEL Q-6/B**
Industrial and educational titling features. 24 character sizes selectable by row. Large and small capital letters by row of 32 horizontal pixel bold face font. Color backgrounds and graphic separators. Self-contained electronics and keyboard. Optional international accents.

**MODEL Q-6/A**
All of the standard features of Q-6/B in monochrome only.

**MODEL Q-6/M**
Automated mass memory information display system. Programmable control over digital cassette memory. Over 3,000 rows — 400 pages typical. All display qualities and standard features of Q-6/B available for automatic recall.

**MODEL Q-V**
Industrial and educational titling features. 12 character sizes selectable by row. Large and small capital letters by row of 32 horizontal pixel bold face font. Monochrome only. Self-contained electronics and keyboard. Optional international accents. Optional on-board mini-cassette extended memory.

**EXTENDED MEMORY SYSTEMS**

**FLEXIBLE DISC MEMORY** Single or dual mini-disc storage systems. 100, 16-row pages per disc. Random or sequential page access of less than .5 second. Total data block of resident memory storage per disc. Memory console can accommodate 6-inch monitor. Available for use with models: Q-7A/R, Q-7A, Q-VII, Q-6/B and Q-6/A.

**DIGITAL CASSETTE MEMORY** High speed computer grade cassette tape systems. Block load storage of entire resident memory. Self-standing or top-mouting console. Top-mounting console can accommodate a 6-inch monitor.

**NightWatch™**
Automatic all-night character generator display for broadcast sign-off to sign-on void. Displays 7 or 8-row formatted newswire service, local weather from sensors and one-row keyboard entry 2,720 character crawl. Color backgrounds and teleproduction quality character font. Rack mount electronics and remote keyboard.

*20 nanosecond effective average start-point resolution with patent-pending NANOLOG™ circuit.

System Concepts, Inc. Corporate headquarters, 2440 South Progress Drive, Salt Lake City, Utah 84119, (801) 974-0992, TWX 910-925-5864 / Cleveland, (206) 692-3410 / Tulsa, (918) 627-4151

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- DYMA Engineering, Inc.
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- Excalibur Electronics, Inc.
- The Finney Co.
- Harris Corp. Broadcast Products Div.
- Integrated Sound Systems Inc.
- Logitek Electronic Systems, Inc.
- Micro-Track Corp.
- Panasonic Company
- ProTech Audio Corp.
- QRK Broadcast Electronics
- RTS Systems, Inc.
- Ramko Research Inc.
- Richmond Sound Design, Ltd.
- Russo Electronics Mfg. Inc.
- Scantex Labs Inc.
- Sharp Electronics Corp. Professional Products
- Shure Brothers Inc.
- Sontec Electronics
- Sound Technology
- Spectra Sonics
- Straight Wire Audio, Inc.
- TEAC Corp of America

**Preamplifiers, Turntable**

- ATI-Audio Technologies Inc.
- Applied Technology Corp.
- Arrakis Systems Inc.
- Audio Technology
- Audionics, Inc.
- Audiotechnics Inc.
- Broadcast Audio Corp.
- Broadcast Electronics, Inc.
- Cetec Broadcast Group
- Continental Electronics Mfg. Co.
- D-B Electronics Inc.
- Datatronics, Inc.
- DYMA Engineering, Inc.
- EAB Systems, Inc.
- EMT-FRANZ GMBH
- Excalibur Electronics, Inc.
- Gregg Laboratories
- Hammond Industries Inc.
- Harris Corp. Broadcast Products Div.
- How Audio Productions, Inc.
- LPI Inc.
- Logitek Electronic Systems, Inc.
- McCurdy Radio Ind. Inc.
- McMartin Industries, Inc.
- Micro-Track Corp.
- Modular Audio Products Unit of Modular Devices, Inc.
- Rupert Neve, Inc.
- Oamp Labs, Inc.
- Pinzone Communications Products Inc.
- ProTech Audio Corp.
- QRK Broadcast Electronics
- RTS Systems, Inc.
- Radio Systems Inc.
- Ramko Research Inc.
- Russo Electronics Mfg. Inc.
- Scantex Labs Inc.
- Sontec Electronics
- Sound Technology
- Spectra Sonics
- Stanton Magnetics Inc.
- Straight Wire Audio, Inc.
- United Recording Electronics Industries
- Westrex
- Wilkinson Electronics, Inc.

**Processing Equipment, Audio**

- ATI-Audio Technologies Inc.
- Audio & Design Recording, Inc.
- Circuit Research Labs, Inc.
- dbx, Inc.
- Dolby Laboratories, Inc.
- Eventide Clockworks, Inc.
- Inovonics Inc.
- Orban Assoc., Inc.
- United Recording Electronics Industries
- Applied Technology Corp.
- Audionics, Inc.
- Broadcast Audio Corp.
- Broadcast Electronics, Inc.
- Cetec Broadcast Group
- Continental Electronics Mfg. Co.
- D-B Electronics Inc.
- Datatronics, Inc.
- DYMA Engineering, Inc.
- EAB Systems, Inc.
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- Howe Audio Productions, Inc.
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- Logitek Electronic Systems, Inc.
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- McMartin Industries, Inc.
- Micro-Track Corp.
- Modular Audio Products Unit of Modular Devices, Inc.
- Rupert Neve, Inc.
- Oamp Labs, Inc.
- Pinzone Communications Products Inc.
- ProTech Audio Corp.
- QRK Broadcast Electronics
- RTS Systems, Inc.
- Radio Systems Inc.
- Ramko Research Inc.
- Russo Electronics Mfg. Inc.
- Scantex Labs Inc.
- Sontec Electronics
- Sound Technology
- Spectra Sonics
- Stanton Magnetics Inc.
- Straight Wire Audio, Inc.
- United Recording Electronics Industries
- Westrex
- Wilkinson Electronics, Inc.

**Processing Equipment, Video**

- Automation Techniques, Inc.
- Robert Bosch GmbH
- Composite Video
- Faroudja Labs
- Fernshe Inc.
- Grass Valley Group, Inc.
- Harris Corp. Broadcast Products Div.
- Image Resource Corp.
- Industrial Sciences, Inc. (ISI)
- Kreonite, Inc.
- Leitch Video Ltd
- Lenco Electronics Div.
- MCI/Quartel
- Marconi Electronic Industries Inc. Broadcast & Communication Div.
- Microtime, Inc.
- Signel Electronics
- 3M Co.-Professional A/V Equip.
- Versa Counter Engineering

**Producers, Bleach Regeneration**

Eastman Kodak Co.

**Producers, Electronic Still**

ADD Corp.

**Programmer/Comparators**

**Processing Equipment, Video**

**Producers, Slide**

- Buhi Optical Co.
- Eastman Kodak Co.
- The Great American Market
- Hammond Industries Inc.
- Harris Corp. Broadcast Products Div.
- Kliegl Bros. Lighting
- Land Telemedia Inc.
- Magnavox CATV Systems, Inc.
- Optical Radiation Corp.
- Radmar, Inc.
- Rangertron Research Inc.
- Spindler & Saupe, Inc.

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- Broadcast Video Systems Ltd.
- Central Dynamics Corp.
- Grass Valley Group, Inc.
- Leitch Video Ltd.
- Xedit Corp.

**Purchasing Services, Broadcast Equipment**

- CSP Inc.
- Jim Cason Electronics
- Centro Corp.
- DYMA Engineering, Inc.
- Industrial Marketing Advisory Services, Inc.
- Old Dominion Broadcast Eng. Service

**Projectors, Film**

- Bell & Howell Audio Visual Div.
- Dukane Corp. Audio-Visual Div.
- Eastman Kodak Co.
- Harris Corp. Broadcast Products Div.
- Kalart Victor Corp.
- L-W International
- Leith Audio Visual Div.
- Magnavox CATV Systems, Inc.
- Marconi Electronic Industries Inc. Broadcast & Communication Div.
- Microtime, Inc.
- Signel Electronics
- 3M Co.-Professional A/V Equip.
- Versa Counter Engineering

**Projectors, Film Rear**

**Projectors, Slide**

- Bell & Howell Audio Visual Div.
- Dukane Corp. Audio-Visual Div.
- Eastman Kodak Co.
- Harris Corp. Broadcast Products Div.
- Kalart Victor Corp.
- L-W International
- Leith Audio Visual Div.
- Magnavox CATV Systems, Inc.
- Marconi Electronic Industries Inc. Broadcast & Communication Div.
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**Pulse Assignment Systems**

**Quadruphonic Systems**

- Audiofonic, Inc.
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- Leitch Video Ltd.
- Xedit Corp.

**Purchasing Services, Broadcast Equipment**

- CSP Inc.
- Jim Cason Electronics
- Centro Corp.
- DYMA Engineering, Inc.
- Industrial Marketing Advisory Services, Inc.
- Old Dominion Broadcast Eng. Service

**Quadruphonic Systems**

- Audiofonic, Inc.
- Belar Electronics Lab., Inc.
- Catel Div. United Scientific Corp.
- Rupert Neve, Inc.
- Spectra Sonics
- Tangent Systems, Inc.
Beyer. We make the best broadcast mics, too.

In recording studios, concert halls and theatres worldwide, Beyer is the premier name in microphones. Loved by performers and respected by engineers. Now that same Beyer quality is available in a full line of innovative broadcast microphones, to meet every need and solve every problem.

The Beyer MCE 5 is the world’s smallest electret condenser and provides true broadcast-quality audio from a 7 x 23 mm. cylinder weighing just 6.5 grams. It has wide frequency response, but is immune to most body noises. And you can hide it almost anywhere and connect it to a cable or a wireless transmitter.

If you can’t get the mic near the sound source, try our Beyer MC 717 shotgun. It has a directional gain of at least 20 dB and a 40-20K frequency response.

The MC 717 is part of a modular condenser mic system consisting of six different transducer capsules plus amplifiers and phantom power supplies that can be perfectly tailored for a wide range of broadcast situations. They’re all ruggedly built to handle ENG as well as studio work and can accept temperatures up to 160° and 99% humidity.

Other mics include: the M 55 — an omni-directional dynamic mic that is especially suited for reporters and field interviews; the M 69 — a uni-directional hypercardioid dynamic mic that is perfect for announcers on TV and a studio mic in radio stations; the M 88 — a uni-directional cardioid dynamic mic with warm and full bass response that is ideal for booth or radio announce. This is easily one of the best mics in the business — with a special suspension that eliminates transmitted noise if hand held. Our M 201 is another microphone with excellent vocal characteristics that is favored by singers and reporters alike.

There are many more mics in the Beyer line, plus stands, booms, headsets and accessories. Visit your local Beyer distributor for more information and specs.

Beyer Dynamic

BEYER DYNAMIC, INC.
5-05 Burns Avenue, Hicksville, NY 11801 • (516) 935-8000
In Canada, H. Roy Gray, Ltd.

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Weather Services Corp.
Weathermation, Inc.
Video Data Systems
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Denrad Technical Group
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Sperry Marine Systems Sperry Corp.
Sperry Weather Systems Technology Service Corp.
Development Labs Div.
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Video Data Systems
Weathercaster, Inc.
Weathermentation, Inc.
Weather Services Corp.

Radomes
Andrew Corp.
Cetec Broadcast Group
Gabriele Electronics Inc.
Harris Corp. Broadcast Products Div.
Micro Communications, Inc.
Nuveco, Inc.
Shively Laboratories, Inc. Div. of Howell Labs, Inc.
Tayburn Electronics, Inc.

**Receivers, AM**

TFT Inc./Formerly Time & Frequency Technology Inc. 201

Bell Audio Systems, Inc.
Bogen Div. Lear Siegler, Inc.
Communiquos Ltd.
Delta Electronics Inc. (VA)
Eaton Corp., L.A. Plant Elec.
Instrumentation Div.
Eumig USA, Inc.
International Microwave Corp.
Kahn Communications, Inc.
McKay Dymek Co.
McMartin Industries, Inc.
Panasonic Company
Potomac Instruments, Inc.
Sharp Electronics Corp. Professional Products
TFT Inc./Formerly Time & Frequency Technology Inc.

**Receivers, Data**

TFT Inc./Formerly Time & Frequency Technology Inc. 201

Coastcom
Communiquos Ltd.
Electrohome Ltd.
International Microwave Corp.
Johnson Electronics Inc.
LeCroy Fibertek Systems Div.
McMartin Industries, Inc.
Microwave Assoc. Communications
TFT Inc./Formerly Time & Frequency Technology Inc.
Telesound Communication Services
Vaile, A Phillips-M/A-Com. Venture

**Receivers, EBS**

TFT Inc./Formerly Time & Frequency Technology Inc. 201

Emergency Alert Receiver Inc.
Gorman-Redlich Mfg. Co.
Harris Corp. Broadcast Products Div.
Johnson Electronics Inc.
McMartin Industries, Inc.
Microwave Assoc. Communications

**Receivers, Earth Station**

Avantek Inc.
California Microwave
Electrohome Ltd.
Gardner Communications Corp.
Harris Corp. Broadcast Products Div.
Microdyne Corp.
Microwave Assoc. Communications
Modulation Associates Inc.
NEC America, Inc. Broadcast Equip.

**Receivers, FM**

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Altec Lansing Int'l.
Bang & Olufsen of America
Bell Audio Systems, Inc.
Bogen Div. Lear Siegler, Inc.
Catel Div. United Scientific Corp.
Communiquos Ltd.
Eaton Corp., L.A. Plant Elec.
Instrumentation Div.

**Receivers, HF**

Communiquos Ltd.
Electrohome Ltd.
Kahn Communications, Inc.
Marconi Electronics Inc. Broadcast & Communication Div.
Marconi Instruments Div. of Marconi Electronics Inc.
McKay Dymek Co.
Nagra Magnetic Recorders, Inc.
Rohde & Schwarz Sales Co.
Scientific Radio Systems, Inc.

**Receivers, Microwave**

TFT Inc./Formerly Time & Frequency Technology Inc. 201

Avantek Inc.
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**Receivers, SCA**

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Panasonic Company
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Rohde & Schwarz Sales Co.
Sharp Electronics Corp. Professional Products
Sony Corp. of America

**Receivers, TV Monochrome**

Electrohome Ltd.
Panasonic Company
Panasonic Co. Video Systems Div.
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Panasonic Company
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United Research Lab Corp.

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Gould Inc. Instruments Div.
Harris Corp. Broadcast Products Div.
Inovonics Inc.
International Tapetronics Corp.
Magnasonic/Moviola Corp.
Studer Revox America
Tobar Mfg. & Eng. Co.

**Recorder Carrying Systems, Videotape**

Datatronix, Inc.
Merlin Engineering Works, Inc.

**Recorder Modifications, Reel Servo**

Inovonics Inc.
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**Recorder Replacement Capstan Assembly**

United Research Lab Corp.

**Recorder Replacement Electronics**

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Lawhead, Ltd.
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Other Products
Opamp Labs, Inc.
Sharepoint Systems Inc.
Sonete Electronics
Studer Revox America
Taber Mfg. & Eng. Co.
United Research Lab Corp.
VIF International

**Recorder Replacement Motors**

Broadcast Electronics, Inc.
Merlin Engineering Works, Inc.
UMC Electronics Co. Broadcast Products Div.
United Research Lab Corp.
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Deltronics Inc.
EMT-FRANZ GMBH
Hitachi Corp.
Broadcast Products Div.
IGM Communications
International Electro-Magnetics
International Tapetronics Corp.
McCurdy Radio Ind. Inc.
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Dichtphone Corp.
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Marconi Electronics Inc.
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Merlin Engineering Works, Inc.
NEC America, Inc.
Broadcast EQUIP.
Phillips Broadcast Group
Central Dynamics Corp.
RCA Broadcast Systems
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Command Productions Radio Broadcasting Services
Media Concepts, Inc.
Old Dominion Broadcast Eng. Service
Peters Productions, Inc.
Tape-Athon Corp.
Cavox Stereo Productions
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Lightning Elimination Assoc., Inc.
Motorola Semiconductor Products Inc.
Straight Wire, Inc.
The Superior Electric Co.
Topaz, Inc.

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Channelmatic, Inc.
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Motorola Communications and Electronics Inc.
ProTech Audio Corp.
Telfax Communications

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Motorola Communications and Electronics Inc.
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American Quotation System, Inc.
IF WE SAID YOU COULD MAINTAIN HIGH PRODUCTION STANDARDS FOR LESS THAN $2000, YOU'D SAY WE'RE UNBALANCED.

By using a -10 unbalanced system, instead of +4 balanced, we eliminated hundreds of dollars of line amplifiers, transformers and balanced audio cables.

And that's how the Tascam 35-2B recorder/reproducer can save you money.

Without compromising your professional quality one nanoweber.

Unless you're running cable hundreds of feet long, there's no real difference between balanced and unbalanced. Since input/output levels and impedance aren't factors in recording quality.

So it pays to use the Tascam 35-2B in production, where you're not running long cables.

Which brings us back to quality. We know the most important thing in broadcast production is the signal that goes on the tape. That's why the 35-2B meets NAB standards. 185 nanowebers per meter.

And with a switchable 1/4-track playback head built in, you get greater flexibility at no extra cost.

What's more, the 35-2B features a rugged three-motor transport system and full IC logic transport controls. Cue and Edit functions and a flip-up, hinged head cover help make editing easy and effortless.

For more details, see your Tascam Series dealer. He'll be happy to show you how being unbalanced can improve your balance sheet.

Specifications (15 IPS)

Wow and Flutter:
0.03% RMS (NAB weighted)
±0.05% peak
(DIN/IEC/ANSI weighted)

Frequency Response:
40 Hz-22 kHz, ±3dB at 0 VU

Signal to Noise Ratio:
Reference 1 kHz at 10 dB above 0 VU (650 nW/m) 65 dB A weighted (NAB) 92 dB A weighted with integral dbx*

*dbx* is a trademark of dbx Incorporated.

TASCAM
Teac Production Products Group

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- Avantek Inc.
- Cherry Electrical Products
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- Fairchild Camera & Instrument Corp.
- CCD Imaging Div.
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- Micro Communications, Inc.
- The Narda Microwave Corp.
- North Hills Electronics, Inc.

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- Arvin/Echo Science Corp.
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- EEE Canada Ltd.
- Electronic Devices, Inc.
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- RCA Distributor & Special Products Div.
- Westonhouse Elec. Corp.
- Semiconductor Div.

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- Amperex Electronic Corp.
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- Electronic Devices, Inc.
- Mallory Distributor Prod. Co. Mallory Components Group
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- Westonhouse Elec. Corp.
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- Wilkinson Electronics, Inc.

Semiconductors, Rectifier Power

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Garnier Industries
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  - Frank Rush-Audio/Video; Max McCollough—Magnetic Tape

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- **Axcess Video,** 2693 Phinom Ave., Huntington Valley, PA 19006
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  - Analog Devices, Inc., Box 280, Norwood, MA 02062

- **Axten Corp.,** Box 1150, Apts, CA 95003
  - Analog Devices, Inc., Box 280, Norwood, MA 02062

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With features like these, no wonder you find dbx compressors working for some of the most demanding engineers in the world.

dbx compressors. They go over easy. Which is why they go over big.

For more information, write Professional Products Division, dbx, Inc. 71 Chapel St., Newton, Mass. 02195 U.S.A. Tel. (617) 964-3210. Telex: 92-2522. Distributed in Canada by BSR (Canada), Ltd., Rexdale, Ontario.
THE INTELLIGENT TEST SET
THAT CLEANS UP
YOUR ACT.

The Sound Technology 1500A

It's the first microprocessor controlled audio measurement test system. It can do in minutes what used to take hours with more conventional and ordinary test set-ups. And, it can show you things you've never seen before.

Designed around the most advanced microprocessor hardware, the 1500A will show you the whole story on an integral CRT with adjustable cursor. Push a "Copy" button, and it delivers a hard-copy printout from the optional VP-150 Video Printer.

What Will It Do?
Conceived to be the ultimate precision test instrument for tape recorder analysis, the 1500A evolved into a comprehensive audio test system for many applications. Here's just a small sample of the varied jobs it will do:
- Complete tape recorder mechanical and electronic performance checks
- Thorough phono cartridge analysis
- One-third octave spectral analysis
- Evaluation of audio quality for VTR's
- Acoustical room analysis including microphone and loudspeaker measurements
- Quality control for high speed tape duplication systems
- Semi-automated production testing
- Research and development for the audio tape manufacturer
- Quality assurance for the audio distribution network
- Exclusive asynchronous inputs and outputs for remote location testing (satellite, transmitter, studios, etc.)

Here's the kind of data you can get:
- Frequency Response
- Azimuth at 4 discrete frequencies
- 2nd and 3rd Harmonic Distortion Vs. Level
- Wow & Flutter; noise; weighted or flat
- Channel Separation 20Hz - 20k
- Delta Speed & Drift

Because of the modular plug-in design, the 1500A is designed to grow with you. The first plug-in option will be available soon: a spectral noise and flutter card. Other current accessories include a hard-copy printer, flight case, rack mounting ears, and our own test record for phono cartridge analysis.

Who Can Use It?

Clean up your act with the 1500A. It's intelligent. And so is a phone call to Sound Technology. We'll be pleased to send full information on the 1500A and our other industry standard test equipment.

SOUND TECHNOLOGY
1400 Dell Avenue, Campbell, CA 95008
(408) 378-6540/Telex: 357445

Please send me more information on how the Sound Technology 1500A System can help me clean up my act.

NAME
COMPANY
ADDRESS
CITY STATE ZIP PHONE

SOUND TECHNOLOGY
© Sound Technology 1981
Take a close look at what Tape Transports are going to be like in the ’80s

The all new Telex 3000 is here NOW!

No industry has witnessed more technological improvements over the past few decades than our own. So, if you’re looking for a tape transport for broadcast, studio or industry, it’s important to choose a product with all the latest industry innovations in one unit, the NEW Telex 3000. Write for exciting details about these features.

- Interchangeable head blocks
- A.Q.R. (Auto Cue Release)
- Differential electro-mechanical braking
  - Spill-proof logic
  - Motion sensing
  - Tape counter
- 4 head capability
- Hyperbolic tape path
- Remote control capability
- Play only or record/play combinations
- Auto cue/rewind/cycle
- Dual speed
- Hysteresis drive motor
- Two torque spooling motors
- Quiet operation
- 120/240 volt operation
- Urethane pressure roller

Quality products for the audio professional

TELEX

TELEX COMMUNICATIONS, INC.

9800 Aldrich Ave. So., Minneapolis, MN 55420 U.S.A

Europe: 22, rue de la Legion-d’Honneur, 93200 St. Denis, France

Circle (159) on Reply Card

September 1981  Broadcast Engineering  195
Since 1970, TFT, Inc. has been a pioneer in state-of-the-art broadcast technology. As such, we have been able to always keep one move ahead in cost-effective design to provide reliable, versatile and innovative products to the broadcast industry.

TFT was the first to use frequency synthesized circuits in its full line of AM, FM, TV, stereo and SCA Modulation Monitors. TFT concepts in Remote Control Systems now allow expansion all the way to microprocessor based data logging, display and alarm systems. In the relatively new field of Studio Transmitter Links, TFT has made major contributions through the use of IF modulation transmitters and pulse counting discriminators to improve both S/N ratio and stereo performance.

Even in the Emergency Broadcast System (EBS), TFT has taken a leadership role in the development of both EBS generators and receivers.

Now, it's your move! Call or write TFT today for full facts on their winning product lines.
And it goes for every Z editor ever built.
Considering all the advancements made in videotape editing systems in just the last three years, you might think your Mini-Z or Z-6 editing system is becoming obsolete. Well, it's not.

In fact, even though we're introducing a whole new line of Z6000 editors, the very first Z editor we ever built can be fully upgraded to Z6000 capability for less than $4,500!

So, if you own a Videomedia editing system, hang on to it. For a surprisingly low cost, you can expand its capabilities whenever you want.

Frame accurate editing, for under $11,000.
Don't buy a system with more features than you need. If you do, you're paying for "extras" before you can use them. Instead, invest in a system that can grow with you.

For example, start with a Z6000-A, a cuts-only editor with four-way split edits, auto extend and tag, four-event swap/recall, printer output, and the ability to select in and out points on the fly. Like all Z6000 editors, it has distributed intelligence, which controls each transport with an individual microprocessor, thus eliminating timing discrepancies... all for less than $11,000!

What's more, you'll be able to add features, such as our new KR6000 character generator for integrated graphics control, when you need them, at a fraction of the cost of a new system with the same capabilities.

Keep up to date at your own pace.
Whenever we build a new product or add a new capability, we make sure that it adapts to all our previous systems.

That's why, when you buy any Videomedia product, you're investing in a system with a future.

For complete details on our entire line of editing systems, post-production equipment, and a copy of our exclusive No-Obsolescence Policy, call or write today.
When you help the United Negro College Fund, you're really helping yourself. Because when you need someone to fill a position, you'll have a qualified graduate that you helped educate.

UNCF member schools prepare their students for demanding business careers. They're taught business management, computer science, accounting, engineering. So they're ready to graduate into a business like yours.

Your contribution to the United Negro College Fund helps support 41 private, predominately black colleges and universities. Where thousands of students graduate each year with the skills and education that could be just what you're looking for.

So help them now. Send your check to the United Negro College Fund, Box K, 500 East 62nd St., New York, N.Y. 10021. And they'll be ready when you need them.

GIVE TO THE UNITED NEGRO COLLEGE FUND.
A MIND IS A TERRIBLE THING TO WASTE.
"Frankly, we couldn't handle our current volume of business without our Computer Concepts System"

Harley Drew
Operations Manager
WBBQ, Augusta, Georgia

Harley Drew knows the radio business and computers. He knows the importance of preparing billing documents the way clients want to see them. "A customer may be flooded with invoices, but ours are paid first." Why? Because each customer of WBBQ gets his invoice the way he wants to see it, even with exact times listed, if desired. "We don't have the manpower to prepare these invoices by hand, but our computer can do it, error-free, in less time than a lunch break."

But a computer system from COMPUTER CONCEPTS CORPORATION will do more than produce impressive billing documents. It will also schedule spots and print logs, all with electronic speed. Similarly, it will pay your employees and vendors, and produce your balance sheets and operating statements.

Let's face it. A system from COMPUTER CONCEPTS CORPORATION can save you time and money. Ask Harley Drew. Or any of the other users of the Broadcast System—there are over 100 of them, coast to coast.

"We'd be sunk without it..."
Broadcast product dealer/distributors

For your added convenience, Broadcast Engineering has designed this Broadcast Product Dealer/Distributors section to provide close-to-home purchasing assistance. Use it, in conjunction with other sections in the 1981 Buyers' Guide, to plan new facilities, and equipment expansion or upgrading. For broadcast product dealer/distributors, this directory identifies: address and telephone, products handled and territory served.

Listings are arranged alphabetically by state. Firms listed do not include all dealer/distributors serving an area, but only those who returned BE's listing form.

Both a typical dealer/distributor listing, and the geographical area and product classification code keys are included on this page to assist you. We think you will find this section, in addition to the updated Product Directory and Broadcast Product Manufacturers' Addresses section, makes this issue the most useful and comprehensive purchasing aid for the broadcast industry.

Typical listing

<table>
<thead>
<tr>
<th>Firm Name</th>
<th>Street Address</th>
<th>City, State, Zip Code</th>
<th>Telephone</th>
<th>Geographical Area Served</th>
<th>Products Handled</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jones Broadcast Sales</td>
<td>2912 W. 10 St., Kansas City, Mo. 64105</td>
<td>816-842-1234</td>
<td>(1) IA, KS, MO, OK, 1, 2, 5, 7, 9</td>
<td>Iowa, Kansas, Missouri and Oklahoma, sells audio equipment, video equipment, tape, film equipment, and service and repair.</td>
<td></td>
</tr>
</tbody>
</table>

**Key to geographical area code**

- AK Alaska
- AL Alabama
- AR Arkansas
- AZ Arizona
- CA California
- CO Colorado
- CT Connecticut
- DC District of Columbia
- DE Delaware
- FL Florida
- GA Georgia
- GU Guam
- HI Hawaii
- IA Iowa
- ID Idaho
- IL Illinois
- IN Indiana
- KS Kansas
- KY Kentucky
- LA Louisiana
- MA Massachusetts
- MD Maryland
- ME Maine
- MI Michigan
- MN Minnesota
- MO Missouri
- MS Mississippi
- MT Montana
- NC North Carolina
- ND North Dakota
- NE Nebraska
- NH New Hampshire
- NJ New Jersey
- NM New Mexico
- NV Nevada
- NY New York
- OH Ohio
- OK Oklahoma
- OR Oregon
- PA Pennsylvania
- PR Puerto Rico
- RI Rhode Island
- SC South Carolina
- SD South Dakota
- TN Tennessee
- TX Texas
- UT Utah
- VA Virginia
- VI Virgin Islands
- VT Vermont
- WA Washington
- WI Wisconsin
- WV West Virginia
- WY Wyoming

**Key to product numerical code**

1 AUDIO EQUIPMENT (including recorders, microphones, mixers, consoles, cart machines, turntables, processing devices, etc.)
2 VIDEO EQUIPMENT (including cameras, videotape recorders, production switches, monitors, lights, etc.)
3 TEST AND MEASUREMENT EQUIPMENT (audio and video)
4 TRANSMITTERS, ANTENNAS AND TRANSMISSION SYSTEMS (including towers, ATS, STL, MDS, etc.)
5 TAPE (including video and audio recording tape, etc.)
6 VACUUM TUBES (including video camera, transmitter, TWI, etc.)
7 FILM EQUIPMENT (including cine cameras, processing equipment, film projectors, etc.)
8 VANS AND ACCESSORIES
9 SERVICE AND REPAIR
10 SYSTEM DESIGN (including studio installation, etc.)
11 USED EQUIPMENT (including leasing, rent, etc.)
COLORADO

Colorado Magnetics, Box 713, Colorado Springs, CO 80901 (303-596-0684) AZ, CA, CO, FL, ID, KS, MI, MT, NE, NV, NM, OH, OK, OR, SD, TX, UT, WA, WI 1, 2, 3, 4, 5, 10, 11

Colorado Telecommunications, Inc., 13750 E. 1st Ave., Littleton, CO 80120 (303-738-1002) AK, AZ, CA, CO, KS, MT, NE, NV, NM, OK, OR, SD, TX, UT, WA, WI 1, 2, 3, 4, 5, 8, 9, 10

Film/Video Equipment Service Co., 177 S. Pearl St., Denver, CO 80210 (303-778-8616) AZ, CO, KS, MT, NE, NV, NM, ND, SD, UT, WA 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

See advertisement on page 32

Western Tele-Communications, Inc., Box 215295, Wellington, CO 80222 (303-771-8200) AZ, CA, CO, ID, KS, MT, NE, NV, NM, ND, OR, SD, UT, WA, WI 4, 8, 10, 11

See advertisement on page 92

FLORIDA

Doug Holland Associates, 9035 S.W. 9th St., Boca Raton, FL 33433 (305-428-7120) FL, GA, IL, IN, IA, KY, LA, MD, MI, NE, NJ, NY, NC, OH, PA, SC, TN, TX, VT, VI, WA, WV, WI 1, 4, 5, 9, 10, 11

Pro Audio General Store, Inc., 1378 NW 100th Ave., Coral Springs, FL 33065 (305-752-0330) FL, GA, LA, MS, NC, SC 1, 5

Broadcast International, Inc., 1229 N.E. 37th St., Ft. Lauderdale, FL 33334 (305-564-4422) Worldwide 1, 3, 4, 5, 6, 10, 11

Lauderdale Electronic Labs, 16 S.W. 13th St., Ft. Lauderdale, FL 33315 (904-376-2435) FL 2, 5, 8, 9, 10

Southeast Electronics, Inc., 1125 Roselle St., Box 41308, Jacksonville, FL 32203 (904-351-3007) AL, FL, GA, LA, 2, 5, 6, 9, 10, 11

Electrex Co., 18680 Northeast 2nd Ave., Miami, FL 33179 (305-651-5752) U.S.A. and Latin America 1, 2, 3, 4, 5, 6, 10

Image Devices Inc., Box 610666, 1825 N.E. 149th St., Miami, FL 33181 (305-945-1111) AL, AR, FL, GA, KY, LA, MS, NC, OK, PR, SC, TN, VA, ONT, QUE 1, 2, 5, 7, 8, 9, 10, 11

Lita Broadcasting Distributors, 7154 N.W. 72nd Ave., Miami, FL 33166 (305-887-1223) FL, Central & South America, Caribbean 1, 4, 5, 6

See advertisement on this page

Midwest Telecommunications, 3331 Northwest 82nd Ave., Miami, FL 33122 (305-592-5355) AL, FL, GA 1, 2, 3, 4, 5, 9, 10

Stage Equipment & Lighting, Inc., 12231 NE 13th Court, Box 61000F, Miami, FL 33161 (305-891-2010) FL, GA, Caribbean, Central & South America 2, 9, 10, 11

Crescendo Associates, 3597 Southwest 69th Terr., Miramar, FL 33023 (305-961-0886) AL, FL, GA, MS, NC, SC, TN 1, 10

Benscik Associates, 1627 E. Silver Springs Blvd., Suite F, Ocala, FL 32670 (904-327-9775) FL, PR 1, 2, 3

Global Video Communications Corp., 744 W. Church St., Orlando, FL 32805 (305-843-8982 or 423-8299) Southeast U.S.A. and Latin America 2

Gray Communications, 1605 S. Burnby Ave., Orlando, FL 32806 (305-896-7414) FL 2, 5, 8, 9, 10

Crescendo Associates, 9766 Deer Run Dr., Ponte Vedra Beach, FL 32082 (904-372-0881) AL, FL, GA, MS, NC, SC, TN 1, 10

Audio Visual Services, Inc., 5484 Jet Port Industrial Blvd., Tampa, FL 33614 (813-884-1461) U.S.A 1, 5, 7, 9, 10, 11

See advertisement on this page

Design Line, Inc., Box 260007, Tampa, FL 33685 (813-886-5073) AL, FL, GA 1, 2, 10

Gray Communications, 5401 Southern Comfort Blvd., Tampa, FL 33614 (813-885-1411) FL, PR 1, 2, 4, 5, 8, 9, 10, 11

GEORGIA

Image Devices Inc., 1651 Phoenix Blvd., Box 490250, Atlanta, GA 30349 (404-996-0000) AL, AR, FL, GA, KY, LA, MS, NC, OK, PR, SC, TN, WA, ONT, QUE 1, 2, 3, 5, 7, 8, 9, 10, 11

Siboney Audio Visual Products, Inc., 1760 Tally Circle, N.E., Atlanta, GA 30329 (404-329-9200) AL, FL, GA, TN, TX 1, 2, 5, 7, 9, 10, 11

Technical Industries Inc., of Georgia, 6000 Peachtree Rd. N.E., Atlanta, GA 30341 (404-455-7610) GA, SC 1, 2, 3, 10

Quality Media Corp., Box 7008 Columbus, GA 31908 (800-241-7878; in GA 404-324-1271) U.S.A. and Canada 1, 2, 3, 4, 5, 6, 7, 8, 10, 11

Gray Communications, 3684 Clearview Ave., Doraville, GA 30340 (404-455-3211) GA 1, 2, 5, 7, 8, 9, 10, 11

See advertisement on this page
(See page 210 for key to listings)

Audio Distributors, Inc., 2342 S. Division Ave., Grand Rapids, MI 49507 (616-452-1596) U.S.A. 1, 3, 4, 5, 10, 11
Victor Duncan, Inc., 32380 Howard St., Madison Heights, MI 48071 U.S.A. and Canada 1, 2, 3, 5, 6, 7, 9, 10, 11
V F Sales Inc., 41940 Joy Rd., Plymouth, MI 48170 (313-453-8720) MI 1, 3

T. R. Pitts Co., 458 W. Sanborn St.; Box
Clark R. Gibb Co., 11100 Bren Rd. W., Video Midwest, Inc., 434 Stinson Blvd., Todd
Emmons Associates, Inc., 1121 River -
V F Sales Inc., 41940 Joy Rd., Plym-
Audio Distributors, Inc., 2342 S. Divi-
(See page 210 for key to listings)

MISSOURI
Television Engineering Corp., 580 Goddard Ave., Chesterfield, MO 63017 (314-532-4700) IL, IA, KS, MI, MN, MS, MO, NE, OH, TN, 1, 2, 4, 5, 7, 9, 10
Dytec/South Inc., 11657 Adie Rd., Maryland Hts., MO 63141 (314-569-2990) AR, IL, IA, KS, MO, NE, OK, 1, 3, 4, 6, 11
Delcom Corp. of St. Louis, 2349 Gris-
Lines Video Systems, 219 S. Jeff-
Lines Video Systems, 219 S. Jeff-
LAS Video Lab, 250 Derry Rd., Hudson, NH 03051 (603-880-1896) ME, MA, NH, VT, 1, 2, 5, 9, 10, 11
Associated Systems, Box 333, Lon-
donderry, NH 03053 (603-434-0731 or 4533) CT, ME, MA, NH, NY, RI, VT, 1, 2, 3

MINNESOTA
Emmons Associates, Inc., 1121 River-
Ohms Lane, Minneapolis, MN 55435 (612-835-3080) IA, MN, NE, SD, WI 1, 2, 3, 5, 7, 9, 10, 11
Todd Communications Inc., 7360 Video Midwest, Inc., 434 Stinson Blvd., Minneapolis, MN 55413 (612-379-3300) IA, MN, NE, SD, WI 1, 2, 3, 5, 7, 9, 10, 11
Clark R. Gibb Co., 11100 Bren Rd. W., Minnetonka, MN 55343 (612-938-5434) MN, ND, SD, WI 1, 3, 5, 9, 10, 11
T. R. Pitts Co., 458 W. Sanborn St.; Box 57, Winona, MN 55987 (507-452-2629) All - MD, MN, SD, WI; Parts of - IL, IN, IA, KY, MI, MT, OH 1, 2, 3, 4, 5, 8, 9, 10

MONTANA
Holm-James Distributors Inc., 4th Ave. S. at 6th St., Box 2487, Great Falls, MT 59403 (406/761-2420) MT, Northern-WY 1, 2, 3, 5, 6, 9, 10

NEVADA
Cinema Services, 3050 Sheridan St., Las Vegas, NV 89102 (702-876-4667) AZ, NV, NM, UT 2, 7, 11

NEW HAMPSHIRE
New England Wholesale Supply, dba Video Lab, 250 Derry Rd., Hudson, NH 03051 (603-880-1896) ME, MA, NH, VT, 1, 2, 5, 9, 10, 11

NEW JERSEY
Landy Associates, Inc., 1890 E. Marion Pike, Cherry Hill, NJ 08003 (609-424-4660) CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT, 1, 2, 3, 5, 7, 8, 9, 10, 11
See advertisement on page 101

NEW YORK
Cesco Communications Inc., 2115 Avenue X, Brooklyn, NY 11235 (212-646-6300) Worldwide 6
See advertisement on page 244

H.M. HOLZBERG ASSOCIATES, INC.
P. O. BOX 322
TOTOWA, NEW JERSEY 07511

WE HAVE THE WINNERS
Manufacturer Rep Distributor of Equipment for: Radio & TV Broadcast – CCTV – Cable TV – Recording Studio – Communications.
Complete Radio TV Systems...Financing, Too!
Phone – The “Rep With A Smile” 201-256-0455

STYLIST SYSTEMS, INC.
TV • RF • AV
Domestic & International
Turnkey Systems
39 Industrial Avenue
Teterboro, N.J. 07608
(201) 280-6130
Telex: 134421

MIDWEST offers leading brands in every product category, strong in-stock position, and an on-line computer network, allowing same-day service from our multi-million dollar inventory to keep you operating and growing. . . good reasons to call MIDWEST for all your remote telecast units, cable supplies, and video needs.

Write or call for our new catalogs:
Request One or Both—
MIDWEST 1981 CATV PRODUCTS GUIDE
MIDWEST 1981 VIDEO PRODUCTS GUIDE

CALL US FOR THE PHONE NUMBER OF THE OFFICE NEAREST YOU—
800-543-1584
(in Ohio 800-282-0705)

MIDWEST CORPORATION
1021 West 6th Street
Cincinnati, Ohio 45203
A UNR Company

MISSISSIPPI
Central School Supply, 310 Airport Rd., Jackson, MS 39208 (601-932-1901) AL, LA, MS, TN 1, 2, 4, 5, 6, 7, 9, 10, 11
Transvolt, Inc., 4672 Nisqually Rd., Jackson, MS 39206 (612/362-2697) AR, DC, FL, GA, KY, LA, MD, MS, MO, NC, OK, SC, TN, TX, VA, WV 9, 10, 11

NEVADA
Cinema Services, 3050 Sheridan St., Las Vegas, NV 89102 (702-876-4667) AZ, NV, NM, UT 2, 7, 11

NEW HAMPSHIRE
New England Wholesale Supply, dba Video Lab, 250 Derry Rd., Hudson, NH 03051 (603-880-1896) ME, MA, NH, VT, 1, 2, 3, 5, 9, 10, 11

NEW JERSEY
Landy Associates, Inc., 1890 E. Marion Pike, Cherry Hill, NJ 08003 (609-424-4660) CT, DE, DC, ME, MD, MA, NH, NJ, NY, PA, RI, VT, 1, 2, 3, 5, 7, 8, 9, 10, 11
See advertisement on page 101

NEW YORK
Cesco Communications Inc., 2115 Avenue X, Brooklyn, NY 11235 (212-646-6300) Worldwide 6
See advertisement on page 244

Audio Video Corp., 55 Delaware Ave., Teterboro, N.J. 07608 (201) 288-6130 Telex: 134421

H.M. HOLZBERG ASSOCIATES, INC.
P. O. BOX 322
TOTOWA, NEW JERSEY 07511

WE HAVE THE WINNERS
Manufacturer Rep Distributor of Equipment for: Radio & TV Broadcast – CCTV – Cable TV – Recording Studio – Communications.
Complete Radio TV Systems...Financing, Too!
Phone – The “Rep With A Smile” 201-256-0455

MIDWEST offers leading brands in every product category, strong in-stock position, and an on-line computer network, allowing same-day service from our multi-million dollar inventory to keep you operating and growing. . . good reasons to call MIDWEST for all your remote telecast units, cable supplies, and video needs.

Write or call for our new catalogs:
Request One or Both—
MIDWEST 1981 CATV PRODUCTS GUIDE
MIDWEST 1981 VIDEO PRODUCTS GUIDE

CALL US FOR THE PHONE NUMBER OF THE OFFICE NEAREST YOU—
800-543-1584
(in Ohio 800-282-0705)
Temtron Electronics Ltd., 15 Main St., East Rockaway, NY 11518
(516-599-6400; 800-645-2300) U.S.A. 5, 6
London Electric, 27-16 Fortyfirst Ave., Long Island City, NY 11101
(212-786-1800) U.S.A. 1, 2, 3, 5, 9, 10
Team Electronics, Inc., 24-16 Queens Plaza South, Long Island City, NY 11101
(212-937-9200) U.S.A. 2, 5, 6, 7
Boynton Studio Inc., Melody Pines Farm, Morris, NY 13808
(607-263-5695) U.S.A.; in Canada: BC, MB, NB, NS, ONT, PEI, Que, Sask 1, 3, 4, 5, 10, 11
Richard W. Burden Associates, 342 Henry Grossman Farm, 11101 (212-599-6400; 516-599-6400) Worldwide 1, 2, 3, 5, 9, 10
Adwar Video Corp., 100 Fifth Ave., New York, NY 10003
(212-797-9330) U.S.A. and Canada 3, 5, 9, 10
Studio Film & Tape Inc., 630 9th Ave., New York, NY 10036
(212-679-1666) CT, NJ, NY, Mail Order in U.S.A. 1, 2, 5, 7, 9, 10
United Research Lab Corp., 16 East 52nd St., New York, NY 10022
(212-751-4663) Worldwide 1, 3, 5, 9
See advertisement on page 260
Videotape Services Inc., 855 Avenue of the Americas, New York, NY 10001
(212-695-6606) Worldwide 5, 7, 11
R F Gain, Ltd., 100 Merrick Rd., Rockville Centre, NY 11570 (516-386-8866; 800-645-2302) Worldwide 6
See advertisement on page 252
Northeast Broadcast Lab, Inc., 15 Charles St.; Box 1176, S. Glens Falls, NY 12801 (518-789-2181) CT, ME, MA, NH, NY, RI, VT, VT, NY 1, 2, 5, 9, 11
Motion Picture Enterprises, Inc., Box 276, Tarrytown, NY 10591
(212-245-0969) Worldwide 2, 5, 7, 10, 11
Singer Products Co., Inc., 875 Merrick Rd., Melody Pines, NY 11518
(516-684-5393) Worldwide 1, 3, 5, 9, 10, 11
United Radio Supply Inc., Box 14040, Portland, OR 97214 OR, WA 3, 6, 7, 8, 9, 10, 11
Doug Cook & Associates, 6300 Carmel Rd., Charlotte, NC 28211
(800/438-6040) AL, FL, GA, KY, OH, W-PA, TN, WV 1, 2, 3, 4, 10
Southern Coastal Marketing Services, Inc., 6300 Carmel Rd., Charlotte,
NC 28211 (704-542-6543) NC, SC, VA 1, 2, 3, 4, 5, 9
Electronic Merchandising Enterprises, Inc., 112 Buena Vista, High Point,
NC 27260 (919-869-3335) East-Coast, NC, East-TN, VA, WV 1, 2, 3, 4
Technical Video Systems, Inc., 215 N. Broad St., Winston-Salem, NC 27101 (919-748-0916) GA, NC, SC, TN, VA, WV 1, 2, 3, 4, 5, 7, 8, 9, 10, 11
See advertisement on this page

NORTH DAKOTA
Audiovisual Inc. Formerly Known As OMF Audiovisual, Inc., 1818 E. Broadway, Bismarck, ND 58501
(701-258-6560) MN, MT, ND, SD 1, 2, 3, 5, 7, 9, 10, 11

OHIO
Cercene Vincent Associates, Inc., 5020 Richmond Rd., Bedford Heights, OH 44146 (216) 292-2550 IN, OH, WV 2, 7, 10, 11
Cartwright Communications Co., 7812 Red Sky Dr., Cincinnati, OH 45242 (513-489-1755) Outside OH: 900-543-8614; OH: 900-582-2641 U.S.A., AK, HI 3, 4, 5, 6, 8, 9, 10, 11
See advertisement on pages 141, 214
KAVCO, Inc., 3931 Image Dr., Dayton, OH 45414 (513-236-5500) IN, KY, MI, OH, WV 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11

OREGON
United Radio Supply Inc., Box 14040, Portland, OR 97214 OR, WA 3, 6, 7, 8, 9, 10, 11

PENNSYLVANIA
P.A.G.E. Co., R.D. 8, Box 41, Allenwood, PA 18104 (215-395-3456) DE, DC, MD, NJ, NY, OH, PA, VA 4, 8, 9
Dimension Five Sound Co., 139 Montgomery Ave., Bala Cynwyd, PA 19004 (215-668-8260) DE, DC, NJ, NY, OH, PA 1, 3, 5, 7, 9, 10, 11

NORTH CAROLINA
Doug Cook & Associates, 6300 Carmel Rd., Charlotte, NC 28211
(800/438-6040) AL, FL, GA, KY, OH, W-PA, TN, WV 1, 2, 3, 4, 10
Southern Coastal Marketing Services, Inc., 6300 Carmel Rd., Charlotte,

OKLAHOMA
Hill Radio Equipment Co., Route 6, Box 622, Claremore, OK 74017
(918-341-5240) AR, KS, MO, OK 1, 3, 4, 5
Walter S. Brewer Co., Inc., 2216 East 56th Place, Tulsa, OK 74105
(918-747-3618) Worldwide 1, 3, 5, 9, 10, 11
See advertisement on page 242
Delcom Corp., 6019 S. 66th E. Ave., Tulsa, OK 74145 (918-494-9500) AR, KS, South IL, MO, OK 2, 3, 5, 7, 9, 10, 11

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Mead Data Central has introduced NEXIS, a computer-assisted electronic library that compiles news stories from major publications for instant access. To search for full text, a system is used that eliminates the need for an index or thesaurus. Also simplifying the process is a small video display terminal with controls labeled with straightforward English names.

Copy goes into the computer exactly as it appears in the publication—in upper- and lowercase letters, in sentences with punctuation intact, and with indented paragraphs. Any word, name, phrase or number—or any combination that occurs in the copy can be the basis of a search.

For example, a story about the Royal Wedding can be summoned by telling NEXIS, 'Find me stories in which the names 'Lady Diana' and 'Prince Edward' occur.'

The NEXIS compiles stories in full text for easy access and reference.
CBS said Thursday it has declined to join the two other major commercial networks and public broadcasting on captioning television programs for the deaf because the equipment to be used might soon become obsolete.

Gene Mater, a CBS vice president, explained the network's reluctance at a Federal Communications Commission briefing. At issue was the advisability of going ahead next year with a closed-captioning system already adopted by ABC, NBC and the Public Broadcasting Service, which serves about 240 stations.

Closed captioning differs from open captioning, now employed by PBS to air ABC News television broadcasts for the hearing-impaired. Closed captioning requires use of a decoder costing about $250 which, when turned on, enables the deaf or partially deaf to watch captions on their television screens.

It is estimated that as many as 20 million Americans have some form of hearing impairment, and the number is likely to grow. "The rock generation is going to be a deafener," FCC commissioner Abbott Washburn said.

The closed-captioning system is expected to start early next year. Start-up costs are being financed by the Department of Health, Education and Welfare.

Mater said CBS "wants to be sure that the method used is the best possible." He said the system being planned for U.S. use is outdated, and "the equipment may soon be rendered obsolete."

A printout from NEXIS data base was made by station WEWS-TV3 in Cleveland, OH. The system was asked to find teletext and captioning information just before a trip to England by Bill Rhodes, BE editorial director, to research British Teletext developments.
Charles' occur together." Because the search is not based on an index, key words that would have been used by the writer of a story on the subject are the basis of the search. These words would occur many times in the NEXIS library, but both in combination would bring up a few stories only. If a search such as this found more than a few stories, another word such as "honeymoon" might be specified in combination with Lady Diana and Prince Charles. The system is rapidly interactive. The operator can conduct a search until the particular story is located.

The stories are displayed on the terminal screen in full text or in keyword-in-context (KWIC) form for efficient browsing. In KWIC, NEXIS displays blocks of text from stories. Each block consists of words used in the search, shown in the context in which they appear.

If while skimming the stories found by the search, something is uncovered that would suggest a different approach, the operator can easily modify the search—by starting over, by deleting something, or by adding to the search. The dialogue with the computer continues while the operator browses.

Aside from locating a story by using key words, it is also possible to locate stories published only on a certain date, before a given date, after a given date or between two dates.

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Broadcast Engineering  September 1981
On site, the EMCEE solution to TV translator requirements is quite uncomplicated. A translator must go on the air quickly. Stay on the air continuously. And require a minimum of time and attention to accomplish both.

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With that in mind, EMCEE developed the new TUA1000C amplifier.* A one-thousand watt unit that shares the high gain, efficiency and reliability of the entire EMCEE line. And introduces further improvements like compact single bay construction. Solid-state control circuitry. LED status indicator. A slide out RF cavity and more. Which makes the TUA1000C amplifier the perfect solution for either conventional or new low power TV applications.

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NEXIS

tion—to stories, for example, from
Newsweek. These limitations can be
combined to find all the stories
published in Newsweek since January
1981 on a certain subject.

NEXIS currently covers the full text
of the Washington Post (1977 to pre-
sent); Dun's Review (1975 to present);
American Banker; the BBC's summary
of World Broadcasts; the BBC's
Monitoring Report; U.S. News and
World Report (1975 to present); Con-
gressional Quarterly Weekly Reports
and Editorial Research Reports; PR
Newswire; Jiji Economic News Ser-
dices; Kyodo English Language News
Service; and The Associated Press
(March 1979 to present). Wire service
can be done on the whole file, in-
dividual files, or groups of files
(newspapers, magazines or wire ser-
dices).

Mead Data Central and
Disclosure Inc., a Washington, DC-
based company, have made avail-
able in the NEXIS Service the
DISCLO library, a library prepared
by Disclosure, consisting of ex-
tracts of Securities & Exchange
Commission corporate filings for
the approximately 11,000 com-
panies required to make filings with
the SEC. These extracts comprise
corporate profiles and significant
items of information taken from
10-Ks, 8-Ks, registration state-
ments, prospectuses, 10-Qs and
proxies.

The initial DISCLO library avail-
able to NEXIS subscribers com-
prises company profiles for all com-
panies and extracts of 10-Ks for
listed companies (for example,
those traded on the New York and
American Stock Exchanges). Later
this year, extracts of 8-Ks, registra-
tion statements, prospectuses,
10-Qs and proxy statements filed by
these companies will be added to
the library. In addition, these filings
and extracts of 10-Ks will be added
for the approximately 7000 com-
panies traced over-the-counter.

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cess to the DISCLO library by exe-
cuting an agreement letter. Stan-
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with the SEC by approximately 9000 abstracts and extracts of reports filed and agreement with Mead Data Central Financial Service are also available.

Regional

The Latin American Newsletters and Xinhua, the New China news agency.

The following are some of the broadcast stations that subscribe to NEXIS: American Broadcasting Company (WLS-TV); Hubbard Broadcasting (WTOC, KSTP, KOB); Kronicle Broadcasting Company (KRON); Midwest Radio-TV (WCCO stations); National Broadcasting Company (WMAQ-Chicago); Scripps Howard (WCPO-TV, WEWS-TV); Taft Broadcasting (WBRC, WDAF, WKRC, WTVM); Westinghouse Broadcasting (KPIX); and WNEP Communications Inc.

Full text is used rather than abstracts to preserve objectivity. If someone creates an abstract or index, there are certain value judgments made—which pieces of information are valuable and which are not. These judgments may not agree with the ones that someone looking for that story at a later date might make.

Indexers make their judgments on the basis of what they know at the time. A fact that now seems insignificant, an aside in the story, may in the future become the most important reference in that story.

An index limits the operator to a specified group of topics. NEXIS allows the search to be made based on any word, phrase, number or any combination of these.

The system is kept current by daily updates. However, this will not substitute for a subscription to a particular publication, because newspapers are not available in NEXIS until the day after publication and weekly magazines a week after they are published. Wire service copy will appear 12 to 48 hours after it goes over the wire depending on the arrangement with that particular wire service.

Newspaper and wire service stories generally will be carried from January 1, 1977 to the present. Magazines will be carried from January 1, 1975.

For further information please contact our marketing department.
The BBC has recently opened its first multiple machine C-format 1-inch helical-scan videotape editing suite at the Television Centre in London. The corporation is gradually changing to C-format video recording and has developed its own edit control system.

Until recently, commercial editing systems have been designed for 1-man operation with a single dedicated control panel geared to computer-keyboard-type entry. The BBC system, however, offers a control panel per machine with dedicated switches for each function. Such a system is easy to use, allows for dual manning, thereby shortening editing time and also provides hands-on training for assistants.

Ray Taylor of the BBC's Engineering Designs Department, who had led the design team, said, "We set out to produce equipment that would meet the needs and specifications of the BBC's Television Engineering and Operations Department and they have been involved with us in the project from the start. Now we believe that we have ended up with an editing system which has most, if not all, the special features required by the BBC."

The suite consists of a new edit control system and can have up to four Ampex VPR2B 1-inch helical-scan videotape machines. Each machine has two microprocessors associated with it as part of the editing system. A Motorola MC 6800 handles the time code data and a Motorola 6802 checks and updates the incoming time code when the tape is running below the normal time-code reading speed.

With separate control panels for each machine, an editor and his assistant can work on a program at the same time. For example, the editor can complete one edit while his assistant is preparing the next. Editors can learn to operate the system more quickly because of the dedicated control buttons and switches for each function.

The system includes a data control unit, an events selector panel and playback control panels. The data control unit allows edit-point times to be entered into electronic stores either from small numeric keyboards or directly from tape time code. These newly entered time codes are then used to control the video and/or audio in-and-out points for the different edits. The stored times can be modified, removed from the store or transferred to another store during the editing session.

The events selector panel can be programmed to operate a mixer, a caption generator or a special effects unit within a sequence of up to 48 events. Event points, stored in the playback equipment, can be programmed to put the playback machines into a slow, play or stop mode at certain points in the program. Time code can also be used to start two 1/4-inch audio tape recorders. A time for an out-point, which is being rehearsed on a playback machine, can be automatically noted on the edit machine in this machine's own time code. Updating time code can be carried out when the tape is running at speeds that are too slow for the time code to be read, by using control track signals from the machine. In order to find a precise point, the tape can be
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The BBC new 1-inch editing suite. Shown (from left to right) are Don Kershaw (seated), BBC Television Engineering and Operations Department; Jerry Garratt, BBC Studio Capital Projects Department; and Ray Taylor, BBC Engineering Designs Department. The editing control panels are mounted behind the vision mixer within the three playback panels on the left. The edit control panel and the events control panel are on the far right.

Videotape

moved one frame at a time, in either direction, by special "jog" buttons.

The playback control panels are used to rehearse the material independently of the edit control panel. For example, with a 3-machine suite there is an edit machine and two playback machines. The control panel on each machine has buttons for controlling the data control unit as well as for functions such as play, stop and spool—and also for the various controls for editing. During editing, however, the edit control panel becomes the master control.

Already the system is proving to be so successful that the BBC's Engineering Equipment Department is developing four more for use by the BBC.

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TYPE 642-21 Degausser is similar to the 9205A except it is limited to erasure of 10½ inch reels. This unit is recommended where size and cost are limiting factors.

TYPE 8905 Magnetic Erasing Pencil is an excellent tool for erasing limited, small areas of tape or film and for demagnetizing record/play heads. In program material, words, complete sentences, and even syllables may be erased. This unit is equipped with a press-to-operate switch on the handle.

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September1981   Broadcast Engineering  227
WNYC experiments with “high tech” FM sound

By Victor Campos, director of technical development, WNYC, New York, NY

WNYC, New York City’s municipal station that encompasses AM, FM and a UHF-TV channel has a checkered and somewhat offbeat history. New York’s charismatic mayor of the late ‘30s and early ‘40s, Fiorello H. La Guardia, achieved broadcasting immortality when he used WNYC to read the comics to children during a newspaper strike. More recently, Edward Koch, New York’s current mayor, another colorful personality, decided that he wanted the names of men convicted of patronizing prostitutes broadcast in what became known as the “John Hour,” a short-lived series.

Koch, who launched his administration at the height of the city’s recent fiscal crisis, hired a new WNYC director, John Beck (formerly with WGBH, Boston’s prestigious public service radio station), giving him the task of phasing out the city funding for the station and moving it towards financial independence. But until that goal is achieved, WNYC operates on a financial shoestring and must present its highly regarded classical music programming with archaic and substandard transmitting and electronic equipment.

Despite these problems, Beck, who has launched an ambitious fund-raising drive, is determined not only to upgrade the station’s sound, but to eventually make it New York City’s sonic showpiece.

Within a year, Beck hopes to have a new studio, transmitter and updated audio equipment. To anticipate this, the author, a former WGBH associate, was brought in to produce and develop a series of experimental programs to showcase both the newly acquired high tech discs and the technical improvements that have already been achieved in the WNYC-FM signal.

Beck and I as co-hosts of the pro-

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gram Audiophile Showcase have been able to supplement the station's output.

Another goal of WNYC's high tech showcase was to develop a system so that the average station operator could broadcast the new high tech discs with maximum fidelity and with little compression. Within five years' time, there will be a whole new facet of the recording industry—there'll be a new generation of high tech recordings—made from digital originals; wide-dynamic range, high-speed masters, etc. Because the Federal Communications Commission limits the loudness level you can put on FM carriers, you would seriously deteriorate the sound if you were to broadcast these discs by the conventional commercial FM transmission methods with heavy limiting and compression. Some of those recordings, if put on by untrained operators, particularly on those stations that have compromised the inherent high performance capabilities of FM broad-

The author finds that the Technics RS-M95 cassette player allows WNYC to showcase many outstanding prerecorded cassettes.

(Due to the limitations of the FM broadcast spectrum and the necessity to maintain high quality, many stations have opted for louder signals and maximum coverage by compressing, equalizing, and otherwise processing the music signal until little of the original dynamics and spectral density remains. Our test program is trying to deal with the new, high quality, wide dynamic range recordings as much as is possible.

The program has enabled our listeners to hear the new digital high tech discs closer to the way they are meant to be heard; to broadcast them without seriously compromising their sonic quality; to preserve in the broadcasts, as much as possible, the original dynamic range of those superior recordings.

Unfortunately, as FM has become more commercial, some broadcasters have opted for a louder signal and maximum coverage by compressing, equalizing and otherwise processing the music signal until little of the original dynamics and spectral density remains. Our test program is trying to deal with the new, high quality, wide dynamic range recordings as much as is possible.

The program has enabled our listeners to hear the new digital high tech discs closer to the way they are meant to be heard; to broadcast them without seriously compromising their sonic quality; to preserve in the broadcasts, as much as possible, the original dynamic range of those superior recordings.

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casting, would sound as though they had gone through a meatgrinder.

At WNYC-FM, the first thing we did was to identify the limitations of the station's present transmission with a view toward improving it as quickly as possible. We tried to immediately improve the overall signal broadcast quality with a long term goal of providing a system with which the average operator could showcase the new generation of discs. I had to assemble equipment that would perform so well that it would discover the problem areas in the broadcast chain. And we did find faults. We found the FM exciter was not up to broadcast quality of the original equipment; we found the limiter being used was unacceptable, and we removed it; and, we are not finished yet.

In the process of this experiment, I discovered that a great deal of the home equipment was superior to the broadcast equipment we generally have available. For example, there is no broadcast-type phono preamp that begins to approach the quality of the currently available home phono preamps. I am happy to say that many manufacturers came to our assistance—Technics, Panasonic Professional Audio, Studer Revox, NAD, ADCOM and DB Systems were most helpful.

For our Audiophile Showcase, we used the Technics R&B Series SL-1025 quartz synthesizer direct drive turntables. We plan to eventually replace the station's current turntables with the highly suitable Technics units, which exploit the new disc's low noise level and wide dynamic range.

The Technics R&B Series turntable's tonearms were a revelation. They showed us the need for less massive, more stable tonearms that were simpler in design. I also like the turntable's instant start, and the tonearms Technics use are substantially higher in quality than the tonearms we now have in use.

We also found that the record and playback fidelity of such home audio equipment as the Technics RS-M95 cassette player is much better than the standard cartridge systems broadcasters normally use, although admittedly the ultimate application of cassettes and cartridges, as presently used in broadcasting, is very different. To date, we know of no classical FM station that uses a cassette player on the air, but the Technics cassette player

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The author uses Technics R&B Series SL-1025 turntables for Audiophile Showcase. He likes the instant start and the tonearm's stability and simple, compact design.

(Courtesy of Grey & Davis, New York)

and its programmable features can be set up before going on the air. It permitted us to showcase many outstanding prerecorded cassettes.

WNYC's current venture into experimental broadcasting, with its unique showcasing of high tech recordings, looks towards a new era at the municipal station. It may point the way toward the use of FM broadcasting's highest performance capabilities.

*Editor's Note:
There is increasing evidence that other broadcasters are using cassette systems in their operations. We suggest you submit a short note to us detailing your experience and we will consider your story in a special feature on this topic. Send your story to: Broadcast Engineering, Audio Editor, P.O. Box 12901, Overland Park, KS 66212.

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Step generator for transmission testing

By Linn Boyd
Transmitter Supervisor
WRTV, Indianapolis, IN

In the April 1979 issue of Broadcast Engineering (page 78), an article described a circuit that helped make transmission line measurements under adverse conditions and using a Time Domain Reflectometer (TDR).

The main circuit from that article is repeated in Figure 1, with corrections and updates noted. The 3911 resistor on the emitter of the 2N3906 was changed to 1011 to obtain more gain from this stage. (This suggestion came from Don Betts of WISN, Milwaukee.) Also, the addition of the 1000Ω resistor across the 4.7 µF coupling capacitor helps smooth the leading edge of the square wave.

For reference purposes, the oscilloscope used in arriving at the changed values is a Tektronix 7613 with a 7A18 dual-trace plug-in. Please note that the circuit has been used only for 50-75Ω coaxial transmission lines. I have not tried it on a waveguide.

NOTE: If there is another source of RF nearby (FM, TV, etc.), do not use the 7600 series scope with the 7A18. It is too sensitive to RF. The 545 series works as well as the old 524.

Recent changes, as shown in Figure 2, have been made to simplify the circuitry of the step generator.
Remote turntable start circuit

By Doug Howe
Chief engineer
WMUK-FM, Kalamazoo, MI

At WMUK we have designed a remote start circuit for our Technics SP-10 MKII turntables that we would like to share with other stations to eliminate half their problems in remote turntable start circuits. Every circuit we have seen so far for momentary closure from a console key switch uses two relays. We managed to do the job with one relay.

The circuit works as follows: K1 is energized through D1 and C1 when the turntable delegation switch applies a 24Vdc control voltage to the circuit. As C1 charges, the current through K1 decreases, resulting in a momentary contact closure to start the turntable. The forward drop across D1 during the initial charging of C1 helps ensure cutoff for Q1. When the 24V control signal is removed, D1 becomes Q1 and K1, resulting in another momentary contact closure to stop the turntables. We used a relay with bifurcated contacts to help minimize contact problems.

There is nothing special about the transistor; we simply had a supply on hand. If a different transistor is used, the value of R1 will have to be selected for proper bias.

The parts used in the circuit are:
C1, Electrolytic 100µF/50V Sprague TVA-1310; D1, diode Mallory 2.5A; K1, relay P & B R10-E1-Z2-V700, 24V; Q1, transistor 2N4036; R1, resistor 47kΩ 1/4W.
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Circle (190) on Reply Card

new literature

Electronic measuring instruments
A new, 28-page condensed catalog of electronic measuring instruments for telecommunications equipment and systems is now available from Anritsu America Ind., headquartered in Oakland, NJ.

Circle (260) on Reply Card

Coaxial cables
CATEL, a division of United Scientific Corporation and a subsidiary of Data Design Laboratories, has published a new issue of the "Catelegram," a newsletter concerning applications and technical developments in coaxial cable communications. The current issue introduces three new products, dealing with data communications (DM-2100), wideband FM transmission (WFMS-3000) and stereo simulcast (CATEL 245M).
The Catelegram is available to people in the communications industry at no charge. For more information, contact: CATEL, PO Box 1389, Mountain View, CA 94042.

Circle (261) on Reply Card

Recording camera system
A full-color brochure by RCA
The New Anton/Bauer LG-30 Lighting Head

Anton/Bauer, the recognized leader in portable battery systems, has done it again with their new LG-30 "Black Beauty" Lighting Head, the ultimate in portable lighting. This unique unit offers professional features not found in any other light—a spring loaded, captive, swing-away dichroic filter; integral one hand on-off and focusing; extra heavy duty cable and strain relief; a standard handle with spare bulb storage (removable for camera mounting); brackets for custom mounting on all ENG cameras; and an improved lamp socket that accepts standard 12v and 30v bulbs. The LG-30 "Black Beauty", the first truly heavy duty professional portable light.

The LG-30 mounts easily to any ENG camera.

For further information call or write:
ANTON/BAUER, INC.
66 Center Street, Shelton, CT. 06484
(203) 735-3305

Circle (193) on Reply Card
Catalogs and literature

Outlines features, applications and capabilities of the Hawkeye Recording Camera System. Designed for both newspapering and field production, the new system achieves the feel and mobility of a film camera plus the immediacy and instant replay capability of videotape. For copies of the booklet, contact: RCA Broadcast Systems, Bldg. 2-2, Camden, NJ 08102. Request form 9155B.

Circle (262) on Reply Card

Videocassette recorders

A 322-page book, "The Complete Handbook of Videocassette Recorders," has been released by Tab Books Inc. The handbook tells how to select the model best suited to the particular need, maintain it, troubleshoot and repair it. It is written in non-technical language and contains many photos, diagrams and schematics.

Circle (263) on Reply Card

Continuing education courses

A catalog describing 212 continuing education courses for engineers, "IEEE Continuing Education Courses - 1981/82" has been published by the Educational Activities Board of the Institute of Electrical and Electronics Engineers Inc. (IEEE).

Featuring descriptions of 177 "live" short courses of one, two and three days' duration, the catalog also describes 19 individualized home-study programs—both interactive and self-study—and 17 videotaped courses for group instruction.

All courses are applications-oriented and cover the state-of-the-art in a broad range of topical electrical/electronics technologies, as well as business and management subjects.

To obtain a copy of the new catalog, contact: Continuing Education Department, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854; (201) 961-0060, Ext. 175/177.

Circle (312) on Reply Card

Microprocessor-based sweep generators

A family of microprocessor-based sweep generators covering the 10MHz to 40GHz range is described in a new 24-page 6600 series brochure released by Wiltron Co. Graphics illustrate controls, test setup, applications, accuracy characteristics, specifications and test results. This brochure documents recently developed techniques for making the most accurate transmission loss/gain and return loss measurements. For a free copy, please contact: Walt Baxter, Wiltron Co.

Circle (195) on Reply Card
Trompeter Electronics Inc. has announced the publication of a 48-page catalog, the T-14. It features TEI's complete line of interconnect systems of coax, twinax, triax and quadrax cable connectors, patch panels and complete cable assemblies.

Technical discussions are included on RFI/EMI noise reduction, EMP suppression, military and commercial digital data bus applications and fire retardant FEP plenum cables for TV and computer installations.

Copies may be obtained by writing to Trompeter Electronics Inc., 8938 Comanche Ave., Chatsworth, CA 91311; (213) 882-1020.

Circle (265) on Reply Card

Direct broadcast satellite service
Satellite Television Corporation has released a brochure that highlights the public interest benefits of STC's proposed satellite-to-home subscription TV service.

STC, a COMSAT subsidiary, has filed an application with the Federal Communications Commission seeking permission to construct satellites for the first phase of a US direct broadcast satellite service.

Circle (266) on Reply Card

Fiber-optics standards
The Electronic Industries Association Components Group recently announced the availability of Volume Two of the proceedings covering the First International DOD/Industry Fiber-Optics Standards Conference held on April 21-23, 1981.

The conference was conducted as a...
Catalogs and literature

forum for the exchange of ideas to achieve more effective communications between members of industry and government. The major thrust of the conference encompassed: standards needed, parameters to be covered and procedures in need of standardization. Volume Two includes those papers that were presented at the conference but not available for publication in Volume One.

Price is $50. For more information, write to Mark V. Rosenker, Electronic Industries Association, 2001 Eye Street NW, Washington, DC 20006; (202) 457-4981.

Circle (267) on Reply Card

Circuit order wire system

Raven Electronics Corporation has announced the availability of a brochure on its new engineering service circuit order wire system for INTELSAT Standard B service.

The illustrated brochure presents complete details on the Raven 416 Series Order Wire System, which is designed to meet all INTELSAT Standard B requirements for Engineering Service Circuit (ESC) operation. A technical summary and specifications are provided for the system, which houses all circuitry for line conditioning, amplification, filtering, SCPC control and 2280Hz selective signaling in two rack-mountable cabinets.

More information is available from Raven Electronics Corporation, 395 Freeport Blvd., Sparks, NV 89431; (702) 359-3700.

Circle (268) on Reply Card

Optical transmitters

GTE Lenkurt’s Fiber-Optics Com-
A communications Division has announced the availability of a 6-page brochure describing its 3120 Optical Transmission family.

The new 3120 family can transmit and receive voice, data or video signals over optical fibers, thus providing high quality, interference-free voice and data communications that are ideally suited for use in locations where communications quality experiences deterioration due to electromagnetic interference (EMI). Five models are available, each offering a transmitter unit and receiver unit that provide simplex (1-way) transmission through an optical fiber cable link.

For a copy of the 3120 Optical Transmission Family brochure, write GTE Lenkurt Inc., Dept. C720, 1105 County Road, San Carlos, CA 94070.

Circle (269) on Reply Card

Monitor oscilloscope
A 2-page bulletin from Gould Inc., Instruments Division, describes the new OS3350/5 TV Monitor Oscilloscope. This unit combines a line-by-line NTSC waveform monitor, a video monitor and a conventional 40MHz dual-trace scope with 5mV/cm maximum sensitivity. It is ideal for troubleshooting TV, CATV, CCTV, video recording, microwave repeater, mobile TV equipment, FLIR and digitally encoded signals. Bulletin 449-15A provides complete specifications for the OS3350/5 and is available free of charge from Marketing Communications, Gould Inc., Instruments Division, 3631 Perkins Ave., Cleveland, OH 44114.

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new products

8x4x2 mixer
Fostex Corporation of America has introduced an 8x4x2 mixer, model 350, which is designed to be a companion to the Fostex A-8 recorder/producer.
The eight input channels are selectable for mix or line and are individually adjustable for any input level, with a 50 dB continuously variable trim control to accept other input sources.

External signal processors can be plugged in through any channel with individual accessory send and receive jacks.

Circle (272) on Reply Card

EFP Camera cable
A 14-conductor TV camera cable for electronic field production application has been introduced by Belden Corporation's Electronic Division. The Belden 9171 is made of color-coded vinyl-insulated 22-gauge conductors comprising five twisted pairs, each with its own Beldfoil aluminum foil-film shield and 22-gauge drain wire; two RG 59/U-type color-coded 75Ω coaxial cables with cellular polyethylene dielectric, 95% braid shield and vinyl jacket; and two color-coded vinyl-insulated 16-gauge conductors. The assembly is cabled together inside a chrome vinyl jacket 0.57 inches in diameter. Standard putups are 250, 500 and 1000 ft.
Circle (273) on Reply Card

Multichannel recorder
Sony has introduced its PCM-3324 24-channel stationary-head digital audio recorder, which provides 24-channel recording with 16-bit full linear quantization. Dynamic range is greater than 90 dB, frequency response is flat from 20 Hz to 20 kHz.

Circle (250) on Reply Card

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Circle (250) on Reply Card

Circle (206) on Reply Card
and harmonic distortion is less than 0.05%.

With the PCM-3324, edit points can be digitally cross-faded, and punch-ins and punch-outs can be automatically repeated with the same edit timing. The PCM-3324 has two additional analog tracks to allow razor-blade editing and provides a separate SMPTE time code track for synchronized recording of up to 72 tracks. Advanced integrated circuits for the A/D, D/A converters have been developed for 16-bit accuracy with no adjustments.

The PCM-3324 incorporates a newly developed error correction system called the Cross Interleave Code, which presents loss of the music source, even if up to 88% of signal is interrupted within a constrained length of tape.

Circle (274) on Reply Card

VTR console system

The Winsted Corporation has announced the new model 3101-T VTR Console, which packages components in a compact, working module. It features adjustable height overhead bridge and rotating VTR turntable for ease of viewing and maintenance. Upper bridge includes 12-inch color monitor rack space and two half-rack spaces for waveform monitor and vector scope. Bridge adjusts up or down

Circle (208) on Reply Card

Time Code on the Move

The New PTC-100 sets the standard for TV and Film EFP Time Code generation and recovery.

Rugged, reliable and compact the PTC-100
Generator • Reader is designed to accommodate the user and meet all your EFP requirements for TV and Film.

Features include:
- Identifies Color Field sequence in Time Code
- Film Standards: 24, 25 and 30fps.
- TV Standards: NTSC, PAL & PAL-M.
- Jam Sync reader: several PTC-100’s can be slaved together.
- No multi function controls.
- Power saving circuitry: 5 days normal operation with four AA cells, or plug into external 6-12 VDC source. NiCad batteries and charger are optional.
- Remote control for Time Code.
- Generates and reads User Bits.
- Thumbwheels preset time counter, or loads User Bits into memory.
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Circle (209) on Reply Card

September 1981  Broadcast Engineering  241
New products

in 1-inch increments to accommodate any 1-inch VTR. Roll-around base cabinet has 19¼-inch rack space for TBC, master on/off switch and convenient storage drawer for tools and service manual.

Circle (275) on Reply Card

Diagnostic equipment

Rank Cintel has introduced the T.O.P.SY. Diagnostic Equipment II, a microprocessor-based system that gives the T.O.P.SY. user access to all addresses in the T.O.P.SY. address field.

TDE II simplifies analysis and fault diagnosis and allows the user to program data externally for analysis of a required address area with an oscilloscope.

This system can be used to analyze the local interface, mainframe and remote racks either by running the pre-programmed routines or by writing a special program to examine a specific parameter under suspicion of failure.

Circle (276) on Reply Card

Broadcast aural exciter

Aphex Systems Ltd. has announced the Aphex II Broadcast Aural Exciter, which is designed to enhance multiple generation program materials to recreate the acoustical nature of sounds that may have been lost to heavy compression and bandwidth limiting. A tunable filter recovers audio information above 1kHz and creates a signal composed of frequency dependent, phase-shifted components, as well as amplitude dependent harmonics. This enhances sounds originating from strings, voices and percussion for reintroduction into the source material. Designed for stereo operation, the exciter works equally well for monaural use with individual channel controls for the enhancement circuitry.

Circle (277) on Reply Card

Amplifiers

Raindirk Ltd. has introduced the Status 20 preamplifier and the Status 500 amplifier. The Status 20 features comprehensive facilities for professional or domestic use. It has 3-band sweepable tone controls, modular cartridge circuitry and outboard power supply. The Status 500 is a professional power amplifier featuring MOS, FET output stages, comprehensive protection circuitry, bridging and 2.5Ω operation.

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Snuggly housed in a rugged, portable, all aluminum case measuring: 8.82" x 6.75" x 1.75" and weighing a mere, but solid, 3 lbs. The 20-P is ideal for field service, studio, broadcast station, repair and quality control applications. For these or similar uses, paying more for a larger, expensive instrument will only result in more bulk for you to move around. The small 20-P comes with a large two-year warranty.

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Model 20-P professional net: $495.

Circle (211) on Reply Card

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New products

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Circle (279) on Reply Card

Telescopic Hilomasts

Allen Osborne Associates has introduced a comprehensive line of telescopic Hilomasts. The NK series of Hilomasts are pneumatically operated with either a standard vehicle foot pump or a small air compressor. The series features five different models covering an extension range of 20 to 60 feet. A special feature is the full length keyways that prevent relative rotation between sections. This enables the masts to be used for directional antennas for frequent operations of short duration, without the necessity of locking the collars.

The NL series of telescopic Hilomasts feature seven models covering extension ranges from 26 to 70 feet. They are operated with a small air compressor. These masts have all the features of the NK series, but are of a heavier construction and will support larger antennas under more adverse weather conditions.

The NX series are the largest masts in the range. There are six models covering an extension range of 25 to 93 feet. These masts will support heavier head loads with greater stability, and are easily raised and lowered by means of a compressor. Both the NL and NX series Hilomasts are best used for vehicle installation.

The NP series are pneumatically operated with a standard vehicle foot pump or a small compressor. Three models cover an extension range of 17 to 30 feet. These masts are intended for use with light antennas where portability is of prime importance.

The WTM series of telescopic Hilomasts are hand- or machine-winch operated. They are suitable for use under inclement conditions. Four models cover extension ranges from 29 to 70 feet.

Supporting equipment for this line of Hilomasts include compressors, mounting hardware, winches and trailers.
Circle (280) on Reply Card

Bi-radial studio monitors

James B. Lansing Sound Inc. introduces the 4430 and 4435 bi-radial studio monitors, each equipped with a bi-radial constant coverage horn, a new compression driver, new 15-inch low frequency drivers and an improved dividing network. The bi-radial horn is coupled to a compression driver which is crossed over at 100Hz. Recently developed in JBL’s engineering laboratory, the driver features an aluminum diaphragm with a 3-dimensional diamond-pattern suspension.

Both the 4430 and 4435 are equipped with new 15-inch low-frequency drivers which feature new adhesives, voice coil formers and continued on page 246

Delay system

MXR Innovations Inc. has introduced the model 151 Delay System II, which features such studio effects as flanging, chorus, Doppler shifting, doubling, hard reverb and echo. A 4-digit display indicates the actual time delay being used, and LEDs indicate the bandwidth of the system at each delay setting. Front panel LEDs also indicate the optimum operating level, delay bypass and repeat-hold.

Other features include XLR and phone jack inputs and outputs and a level switch to optimize signal-to-noise for line and instrument level operation. Delay System II is housed in a sturdy, rack-mountable enclosure.
Circle (281) on Reply Card

Bi-radial studio monitors

James B. Lansing Sound Inc. introduces the 4430 and 4435 bi-radial studio monitors, each equipped with a bi-radial constant coverage horn, a new compression driver, new 15-inch low frequency drivers and an improved dividing network. The bi-radial horn is coupled to a compression driver which is crossed over at 100Hz. Recently developed in JBL’s engineering laboratory, the driver features an aluminum diaphragm with a 3-dimensional diamond-pattern suspension.

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McMartin Industries has announced the appointment of three broadcast district sales managers: Jim Wagner, serving Ohio, Indiana, Eastern Kentucky and Lower Michigan; Richard Moen, covering Delaware, Maryland, New Jersey, Pennsylvania, Northern Virginia, Eastern West Virginia, New York City and Long Island; and Bill Harland, serving Arizona, New Mexico, Southern California, the Southeast portion of Nevada and Hawaii.

Nick Adams has joined Videomedia as product marketing manager. Adams came to Videomedia from Orrox Corporation, where he held various key marketing positions for CMX editing systems.

Hitachi Denshi America Ltd. has announced the appointment of Gino Nappo to sales and marketing manager, southern region, which includes the Atlanta and Dallas offices. Nappo was most recently with Fernseh as regional sales manager. James Morrison has been appointed to the position of broadcast sales manager, western region. He has held numerous positions in both engineering and sales during his 30 years in the industry, including vice president of marketing for Ditek and sales manager engineer of Fernseh.

Joseph B. Howe has been promoted to division vice president and general manager of RCA’s Commercial Communications Systems Division. Howe comes to the division from RCA’s Government Communications Systems operations, where he served as division vice president and general manager since June 1979.

Rupert Neve Inc. has announced the appointment of Anthony H. Langley as vice president of sales. Langley most recently held the position of marketing manager for Neve’s US operation.

The Broadcast Electronics Systems Division (BESD) of Toshiba America Inc. has announced the appointment of two regional sales managers: Ronald E. Zimbrick, Midwest; and Joy L. Wenzlaff, Southern California and Arizona.

Cetec Vega has named Kenneth M. Bourne director of marketing, with responsibility for directing the firm’s marketing, sales and product-planning activities, and for communicating with customers to satisfy their technical systems requirements. Before joining Cetec Vega, Bourne was manager of marketing services for Trio-Kenwood Communications.

Michael O. Felix, director of new product technology at Ampex Corporation, has received the 1981 Alexander M. Poniatoff (AMP) award, the company’s highest honor for technical achievement given to employees. Felix was cited for his 21 years of extraordinary contributions to the development and design of magnetic recording systems. Awarded the gold medal and a cash prize of $5000, Felix was honored at a recent banquet.

Joe Bean has joined Studer Revox America as a sales representative. Bean will develop the broadcast market for the Studer professional lines in the Southeast.

John L. Romanko has been named sales manager for Eigen Video, a California-based manufacturer of video
recording equipment. A 17-year veteran of the broadcasting field, Romanko will direct the growing company’s sales efforts in the color broadcast, military, scientific and industrial fields. Romanko will also serve as liaison for Eigen with its network of North American sales representatives and be responsible for the company’s marketing and advertising programs.

**Larrie Rose** has been named international sales manager of Belden Corporation’s Electronic Division. Rose will be headquartered in Dusseldorf, West Germany, where he will direct a program to increase Belden’s penetration of the western European electronic cable market.

**Stanley Schwartz** has been elected executive vice president at Rosco Laboratories. He was formerly president of an advertising agency bearing his name and had been associated with Rosco for more than 10 years.

**Chip Ermish** has been promoted to the sales staff of Katz American Television in New York. Ermish came to Katz in 1980 as a member of the American division’s sales training program. Prior to joining Katz, Ermish was a broadcast buyer for Kenyon & Eckhardt. His previous experience includes positions with Benton & Bowles as an assistant broadcast buyer and target group as a media trainee.

**Vicki Pierce** has joined the sales staff of Katz Radio’s Chicago office. Pierce comes to Katz Radio from Buckley Radio Sales in Chicago where she was an account executive. Her previous experience includes sales positions with several broadcasting stations.

**Roy Raymond** has been named manager, national interactive programs for Sony video products. In this newly created position, Raymond will be responsible for the national planning and coordination of Sony’s new institutional video disc and Video Responder hardware with the national dealer network, end-users, production houses, and duplication facilities. He will be headquartered in New York.

**Robert Bensman** has joined Sony as market development manager in the southeast. He will be responsible for the marketing of interactive equipment including the videodisc and Video Responder in Florida, Georgia, South Carolina, North Carolina, Virginia and Washington, D.C.

**Mary Ann Weisberg** has been named west coast public relations account executive for the William B. Tanner Company Inc., Memphis, working out of the Tanner regional office in Los Angeles. She will report to Mr. William B. Tanner, chairman/president, through director of marketing/media sales Edward F. Hartnett. Previously, Weisberg was an account executive with ICP/R, a public relations firm specializing in service to the motion picture and broadcasting industries.

Vital Industries Inc. has announced the appointment of **Stanley E. Basara** as senior vice president and general manager of its facility in Gainesville, FL. Basara was formerly division vice president and general manager of RCA’s Broadcast Systems. Basara will be responsible for the full line of video products designed, manufactured and distributed by Vital Industries Inc.
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Symmetrical Field Geometry (SFG) magnetic structure. The 4430 and 4435 differ in their low frequency system design. The 4430 incorporates a single 15-inch driver and can handle full-power input (150W) to 27Hz. The 4435 uses two 15-inch low frequency loudspeakers; the second operates below 100 Hz in parallel with the first. The 4435 will handle full power (300 W) from 100 Hz down to 22 Hz.

Circle (282) on Reply Card

Flash filter, soft contrast filter
Tiffen Manufacturing Corporation has introduced the new Tiffen Filter Number 812 designed to reduce excess blue when using electronic flash. The 812 absorbs the excess blue of both portable and built-in electronic flash units and achieves a more natural rendition of skin tones with Kodacolor or Ektachrome film. The new Tiffen Number 812 Filter can also be used outdoors or in shaded areas to produce a warmer, more pleasant tone.

Tiffen has also announced a new soft contrast filter. This filter tones down bright colors to produce a softer, muted effect. With the new soft contrast filter, blacks remain black and sharpness is maintained without graininess. Available in all sizes, supplied in densities 1 through 5.

Circle (283) on Reply Card

Chargers
Perrott Engineering Labs Inc. has introduced three new products. The PE 8100 Kwik-Charger is a lightweight, compact microprocessor charger, which can charge any major manufacturer's 12, 14.4 or 30V battery packs, as well as VTR and Ampex packs. The PE 62 Minipack, a 13.2V/8 AH ni-cad pack, operates the Ampex VPR-20 for more than an hour. The PE 200, MP 114 Gemini Kwik-Klips, a lightweight battery and charger combination, are available in ni-cad and silver. These units clip on to cameras for convenience.

Circle (284) on Reply Card

Split recording/remixing console
MCI has announced the release of the JH-652 Recording/Remixing Console, designed for true split operation. The JH-652 incorporates 52 inputs, physically installed 26 on either side of the master control section. The
revolutionary feature is that the mix outputs, effects/foldback outputs and automation of each side can be operated independently as if they were two separate consoles, or joined to operate as one larger console. This makes the console ideal for use with synchronized multi-track recorders or in applications requiring separate monitoring facilities. Standard features on the JH-652 include MCI patented Plasma Display PPM bargraph metering, full level and mute automation, six wild faders usable for pan or effects automation, 3-band equalization on each input and transformerless circuitry throughout the recording chain.

Mastering recorder
Fostex Corporation of America has announced a 2-track, 2-channel mastering recorder/reproducer, the A-2, a 3-head machine that operates at 15 ips and 7 ¼ ips with 7-inch reels. The A-2 features a transport section with three lightweight dc motors and an FG servo on the capstan motor.

The A-2's sync capability permits last-minute adjustments during production. A digital tape counter with LED readout includes a memory function. The A-2 weighs 29 lbs and measures 13 ¼"x14"x6 ¼".

SMPTe test cassette
SMPTe's videocassette test cassette for receiver monitor setup is now available in a ¾-inch format, in addition to the ¼-inch format. There are three ¼-inch tapes available: Type G 1-hour (beta) format (code no. V2-RMS-B1); Type G 2-hour (beta) format (code no. V2-RMS-B2); and Type H 2-hour (VHS) format (code no. V2-RMS-V). The ¾-inch Type E (U) format (code no. V3-RMS) has been available for about a year. The video test tape is intended to verify that the videocassette playback system is operating normally and to supply reference signals useful for adjusting operating controls on the receiver or playback systems.

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Solid State Tower Flashers

A new series has been added to SSAC’s line of “B-Kon-Flash”. The new devices with a load current rating of 300 Amperes Inrush will operate up to four beacons at 230 VAC, two beacons at 120 VAC. Also available are auxiliary units for synchronous operation of additional beacons on separate lines or for alternating flashing of beacons.

Lamp Life is increased by approximately 10 X due to Zero Voltage Switching. Device measures 2 x 2 inches and is completely encapsulated. Price in 1-9 quantity, $41.52 each, FOB Factory. For more information call (315) 622-1000.

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Circle (221) on Reply Card

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Broadcast Engineering September 1981

248
New products

monitor for its intended use. The cassette is used for the subjective evaluation of receiver or monitor setup and for checking out the overall video and audio performance of magnetic helical-scan tape reproducers. No test instruments are required. A commentator describes each scene and what it is intended to check. Each cassette comes in a case and is accompanied by a Wratten 47B blue filter (or equivalent) and an instruction sheet on tape usage. The tapes are made in accordance with SMPTE Recommended Practice RP 96.

Office computer system

Patrick Computer Systems Inc.'s iC436 Office Computer System is a small, in-house computer system with general accounting, word processor, inventory and mailing list software. The Model 1 is designed for one user incorporating four Z-80A microprocessors. A memory size of 114 kilobytes combines with a storage capacity of 2 megabytes. By adding more microprocessors to the system and including multifunction/multiuser software, the iC436 can easily handle the additional tasks needed for the broadcaster of billing, for example, available spot checks and program logs. Compilers for Fortran, Cobol, RPG and Basic are available for this system, which may include up to five users with 338 kilobytes of memory and access to 100 megabytes of storage. Line printer; four double-density, double-track, double-sided disks; and a 131-key keyboard with a 12-inch diagonal video display unit ease input, output and storage.

Cable access van

Tele-Measurements Inc. has introduced the CAV-1 cable access van to provide technical production facilities for on-site camera coverage and videotape editing.

An Econoline-type vehicle, the CAV-1 comes equipped with a 6.5 kW continuous-duty generator for full electronic operation, heating, air conditioning and work lights. The van is

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Circle (302) on Reply Card

Circle (230) on Reply Card

Circle (231) on Reply Card

September 1981  Broadcast Engineering  249
New products

supplied with two color cameras, camera extension cables, camera control units, and both color and black-and-white video monitors. Electric components are mounted on two portable rack consoles, which may be rolled off the van for close-to-the-scene operation.

Circle (303) on Reply Card

Wireless diversity tuner

Sony’s Professional Audio Division has introduced the WRR-37 UHF diversity tuner for use with the WRR-27 belt-pack transmitter and lavalier microphone or the WRT-57 hand-held wireless microphone. The portable tuner is designed for ENG and EFP use, as well as studio applications.

The WRR-37 uses two independent receivers on the same frequency, two separate antennas and a diversity switching circuit that continuously samples the outputs. The battery-powered WRR-37 measures 6”x1⅜”x8” and weighs 2.8 lbs.

Circle (304) on Reply Card

Low frequency drivers

James B. Lansing Inc. has introduced two new 15-inch low frequency drivers, models 2225H/J and 2235H. Both loudspeakers feature Symmetrical Field Geometry (SFG) magnetic structure, high temperature adhesives, optimized coil former construction, ¾-inch voice coil and suspension elements.

The model 2225H/J is specifically designed for both horn-loaded and vented box enclosures. The drive is available as the 2225H with an impedance of 8Ω or as the 2225J, when a 16Ω impedance is required.

Circle (305) on Reply Card

Audio adapter kit

Switchcraft Inc. has introduced Series 399M audio adapters for its line of “Q-G” audio connectors. Included in the public address audio adapter kit are a 3-pin male “Q-G” to 3-contact female threaded-coupling microphone connector; a 3-pin male “Q-G” to 3-contact male threaded-coupling microphone connector; a 3-pin male “Q-G” to 4-contact female threaded-coupling microphone connector; and a 3-pin male “Q-G” to 4-pin male control equipment.

Circle (324) on Reply Card
threaded-coupling microphone connector. These adapters are designed to mate with all Switchcraft 3-pin male “Q-G” audio connectors and similar types. On the other end, they mate with Amphenol 3- or 4-contact male or female threaded-coupling microphone connectors.

Circle (306) on Reply Card

**Edit time code reader**

The SMPTE Edit Time Code Reader introduced by J.S. Wiener Associates requires only 1⅞” X 4⅝”的 panel space. This self-contained reader has front panel selection of either time code or user bits in 3/10-inch LED displays. Drop frame flag (color timing) is also decoded and displayed on the front panel. Unique circuitry is used to freeze the display, useful for offline edit decision logging or to enable/disable the self-contained error bypass logic.

Circle (307) on Reply Card

**Dual limiters**

New from MXR Innovations Inc. is the MXR Dual Limiter, which offers mono-stereo limiting capabilities and musically natural response. The Dual Limiter can be viewed as two independent mono limiters patched together via front panel switches for stereo limiting applications. Each channel features an in/out switch, slope switch, input, output, attack and release controls and an LED to show the amount of gain reduction. The rear panel has both XLR and ¼-inch phone jack input and output connectors. Other features include balanced inputs, the ability to drive 600Ω loads, ±19 dBm input and output and standard rack dimensions (1⅛ inches high).

Circle (308) on Reply Card

**Audio router/amplifier**

Ramko Research has introduced the Model ARA-1612 Audio Router/Amplifier, which uses CMOS and opamp circuitry to electronically switch 16 monaural inputs to any of 12 outputs, either individually or simultaneously, with an LED display of the activity status. The system may be programmed for stereo and monaural combinations of inputs and outputs. Stacking allows increased capacity of inputs or outputs. The power supply includes auto-switched redundance. Remote control facilities and optional battery pack for logic “keep-alive” are optional.

Circle (309) on Reply Card

**Digital Grain Reducer**

Rank Cintel has introduced its Digital Grain Reducer. The unit enables automatic film-grain reduction achieved by assessing input noise, picture content and picture movement to determine maximum reduction. The equipment operates at a clock frequency of 851 times line frequency and uses 16K dynamic RAMs based on NMOS technology for the picture store and Schottky TTL and low-power Schottky TTL integrated circuits to complement this technology. Certain diagnostics have been built into the equipment including a digital sawtooth signal to enable checks to be made at specific test points and, to aid fault location in the main picture store, a flashing cursor that may be superimposed at each store location and viewed on the output picture monitor.

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calendar

Sept. 23-25
The Sixth Annual Conference on Satellite Communications, entitled “Space Communications in the ‘80s,” will be held at the Washington Hilton Hotel in Washington, DC.

The conference features a look into the future of the space communications industry. “Satellite Communications in the ‘80s and ‘90s” will be presented by Winston Himsworth, first vice president of Lehman Brothers Kuhn Loeb.

For registration information, contact: Director of Communications, Public Service Satellite Consortium, Suite 907, 1660 L Street NW, Washington, DC 20036.

Oct. 5-7
The 1981 International Electrical, Electronics Conference and Exhibition will be held in Toronto.

The conference theme is “Change, Challenge, Opportunity.” Topics include the application of microelectronics and microprocessor technology in all areas of electrical and electronics engineering.

A topic of interest, communications systems—satellite, vehicular, TV digital and fiber-optics—will be discussed. Other topics of discussion include: computer technology, microcomputer technology, electronic circuits and systems, power technology, power systems, industrial systems, biomedical engineering, energy systems and electromagnetic capability.

Oct. 7-8
Three chapters of the Society of Broadcast Engineers are cooperating to bring about a tri-state regional SBE Convention. This year the convention will be held in Indianapolis, IN.

The SBE chapters of Indiana (25), Southwest Ohio (33) and Kentucky (35) have planned this regional convention to be rotated among the states: Indiana in 1981, Ohio in 1982 and Kentucky in 1983.

Papers are being evaluated by the Ohio chapters. To present a paper, contact: Chairman, SBE Chapter 33, c/o WCET, Cincinnati, OH.

Oct. 25-30
The 123rd Technical Conference and Equipment Exhibit of the Society of Motion Picture and Television Engineers (SMPTE) will be held at the Century Plaza Hotel in Los Angeles, CA.

The conference will include five days of sessions on the technical aspects of television and motion pictures. Also, there will be a 331-booth equipment exhibit featuring TV and filmmaking equipment. A full week of social activities is planned, including a luncheon, a banquet and a program for spouses.

Howard LaZare, Consolidated Film Industries, has been appointed general arrangements chairman and will be responsible for many of the non-program arrangements for the conference.

Committee chairmen responsible for conference functions include: Harry Teitelbaum, Hollywood Film Co.; Ted Fogelman, Consolidated Film Industries; Bud Stone, DeLuxe General; Bea Hopkinson; Charles Kircher, Foto-Kem Industries; Esther Kessler, ABC; Irwin Freedman, Agfa-Gevaert; Tony Dieniewski, Golden West Broadcasters; Glenn Berggren, Schneider Corp. of America; Don Klopfell, consultant; Frank Pontius, Westrex Corp.; Fred Godfrey, Eastman Kodak Co.; Scott Robertson, Eastman Kodak Co.; and Gus Deto, ABC.
Julian Hopkinson, Agfa-Gevaert, has been appointed program chairman. He will organize the program to attract a diverse audience from among SMPTE members and others in the motion-picture and TV industries.

The associate program chairman are Chester D. Luton, MGM Labs Inc.; M. Carlos Kennedy, Ampex Corp.; and John D. Moseley, Comtrak.


There are two topic chairmen at large, Dennis J. Kimbley, Kodak Ltd.; and Stephen C. Chamberlain, DuArt Film Labs.

More information may be obtained from SMPTE, 862 Scarsdale Ave., Scarsdale, NY 10583.

Nov. 1-4

The 1981 Annual Conference of the National Association of Educational Broadcasters will be held at the Hyatt Regency Hotel in New Orleans, LA.

Among the special events at the meeting will be a schedule of minicourses, seminars and specialized classes along with innovation and information halls, the program exhibition library and the job center.

The conference will continue its emphasis on professional development for individuals working in public radio and television, and educational, informational and other areas of noncommercial telecommunications.

For more information about registration and accommodations, contact: NAEB, 1346 Connecticut Ave. NW, Washington, DC 20036; (202) 785-1100.

Nov. 1-4

The Annual Satellite Communications Symposium will be held at the Hilton Hotel in Atlanta, GA.

The symposium is expected to attract about 700 participants from the broadcasting, business data and cable TV industries and from related international groups. Workshop sessions, guest speakers and panel discussions are scheduled to cover updated technical and business aspects of satellite communications.

There will be a $125 registration fee to cover costs of meals and conference material. For more information, contact: Scientific-Atlanta Inc., One Technology Parkway, Box 105600, Atlanta, GA 30348; (404) 441-4000.

Nov. 10-12

The Second Annual Visual Communications Congress/West, with its program of comprehensive seminars and an equipment exhibition, will be held at the Century Plaza Hotel in Los Angeles, CA.

There will be seminars covering a variety of subjects dealing with film and TV production, photography and audiovisual presentations. In addition to the seminar program, associations such as the International Television Association, the Information Film Producers and the Association for Multi-Image will conduct concurrent meetings.

For information on the seminar program, contact: VCC Conference Management Corporation, 500 Summer St., Stamford, CT 06901. Exhibit information is available from Visual Communications Congress Exhibit, 475 Park Avenue South, New York, NY 10016.
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BROADCAST ENGINEER: Min. 2 yrs. college level training in analog & digital electronics + 2 yrs. field serv. or TV station experience maintaining video switchers, routers & machine control systems. Exper. w/quip. mfg. by GVG preferred FCC lic. req. Send resume to: Engineering Dept., KRON-TV, P.O. Box 3412, S.F. CA 94119.

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WGBH Boston—one of the country's major production facilities—has immediate openings for maintenance engineers. Three years experience in state-of-the-art digital and analog necessary. There's no time like the future. Send your resume to:

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CHIEF ENGINEER - 12 month appointment—for Broadcast facilities in Communications Department. Includes new 1 kw non-commercial FM currently under construction as well as closed circuit TV facilities. At least three years experience in both radio and television an absolute requirement. Must have FCC First Class license. Good knowledge of FCC regulations needed. Experience in installation and maintenance of audio and video equipment. Experience with non-commercial broadcast facilities helpful. Ability to work with departmental teaching staff and student radio staff. Salary competitive. Send resume and references by September 14 to Robert White, Acting Chairman, Communications Dept., Stephens College, Columbia, Mo. 65215. Stephens is an E.O.E. employer.


BOSTON AREA: Chief Engineer for full-time AM, immediate opening for a maintenance oriented, hard working self-starter. Studio, transmitter and DA experience, 2nd Phone, willingness to travel. Contact: John Anderson, MCI Productions, #10 Greenway Plaza, Houston, TX, 77046. Phone: (713) 741-0293 or (713) 627-0270.

ELECTRONIC CHARACTER GENERATOR OPERATOR: (Chyron) Major NYC-based broadcasting company is looking for experienced people with outstanding electronic graphics ability combined with a thorough knowledge of equipment hook-up and check-out to work in our main studios and on remote. You're already working in broadcasting, so you know that we require superb technical and keyboard skills and a knowledge of sports and news graphics. You must also have the ability to accept responsibility, to adapt to varying work schedules, and to work well with other technical and production personnel in a high-pressure atmosphere. The position is demanding. The rewards are all you would expect from a major broadcaster: excellent salary, industry-leading benefits and professional challenge. Get in touch with us now. Send your resume and references by September 14 to Robert White, Acting Chairman, Communications Dept., Stephens College, Columbia, Mo. 65215. Stephens is an E.O.E. employer.

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HELP WANTED
CONSULTING ENGINEERING FIRM - SOUTHEAST Engineering position. Immediate. Send resume and salary requirements to Kessler and Gahman Associates, 1511 N.W. 6 Street, Gainesville, FL 32601.

HELP WANTED (CONT.)
Discovision Associates, a leader in the video disc industry, has immediate needs for Television Engineers and Technicians. Hands-on experience in the maintenance of TV production and post production equipment: Quad, 1" color, CMX, BGB, Rack, etc. Must have strong technical background.

Excellent salary and benefits. Located in the Newport Beach, CA area. Write to: Ma. Donna Leverett, Discovision Associates, Box 6600, Costa Mesa, CA 92626. Equal Opportunity Employer M/F.

TELEVISION TRANSMITTER MAINTENANCE ENGINEER KPX - SAN FRANCISCO, applicants should have a minimum of 3 year broadcast experience covering VHF transmitters, video processing equipment, remote control, and microwave systems. Send resume to Charles Rose, KPX, 855 Battery, San Francisco, 94111. We are an equal opportunity employer.

AUDIO LEAD ENGINEER (Broadcast Technician III) for major marketplace PTV VHF station to establish audio standards, plan and implement system, and lead proper maintenance and operation of all audio equipment and systems including multi-track recording equipment. MO four years full-time experience in professional radio or broadcast technical work. Must have three years experience in complex audio mix setting; two years in installation, working with creative staff on production, establishing and maintaining standards in large broadcast or recording studio; one year experience leading, training staff, drafting purchase specs, executing stereo pickups for symphony, opera, etc. Salary: $19,992-$25,584 liberal benefits. Deadline October 19, 1981. For official Broadcast Technician III application contact Henri McClenney, Staff Employment Office, University of Washington, 1415 N.E. 45th, Seattle, WA 98115. (206) 543-2889. AA/EOE.

UHF XMT & STUDIO MAINTENANCE: Immediate job opening for person qualified to perform maintenance and proofs on UHF TV transmitter. Also must be experienced in maintenance of Quad & C-Form VTR's, studio switchers, cameras, etc. Competitive salary and benefits. Send resume and application to: R. Snow, KTSF-TV, 185 Berry St., San Francisco, CA 94107. (415) 586-2638. R. Snow C/E.

HELP WANTED TECHNICAL: N.Y.C. post-production facility is looking for a maintenance engineer who has a working knowledge of video electronics and experience who has a working knowledge of video electronics and experience in the repair and maintenance of Sony N" VTR's and similar type "C" VTR's. Responsibilities will include assisting in the construction and set up of new facilities which will include: 2 hour emit center for broadcast quality in-studio stage, and maintenance after construction. Salary will be commensurate with experience. Send resumes to: TAPPOWER, 16 East 50th Street, New York, NY 10022.

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POSITION WANTED
RADIO ENGINEER seeks a secure position with a non-commercial educational entity. Multifaceted with a desire to do live recording/promotes, especially jazz. Also enjoy board shifts, and can do any routine studio/translator maintenance. Strong background in analog/digital technology. Quality oriented attitude with ear for high grade sound. First class radiotelephone. Willing to relocate for the right job. TV and commercial stations need not reply. Contact T. Eifert, 1102 Calota Circle, Madison, WI 53713 9-81-11

HELP WANTED
WANTED: Pre-1928 radio equipment and tubes. August J. Link, Surcom Associates, 305 Wisconsin Ave., Oceanside, CA 92054, (714) 722-6162. 3-76-11

HIGHEST PRICES PAID for 112 Phase Monitors and for clean, 12 year old or less, 1KW and 10KW AM Transmitters. All duty and transportation paid. Surplus Equipment Sales, 2 Thoncliffe Park Dr., Unit 28, Toronto, Ontario, Canada. MAH 1H2, 416-621-5631. 2-79-th

INSTANT CASH FOR TV EQUIPMENT: Urgently need transmitters, antennas, towers, cameras, etc. Color studio equipment. Call toll free 800-241-7878. Bill Kitchen, Quality Media Corporation (in Georgia call 404-324-1271).

SARKES TARZIAN CROSS points Part #85-386 for Sarkes Tarzian part #85-387. Call or write Gordon Gingsberg LC2 SUNY at New Paltz, New York 12561 (914) 257-2625. 2-81-th


NEUMANN, TELEFUNKEN, AKG tube microphones, all models, functioning or not; wanted; some transistor models. Also RCA ribbon microphones; Pultec Equalizers; EMT reverb plates; Telex/Teconix, Fairchild, Universal Audio, Urei Limiters. J. MANDELL, TRITON PRODUCTIONS, 38 BROOKS ST., BRIGHTON, MA 02215, (617) 877-2220. 8-91-21

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