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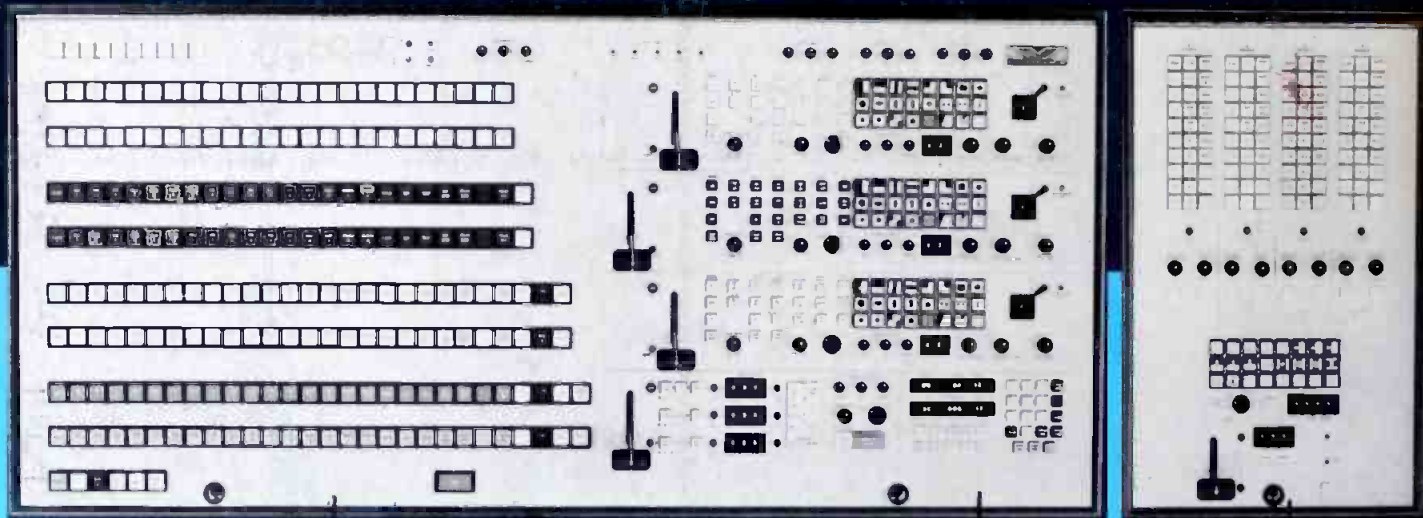
WHAT'S AHEAD: 1979—?



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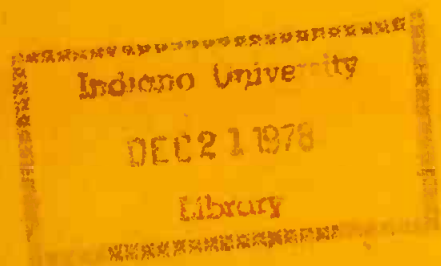
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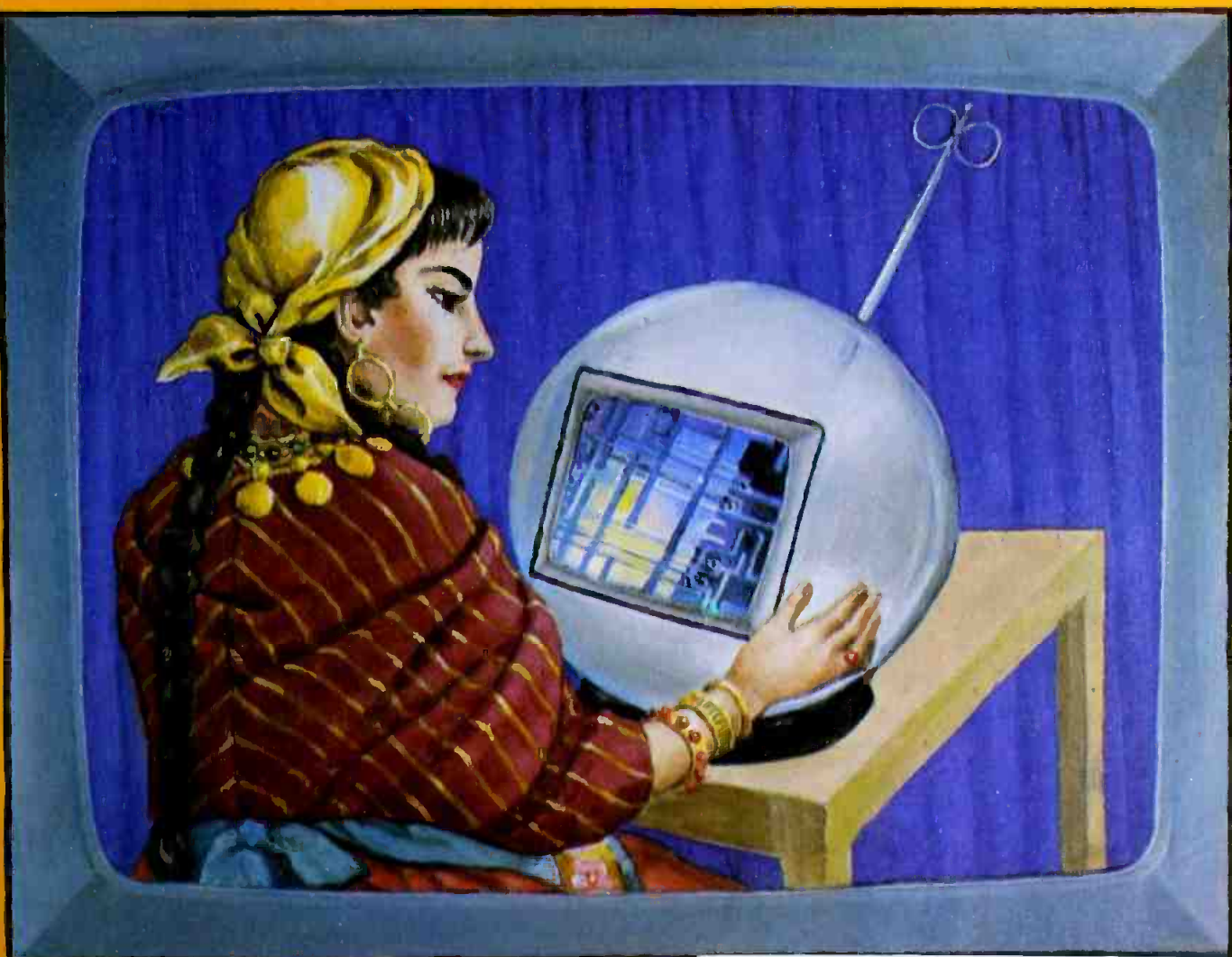
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Ward-Beck introduces affordable quality!

Advanced Ward-Beck technology has developed circuitry in the new WBS 470 Series that's exactly right for broadcasters seeking superior performance at a competitive price.

The standard model L3242 includes such outstanding features as full equalization, individual peak indicators on each input channel, HL line selectors, integral jackfield and redundant power supply changeover. In addition, expanded flexibility is achieved through an impressive selection of optional ancillary modules.

Standardized assembly methods have reduced production time and expense, while traditionally impeccable Ward-Beck engineering and styling have been enhanced.

Now, we can supply most orders from stock. And you can afford to move up to Ward-Beck quality.



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Standard TV Production Console
(32 x 4 x 2 configuration)
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Ward-Beck Systems Inc., 6900 East Camelback Road, Suite 1010, Scottsdale, Arizona 85251.

Lenco's VNM-428 Video Noise Meter

...Only if You *Really* Care About Noise.

Some people think that video noise is a bore. They just couldn't care less about it. They figure that if they ignore it, it'll go away.

On the other hand, there are some forward-thinking, dedicated video engineers who are vitally concerned about their signal quality.

If you belong to the former group, you can stop reading this ad.

However, if you're interested in making fast, accurate signal-to-noise measurements of *any* composite video signal — no matter what the source — check out our VNM-428 Video Noise Meter.

The VNM-428 is specifically designed for the video S/N measurement requirements of TV studios, CATV,

satellite or microwave systems. It utilizes a tangential noise measurement technique which overcomes the problems associated with oscilloscope measurement of Gaussian noise in video waveforms.

It's a small, rugged and stable unit, with a built-in calibrator that ensures an accuracy of ± 0.5 dB throughout the range of 20-55 dB. Three precision filters, conforming to EIA/CCIR standards, are built in. The large, easy-to-read LED display can be seen from across the room. And it's priced at a comfortable \$1,495.

So if you're *really* concerned about video noise, call your nearest Lenco sales office today. We'll be happy to give you a no-obligation demonstration.

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Want to know more about noise measurement? Write on your letterhead for a FREE copy of "Television Signal-To-Noise Measurement — A NEW APPROACH".

BROADCAST engineering

The journal of the broadcast-communications industry

December, 1978 ☐ Volume 20 ☐ No. 12

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BROADCAST engineering

WHAT'S AHEAD: 1979—?



THE COVER

The traditional gypsy fortune teller is depicted gazing into a futuristic crystal ball to view "what's ahead in...." The articles on this topic begin on page 40 and the contributors are listed at the left.

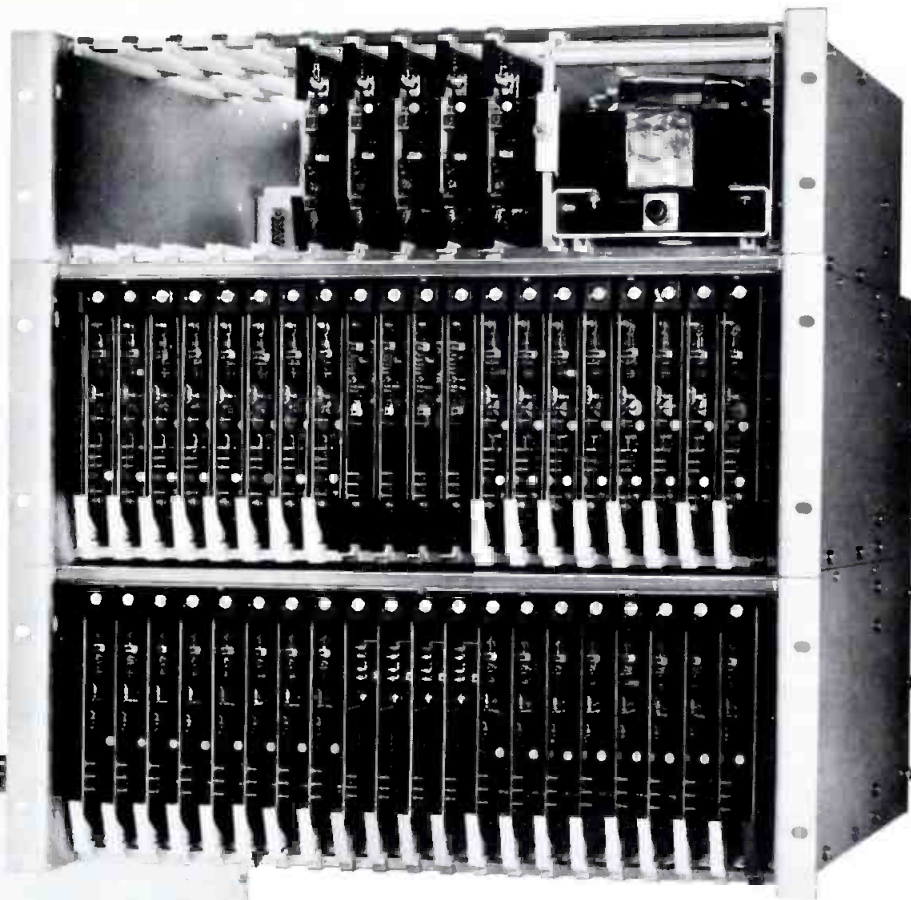
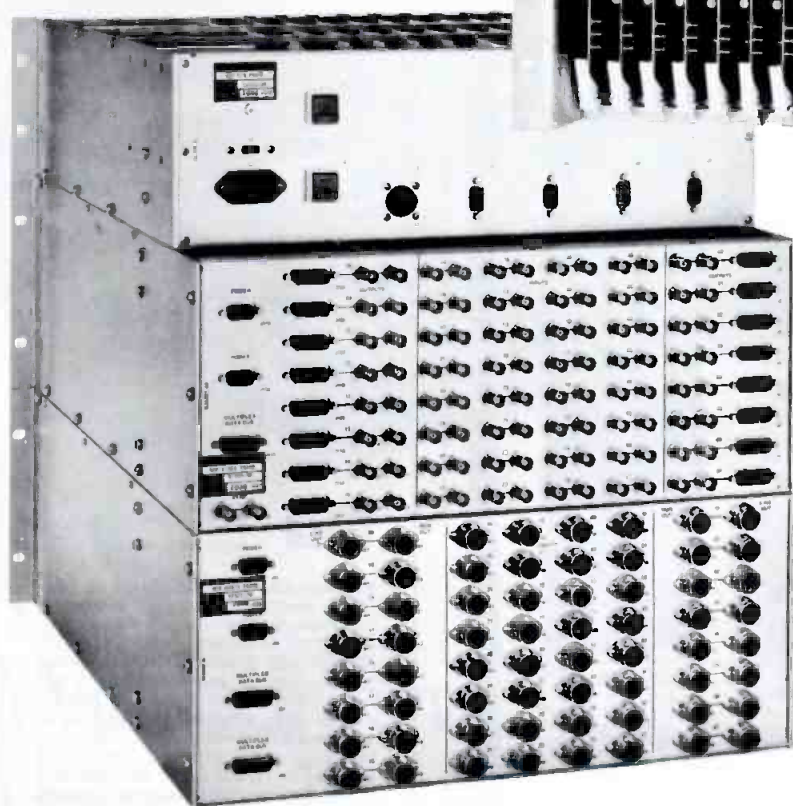
The cover painting was done for BE in oils by E. Bohlman Patterson. She is a graduate of The School of the Art Institute of Chicago where she was granted a tuition scholarship.

OUR 1979 SCHEDULE

We will begin 1979 with an exciting issue on ENG, including a roundup of the cameras and lenses. We'll include some of the activities at SMPTE and continue our regular departments of industry-wide news, including FCC activities.

GRASS VALLEY GROUP 

400 SERIES ROUTING SYSTEM



...solves your signal routing problems with world-famous Grass Valley Group quality, and at a remarkably reasonable price!

And the 400 Routing System specifications are unexcelled! For example, the audio section produces +24 dBm into 600 ohms *without* using transformers. And the design of the 400 System is *totally modular*: you

may add to your basic system as needs arise, even adding as little as *one output at a time*! The cost is low, and the quality the highest; Grass Valley Group quality in the new 400 Routing System.

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Now Two Smart Plotter Plug-ins for Our Top Draw-er

MODEL 2010 LEVEL AND FREQUENCY DETECTOR

The new UREI Model 2010 is the second of a series of plug-in modules for our Model 200 X-Y Plotter. The 2010 module enables the 200 to plot both amplitude and frequency information received from coherent signals such as pre-recorded test tapes, records or other remote signal sources. It features SFD (Smart Frequency Detection) which distinguishes between coherent signals and random voice-type interruptions. The circuit stores the last measured frequency in memory, lifts the pen, and waits for new updated frequency and level information before continuing. It can be synchronized from either the input signal or a different external source for plotting channel separation, head crosstalk, etc.

MODEL 2000 AUTOMATIC SWEEP FREQUENCY GENERATOR AND RECEIVER

The Model 2000 plug-in module, our first of the series, has an internal sine wave generator and receive circuitry for automatically creating amplitude versus frequency response plots on the UREI Model 200 X-Y Plotter. The Model 2000 features a unique Slope Sense* circuit which automatically slows the sweep rate when rapid amplitude changes occur, and then resumes its normal rate afterwards.

Both Models 2010 and 2000 plot signals from 20 Hz to 20 kHz on K&E or DIN Audio Response Graph paper with 0.05 db resolution and a dynamic range of over 60 db. Vertical scaling is switchable from centimeters to inches. (UREI quality, of course) Available from your UREI dealer.

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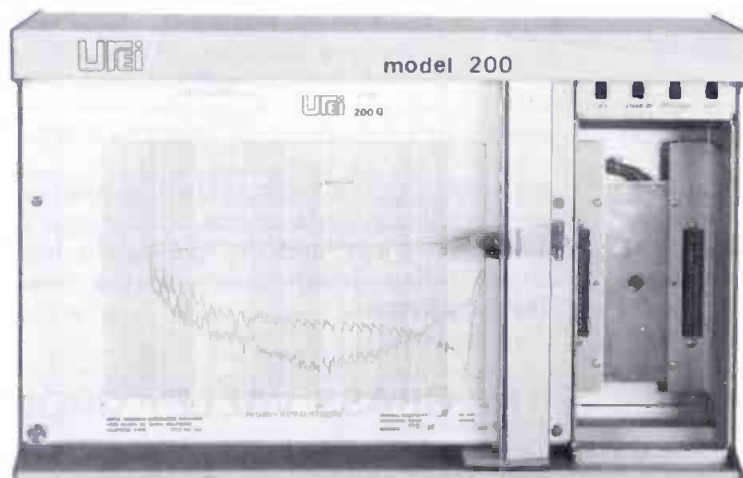
*patent applied for.



MODEL 2010



MODEL 2000



8460 San Fernando Road, Sun Valley, California 91352 (213) 767-1000

Exclusive export agent: Gotham Export Corporation, New York

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INTERTEC PUBLISHING CORP.



With our new 3200
your audio can
equal your video

Somewhere along the line, video technology got ahead of audio technology. Now, Audio Designs and Manufacturing has evened the score.

Our new modular audio consoles are the perfect match for today's video equipment. In fact, we believe our new 3200 and 1600 broadcast production consoles are the forerunners of the audio equipment of the 80's. You won't see anything else like them, at least not this side of late 1979.

Our totally new consoles employ the finest proven components and integrate them into a cohesive, versatile, reliable unit . . . one that will accommodate your most exacting requirements. Our total in-house design and manufacturing capability put so much quality into all of our consoles that ADM® offers an exclusive 5-year warranty, the most comprehensive in the industry.

Learn more about how ADM can increase your audio capabilities. Contact Audio Designs and Manufacturing, Inc., 16005 Sturgeon, Roseville, Michigan 48066. Phone: (313) 778-8400. TLX-23-1114. Southeastern Office: Phone (904) 694-4032. **AMPEX** Distributed outside U.S.A. by Ampex International Operations, Inc.

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FCC update



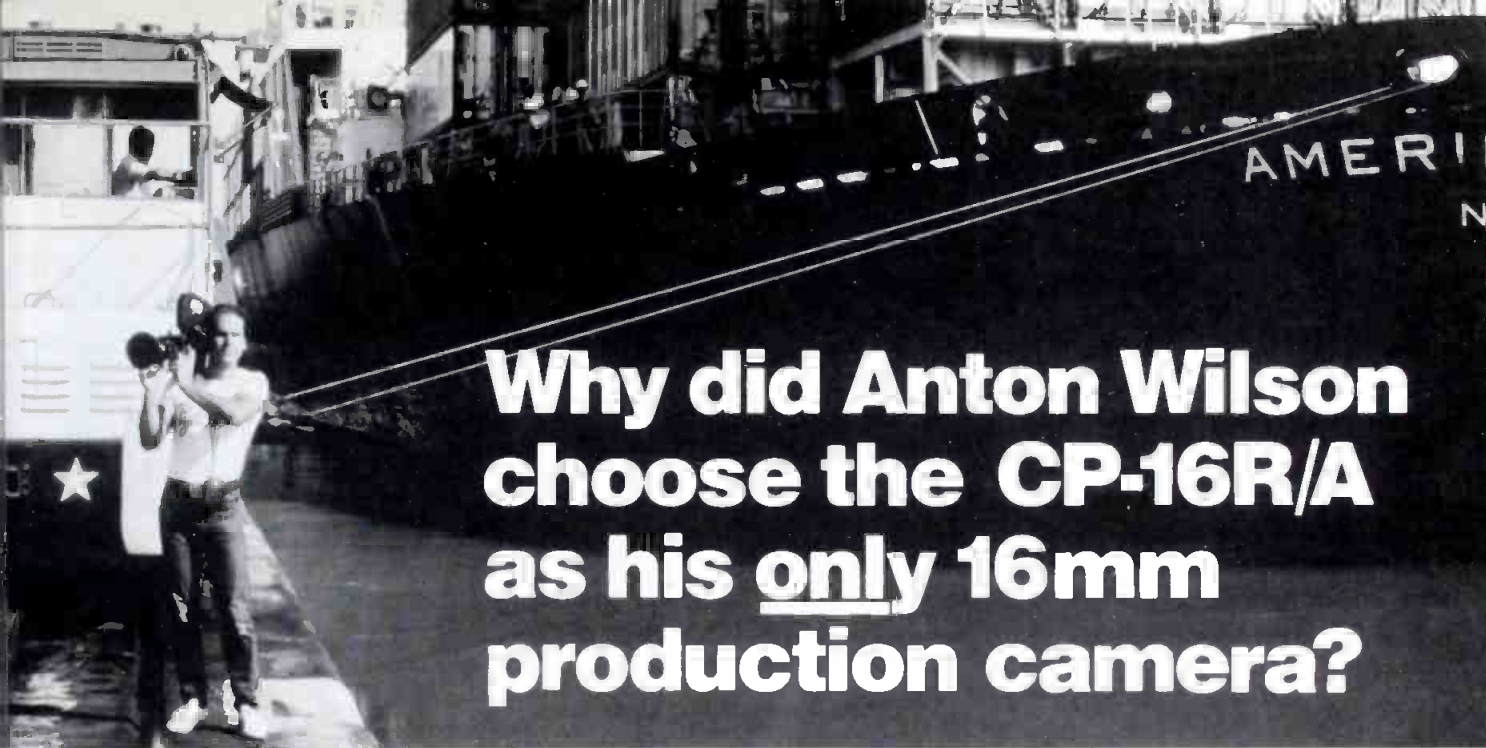
December, 1978/By Howard T. Head and Harold L. Kassens

New re-regulation order!

It always pays to keep your eye on the commission's Broadcast Re-Regulation Task Force. This time they came out with a real goody. The latest re-regulation order provides eight new relaxations starting November 20:

- A. All stations will have a single license covering all transmitters (main, auxiliary and alternate-main terminology will be obsolete).
- B. The replacement of existing transmitters and addition of new type-accepted transmitters may be made without prior authority from or notification to the commission.
- C. FM and non-directional AM stations may operate by remote control from either the main studio or transmitter without prior authority from the commission.
- D. FM and TV stations may replace an existing antenna and transmission line without authority provided the effective radiated power or height above average terrain is unchanged. An accompanying change in transmitter power will require filing only Form 302.
- E. For FM stations, it will not be necessary to obtain a Subsidiary Communications Authorization (SCA) to utilize a sub-carrier for remote control or automatic transmitter telemetry.
- F. An FM station can change from mono to stereo operation without authority from the commission.
- G. All stations may erect and use an emergency antenna to continue service temporarily without prior authorization if the main antenna is destroyed.
- H. FM stations may install a new stereo generator without submitting an informal request to the FCC.

This is further proof of the fact that the Task Force will, in time, make desirable relaxations upon request. We encourage you to drop a note to the Broadcast Re-Regulation Task Force, Room 8010, FCC, Washington, DC 20554 with any suggested changes you have.



Why did Anton Wilson choose the CP-16R/A as his only 16mm production camera?

Known for his daring and inventive camera work, independent producer/cinematographer Anton Wilson has done it all: documentaries, special feature stories for television, industrials... most notably for ABC-TV's *Good Morning, America* and for industrial giants like AT&T, among others.

A former technical director for Arriflex, with a background in mechanical engineering, Wilson is also an authority on motion picture production techniques and equipment design. He is vice-president of Anton-Bauer, manufacturers of power supplies for film and video use, and a contributing editor to the *American Cinematographer* magazine.

"The quietest 16mm camera I've ever owned!"

"I first started out with an Arri 16BL, followed by an Eclair ACL," says Wilson. "Eventually I gave them both up. For various reasons, they just failed to satisfy my particular filming requirements."

"My assignments are so diversified and challenging, I need a versatile production camera that can do just about *everything*! And I find that the CP-16R/A is the only camera in existence versatile enough to do

everything I want — and need — it to do. Best of all... it is the quietest 16mm camera I've ever owned."

"CP-16R/A is the only game in town!"

"The studio-silent CP-16R/A is ideal for all double system work. Yet it is lightweight, compact, and has all the sophisticated features and accessories I consider indispensable: variable speeds, behind-the-lens metering, orientable viewfinder... you name it.

"Most important, the CP-16R/A also has a high-quality single system sound capability that is integral to its original design — not a modification, or an afterthought.

"When I add it all up: CP-16R/A is the only game in town!"

Modern production techniques require high-quality single and double system sound.

Says Wilson: "Single system capability is essential these days for most documentary, industrial and PR films, as well as TV commercials. Because modern production techniques frequently call for the editing to be done on videotape, and single system sound

(Above) Anton Wilson at the Panama Canal. "Filming an in-depth feature story about the upcoming canal treaty and its implications, we were able to move fast and reliably with the CP-16R/A, covering what would normally take two months in just ten days!

"The camera functioned flawlessly, even in the torrential rain that overtook us when we followed General Torrijos into the Panamanian jungles.

"This documentary was so successful it aired both as a two-part series on *Good Morning, America* and as a five-part series on the *ABC Evening News*."

makes video transfer real easy.

"That's why my CP-16R/A is frequently used much like a remote video camera... but with far greater flexibility and superior results. Production costs in the field are cut dramatically, and we are far less conspicuous and obtrusive than any EFP crew would be.

"Occasionally, we want the quality of double system sound as well as single system sound backup and editing ease. So we shoot both ways *simultaneously*, running an additional feed from the mixer into the CP-16R/A built-in amplifier, and recording single system sound on striped film. Incidentally, on a recent documentary shot this way, the single system sound quality was so outstanding that we never even used the sound from the Nagra tape!"



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FCC update

FM rule-making petitions filed

A consulting engineer has filed a Petition for Rule-Making with the FCC asking the commission to permit Class A FM channels to be dropped in on the frequencies reserved for Class B/C stations where the Class A drop-in would not have an adverse impact on the allocation of Class B and C stations. This petition and a similar petition filed several years ago are being considered jointly in connection with a Notice of Inquiry being prepared by the staff looking into the feasibility of allocating FM stations on a 150 kHz separation basis.

New FCC forms available

The commission has announced the availability of five revised broadcast forms. Forms 303, 309, 313, 346 and 348 have been up-dated and the commission encourages all applicants to use the latest form. Those of particular interest to broadcasters are: Form 303 for renewal of the license of a commercial TV station; Form 313 for authorization in the auxiliary broadcast service (Part 74); Form 346 for authority to construct or make changes in a TV or FM broadcast translator station; Form 348 for renewal of a TV or FM translator station license.

New fines procedure

Under a new public law, Congress has changed the provisions governing imposition of fines by the FCC. Previously the Field Operations Bureau issued violation notices. Replies to these by the station were cleared by the Field Office or the case was referred to the appropriate FCC bureau for resolution or issuance of a Notice of Apparent Liability. Under the new procedure, the rules delegate to the Chief of the Field Operations Bureau authority to issue Notices of Apparent Liability subject to statements of policy provided by the other bureaus and offices. The chief of the Field Operations Bureau may now issue final Forfeiture Orders for fines up to \$2000 and orders canceling or reducing forfeitures. The details of the new procedure have been worked out for the cable, common carrier and safety and special service bureaus but the broadcast bureau has not yet agreed to any statement of policy.

Short circuits

The FCC has issued a Notice of Inquiry setting up a government-industry committee to assist in establishing a procedure for measuring TV noise figures (see July, 1978)...The new FCC EEO rules require all stations to maintain in their public files a ranking of all employees by position and salary (dollar amounts and names are not required)...The commission has begun a rule-making proceeding to reduce interference to radio astronomy operations from amateur, CB and other land mobile operations in the area of the big dishes...The FCC refused to waive the rules and returned an application of an AM station in Phoenix. The commission said it did not consider the Mexican-American population of Phoenix as a separate "community."

The HITACHI SK-90

Unsurpassed Picture Quality in a Free-Ranging Portable.

High technology in camera design is Hitachi's business. And the phenomenal SK-90 shines among Hitachi's previous successes.

With the comfortably balanced, self-contained SK-90, you can go on location and shoot action features, documentaries, commercials, training and sales tapes — without worrying about complex equipment, tripping over bulky cords, or staggering under heavy loads — and always producing an image truly worthy of broadcast transmission. The SK-90's sophistication makes it easy for you. Anyplace, anywhere from sub-zero to over 100° F. operating temperatures.

Technological advances? The SK-90 is brimming with them.

A Hitachi-developed Automatic Beam Optimizer (ABO) circuit cuts out the comet-tailing effect common to lesser cameras when shooting highly reflective objects.

Three 2/3" Saticon tubes combine with a smaller-size high index beam splitting prism to deliver better than 500-line horizontal resolution and better than 51dB signal-to-noise ratio.

And, of course, there are all the additional features that assure sharp, crisp pictures and true colors: built-in 2H contour enhancer with comb filter...standard I & Q encoder...switchable color bar generator...automatic white balance...automatic iris...and a built-in Genlock circuit using black burst to lock your SK-90 to other cameras.

Options include a built-in linear matrix masking amplifier for high fidelity color rendition and a complete remote operating unit which lets the camera range up to 1000 feet away on standard camera cable. For an even greater working range of over 3000 feet, a Digital Command Unit/Tri-axial Cable System is also available.

Remarkably, the Hitachi SK-90 may be the first affordable, self-contained portable that doesn't compromise. Contact your Hitachi dealer for more details.



HITACHI

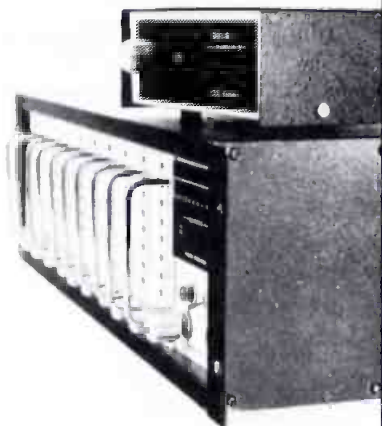
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December 1978 *Broadcast Engineering* 9

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More importantly, the exceptional versatility and performance of these units make installation and maintenance easier and you sound better than ever before. For example: All inputs and outputs may be used balanced or unbalanced and in any combination on the same amplifier. All outputs are individually amplifier isolated and will work into any load over 125 ohms without change in distortion or response. Response - 10Hz to 20kHz, $\pm 0.5\text{db}$. Distortion - 0.1% or less. Output level - $+20\text{dBm}$ max. Hum & Noise - 98db down referenced to $+20\text{dBm}$ out. Channel separation - 75db.

RAMKO DA's start as low as \$145 and are available in 12 rack and table top versions. From our 1x6 line and mic level units, thru the 1x30 mass feed model, to our modular 20x80 rack mount design.

All amplifiers are warranted for 2 full years and are sent on a 2 week free trial basis. Unlock all of your stations performance. Contact your RAMKO Rep. or call us collect for more information.

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industry news

SMPTE awards medal for development of VTR system

The David Sarnoff Gold Medal of the Society of Motion Picture and Television Engineers for 1978 was recently presented to Masahiko Morizono, managing director and general manager of Sony Corporation's video products division, Tokyo.

Morizono received the award for his development of portable helical scan VTR systems with associated versatile editing capabilities. The system facilitates the wide use of electronic news gathering (ENG) equipment throughout the world's television broadcasting industry.

Morizono has been with Sony since 1953, where he first worked on audio and instrumentation recorders. In 1959 he worked on the development of the helical scan VTR and in 1971 was instrumental in the introduction of the U-matic cassette recorder and electronic editing machines.



With the spread of ENG, Morizono headed a team of engineers to develop Sony broadcast equipment and played an important role in the SMPTE working group which resulted in the C-format standard of compatibility.

Cinema Products expands video equipment line



At a Victor Duncan 2-day new equipment demonstration in Chicago, Wayne Weichel (second from right) demonstrated Cinema Products' new entry to the video camera field—the MNC-71CP ENG/EFP camera. Weichel has experience as an electronics and video specialist and recently was appointed as video sales manager, in charge of Cinema Products' line of video equipment: cameras, 1-inch VTR's and related accessories.

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WHAT TO DO DURING YOUR NEXT OBSCENE PHONE CALL.

Order Eventide's BD-955 Broadcast Delay Line. It will delete your obscenities & tape loops. And more.

When Eventide — the world's foremost manufacturer of digital delay equipment* — decided to build a better time delay system for obscenity deletion, it went digital.

The result is the BD-955, a RAM based DDL providing up to 6.4 seconds of delay.

Substitute the BD-955 for the tape machine you're now loading, monitoring and changing tapes on. The BD-955 will allow plenty of time for either the engineer, announcer — or both — to hit removable DUMP buttons.

The BD-955 cancels the objectionable program material; its rear-panel terminals allow automatic control of the phone and/or auxiliary equipment.

** According to Billboard Magazine's latest U.S. Equipment Brands Usage Survey, 44.9% of major U.S. recording studios use Eventide delay equipment vs. only 6.0% for the nearest competitive digital.*

THE BD-955's EXCLUSIVE CATCH-UP MODE:

Here's where the BD-955 really shows its stuff — and makes the switch to Eventide obscenity deletion as much a programming decision as a technical one —

When the DUMP button is hit, programming instantly returns to real-time. Here you have a choice — use The BD-955 merely to substitute for your old Tape delay & insert a profanity-fill cart, or let it automatically build a new delay margin, digitally. In its exclusive "Catch-Up" mode, the BD-955 can eliminate the need for a profanity-fill cart; the BD-955 automatically builds up delay after a deletion by increasing delay during pauses in the program. LEDs indicate the margin of protection afforded at any moment. Stay alert and the show can continue — in delay — almost immediately. Sound like magic? We've manipulated time like this for over five years.

When it's not being used for obscenity deletion, the BD-955 serves double-duty as a production tool. It allows front-panel selection of delays from 6.5 milliseconds up through the full delay available, for musical and segue effects — including vocal doubling

and automatic double tracking (the audible illusion through which a single voice or instrument is made to sound like two) and digitally-clean slapback echo.

Other significant features about the BD-955 Broadcast Delay Line:

1. Full 15 kHz response and 90 dB dynamic range equals the specs of the best music recording delay lines; 7.5 kHz response, perfect for telephone talk shows *at lower cost*.
2. Full digital Random Access Memory. Like the Eventide 1745M music recording DDL, it runs cool, can take the malt.
3. *It's available*. With more experience than any other manufacturer in building digital audio delay systems, the BD-955 is an extension of proven techniques. More than just a design: it's available now!

Pricing Information		FREQUENCY RESPONSE	
		7.5 kHz	15 kHz
DELAY	1.6 seconds	\$2300	\$2950
	3.2 seconds	\$2950	\$3900
	6.4 seconds	\$3900	\$6300

DUMP AND GO!



Eventide's BD-955 Broadcast Delay Line.

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Circle (7) on Reply Card

TV viewers react to documentary on old age in San Francisco

Because of a belief that people won't watch in-depth documentaries, broadcasters of recent years have shied away from them. A test of that concept was made with the airing of *Old Age: Do Not Go Gentle* in prime time on KGO-TV, in San Francisco.

The 2-hour program dealt with the problems faced by the elderly in

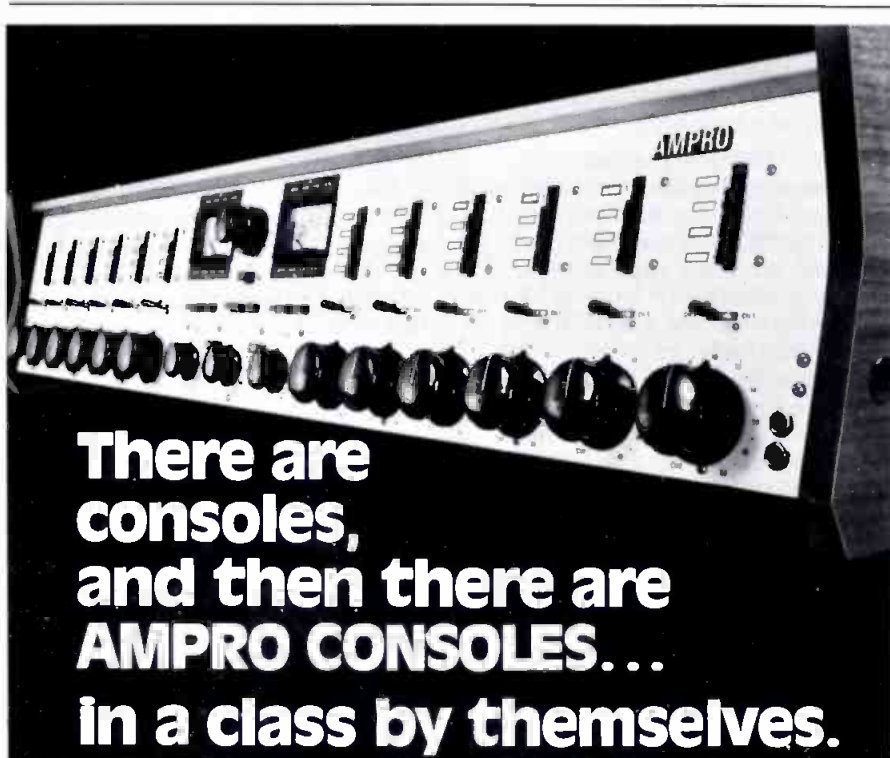
the "tenderloin" district of San Francisco. The area has become delapidated through neglect and has one of the highest crime rates in the city. The program contrasts the lives of aged inhabitants of that area with retired persons in four European nations.

The station made a plea for support for legislation which it

advocated and received more than 450,000 letters in response. "We had hoped for 10,000, but we weren't sure that was realistic," stated reporter-producer Evan White. "We never anticipated anything like this."

The enormous public response was credited to pertinence of the subject matter as well as first class production and promotion of the program. Ads in local media featured coupons supporting the station's efforts to remedy the problems spotlighted on film.

Most of the letters of support came from individuals who were shocked by what they saw. "They realized that the people whose stories we told weren't just a bunch of old bums," White says. "They are working people, just like us, trapped by old age and illness."



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Circle (8) on Reply Card

Space industry gets money

Canada's high-technology space industries will be receiving \$20.4 million from a federal program between now and 1982, communications minister Jeanne Sauvé announced recently.

The money will be used to provide Canadian industry with a national center for the test and assembly of communications satellites and space subsystems through the expansion and upgrading of the David Florida Laboratory near Ottawa.

Of the total allocation, over \$15 million will be for capital expenditures; \$3 million for operating expenses and \$2.4 million for special facilities and services for the ANIK-C integration program.

ARRL appeals orders

In a recent action before a federal appellate court, the American Radio Relay League (ARRL), has appealed the FCC's orders prohibiting marketing of external radio frequency (RF) power amplifiers (linears) capable of operating in the 24 to 35 MHz band and denying reconsideration of that order.

The order also denied a request to delete the 3-year type-acceptance requirement for all RF amplifiers capable of operation below 144 MHz.

Better video—digitally— for any TV standard

PAL/SECAM



CVS-517 Digital Time Base Corrector

Broadcast quality (SECAM optional), L. Lock and V. Lock. SECAM option also provides PAL/SECAM bi-directional standards conversion. Features: 2h + window, Gen Lock, DOC, Vel Comp, Proc Amp. Options include: SECAM, Image Enhancer/Noise Reducer, 16h window.

PAL-M



CVS-515 Digital Time Base Corrector

Broadcast quality; has NTSC to PAL-M standards conversion. Features: 2h+ window, Gen Lock, DOC, Vel Comp, and Proc Amp. Image Enhancer/Noise Reducer and 16h window optional.

NTSC



CVS-510 Digital Time Base Corrector

Ideal for CCTV and CATV; monochrome or heterodyne color. Features include: 1h + window, DOC, Proc Amp, Color Interlace.



CVS-516 Digital Time Base Corrector

Broadcast quality, specifically designed for heterodyne VTRs. Features: 2h+ window, Gen Lock, DOC, Vel Comp, Proc Amp. Options: Image Enhancer/Noise Reducer, 16h window.



CVS-520 Digital Time Base Corrector

Broadcast quality for every VTR: segmented or nonsegmented. Only TBC with 9 bit 4x subcarrier digital processing. Can update mono quad to color; has DOC, line-by-line Vel Comp and digital outputs.



CVS-504B Digital Time Base Corrector

Broadcast quality, monochrome, direct and heterodyne color, (L. Lock and V. Lock). Includes: 3h window, Gen Lock, Proc Amp. Options: Vel Comp, Heterodyne Phase Corrector.



CVS 310 Image Enhancer/Noise Reducer

Reduces luminance & chroma noise 6 dB; enhances horiz. & vert.; minimizes fine grain noise, moiré & streaking; reduces chroma-to-luminance crosstalk by 20 dB; corrects chroma/luma delay errors.

EPIC™ Computer Aided Editor

A complete, software-based system for on or off-line use with multiple VTRs—from quad and 1" to ¾" cassette types. With EPIC, functions that, before, required separate, costly hardware—like time code generation—are now in software. As a result, total system cost is reduced while versatility and convenience are increased.

Want to know more about TBCs?

Ask for our free booklet, the "What, Why and When of Time Base Correction."



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CVS is making digital technology work for video users worldwide. To keep up to date on our new product developments call or write.

Three-day blitz causes ambulance membership and funds increase

A Southwest Louisiana ambulance company recently signed up 94,500 families in its membership program, and gathered \$2.7 million in operating funds by using a unique broadcast media blitz.

Richard Zuschlang, secretary-treasurer and membership campaign director for Acadian Ambulance Service, called the success of

the drive "a testimonial to the amazing ability of radio and television to inform and motivate."

A network of 21 radio stations throughout the company's 11-county service area were united by Zuschlang and broadcast executives. The stations broadcast live campaign progress reports and enrollment appeals from the company's emer-

gency medical dispatch center. Reports were made hourly during the last three days of the drive.

KLFY-TV in Lafayette, LA; WBRZ-TV in Baton Rouge; and KPLC-TV in Lake Charles, LA, carried the reports live while KATC-TV in Lafayette, and WAFB-TV in Baton Rouge carried delayed videotaped reports.

The 3-day blitz was credited with producing one-fourth of the \$2.7 million total.

The **it** Eraser-Splice Locator

The only machine to combine precise splice locating and cartridge erasing in a single, automatic operation. Just insert the cartridge, and press "START." The tape is bulk erased while cartridge is running. Then, the splice is located. 2 year warranty. Only \$495

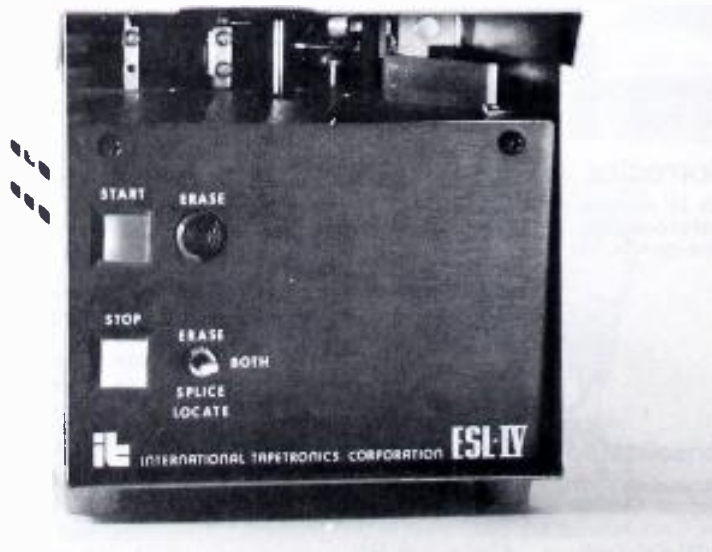
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Circle (10) on Reply Card

Broadcaster honored

In a recent action, the FCC, the National Weather Service and the Defense Civil Preparedness Agency honored 14 Ohio broadcasters for their development of a statewide emergency network.

The network, which originates in Columbus, utilizes 23 key radio stations throughout the state to relay information to all Ohio radio and television stations. The network is linked to the state emergency operations center (Breightler Armory) as well as to emergency agencies such as the national guard, highway patrol, county sheriffs and the national weather service.

Glenn receives award

The director of the New York Institute of Technology's Science and Technology Research Center, Dr. William E. Glenn, was recently awarded an Emmy by the National Academy of Television Arts and Sciences.

Glenn received the award for his work on the digital technology that was utilized in the development of the digital noise reducer (DNR), a joint project of Thomson-CSF Laboratories and CBS. The device is capable of eliminating picture noise during transmission to home TV sets.

The awards were presented at a recent dinner by John Cannon, Academy president. Renville H. McMann, Jr., president of Thomson-CSF Labs, and J. Kenneth Moore, vice president and general manager of the CBS technology center, accepted the awards.

HI-BAND U-format VTR



“Quad” Quality in a $\frac{3}{4}$ ” Format

The model HBU-2860 (Hi-Band U-format video cassette recorder) is a modified SONY VO-2860 with Recortec electronics mounted on top of the unit. The modification provides direct hi-band video recording made possible by tripling the scanner speed and the linear tape speed.

Quality—At the 1200 ips head-to-tape speed the HBU video quality is as good as the “quad” or the new one-inch format. Professional audio quality is also obtained with this modification.

Convenience—Standard and widely available $\frac{3}{4}$ -inch video cassettes for the HBU allow for simple loading, handling and storage.

Dependability—The HBU does not alter the U-type recording format and thus takes advantage of the proven interchangeability of the U-type recorders.

Economy—Lowest cost in equipment, media and operations for any Hi-Band VTR.

Availability—Ready for delivery at the introductory price of \$14,500 direct from Recortec.

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	Hewlett Packard 339A	Sound Technology 1710A	Potomac Instruments AT-51
AUDIO GENERATOR	Combined With Analyzer	Combined With Analyzer	Separate Unit
Intermodulation test signal	No	Option	Yes
Wow & Flutter test signal	No	No	Yes
Simultaneous L&R Outputs	No	No	Yes
600 ohms and 150 ohms Source	No	Yes	Yes
Stereo Matrix Switch (L,R, L+R, L-R)	No	No	Yes
Switch to remove signal and terminate line for S+N/N	No	Yes	Yes
10 dB, 1.0 dB, 0.1 dB Step Attenuators	No	Yes	Yes

AUDIO ANALYZER	Combined with Generator	Combined with Generator	Separate Unit
Harmonic Distortion Mode	Yes	Yes	Yes
Automatic Nulling	Yes	Yes	Yes
Automatic Set Level	Yes*	Option*	Yes
Intermodulation Distortion Mode	No	Option	Yes
AC Voltmeter Mode	Yes	Yes	Yes
Stereo Phase Meter Mode	No	No	Yes
L/R Amplitude Ratio Mode	No	No	Yes
Wow & Flutter Meter Mode	No	No	Yes

PRICE \$1,900.00 \$3,695.00¹ \$2,295.00²

* Limited to 10 dB capture range.

¹ Price includes options listed.

² Total price for Generator and Analyzer including protective covers and 4 test cables.



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Circle (12) on Reply Card

Industry news

Chinese observe satellite stations

A 7-person delegation from the People's Republic of China is touring the US and visiting satellite communications ground stations and facilities with related equipment.

The group is sponsored by the Electronic Industries Association's communications division and it is hoped that the visit will expand relations between ELA's communications division and the People's Republic of China, which started in 1973.

Companies, the delegation plans to visit, include Scientific-Atlanta, California Microwave, GTE, ITT, RCA, Digital Equipment, Hewlett-Packard and Rockwell International.

NAB argues FTC mandate

The NAB maintains that the Federal Trade Commission (FTC) has no legal basis to require warning disclosure information in advertising and therefore should not attempt to establish such a rule for all over-the-counter antacid advertisements, including commercials on radio and television.

To support its position against mandating disclosures, NAB made the following points:

- The Food and Drug Administration has found that antacid products are generally safe for consumers.
- Lack of consumer awareness of particular label cautions is insufficient cause.
- Broadcast commercials cannot accommodate them.
- They will mislead consumers generally and discourage broadcast advertising of the products.

The advertising practices code of the Proprietary Association states that advertising of a proprietary medicine should urge the consumer to read and follow the label directions. NAB said its radio and TV codes contain this guideline for the consumers, therefore "the Commission may be assured that at least broadcast commercials for antacid products encourage consumer attention to product labels."

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...and what have we done for you lately?

14 years ago we delivered the original 30mm Plumbicon® camera tube that revolutionized TV broadcasting...

9 years ago we introduced the 1-inch Plumbicon tube that permitted the design of more compact broadcast cameras...

4 years ago — the 2/3-inch Plumbicon tube brought broadcast quality to portable cameras and gave us ENG...

Today, we bring you two of these popular pickup tubes with further improvements in performance.

Ever since the original Plumbicon tube won the Emmy Award for having revolutionized color TV broadcasting, we've been keenly aware of the importance of the name Plumbicon to the TV industry which has come to depend on it as its assurance of consistent performance and quality. There's no disputing the fact that contemporary Plumbicon tubes outperform their original versions by a wide margin.

Two of the most recent improvements in the Plumbicon pickup tube line, (the 30mm XQ1410 and the 2/3-inch XQ1427) are described here. These tubes, like all Plumbicon TV camera tubes, offer unmatched resolution and sensitivity, superior color rendition... excellent highlight handling... low and steady dark current... high signal-to-noise ratio... minimal lag... stable operation over a wide temperature range... and long life.



Type XQ1427: Offers significantly higher resolution than earlier versions; modulation depth is 60% typical at 320 TV lines giving sharper, clearer pictures and allowing operation at lower light levels. New gun design and 1500-line mesh construction result in improved registration and geometry, reduction of flare by a factor of 3 and reduced beam landing error.



Type XQ1410: The XQ1410 gained immediate acceptance by the television industry as a significant advance over all previous 30mm tubes. This recognition is based on the XQ1410's dramatic reduction in lag (typically 37% below that of our XQ1020.) The XQ1410 ends color-fringing, greatly reduces picture-smear and gives better dynamic resolution — even under poor lighting conditions. With its internal bias lighting, all three channels can now be balanced for identical lag characteristics. New gun construction gives improved resolution, (60% typical modulation depth at 400 TV lines). New mesh construction results in better geometry and registration and significantly reduces microphony.

Make no mistake — these are vitally important improvements on vitally important camera pickup tubes... but these developments are only part of the answer to — "What have we done for you lately?"

...and now the next generation of Plumbicon TV camera tubes: with them begins the age of Electronic Cinematography.



"Cinematography" once meant the creation of motion pictures on film, and film alone. But no more.

The next generation of Amperex Plumbicon TV pickup tubes, in combination with recent advances in new camera design and videotaping systems, is destined one day to reduce to near-zero the use of film in broadcast cinematography and in motion picture production. Now, indeed, begins a new era... and a new art form: Electronic Cinematography. All-electronic production will offer a technically superior product, and will permit shorter lead times between production and broadcast... and it allows motion picture directors to combine the creative aspects of single-camera film production with the immediacy of live-on-tape TV techniques.

All this has been no accident, of course. We, for instance, have been working toward this moment for fourteen years, ever since the introduction of the original Plumbicon tube... right through the advent of ENG, first brought to reality by our 2/3-inch version of the Plumbicon tube.

This steady stream of advances in TV pickup tube technology now culminates in a new generation of Plumbicon tubes that offers major advances in resolution and lag performance... advances that were prerequisite to the dawn of the age of Electronic Cinematography.

Type S45XQ: Developed for use in new studio cameras that will accept 30mm tubes, has limiting resolution of 1600 TV lines, with modulation depth of 95% at 400 TV lines and 40% at 1000 TV lines. Nothing like it has ever been offered in a broadcast quality tube. The S45XQ provides for external bias lighting; but decay lag, even without bias light, is typically only 7% after 50 milliseconds.

Type S73XQ: Physically interchangeable with conventional 1-inch broadcast Plumbicon tubes, can be used in existing studio and field production cameras with only minor circuit modifications. Typical limiting resolution of the S73XQ is 1000 TV lines, with modulation depth of 65% at 400 TV lines. Overall signal-to-noise ratio can be maximized in the S73XQ by a low-capacitance target contact. A revolutionary gun design in the S73XQ reduces lag; decay lag is typically 2% at 50 msec. with bias lighting.

Both of these new-generation tubes inherit all the finer qualities of the original Plumbicon pickup tube: near-zero dark current... high sensitivity... resistance to burn-in, even in highlights... precise geometry and registration... and long life. You can expect from them what you have learned to expect from Amperex Plumbicon tubes; performance at the edge of tomorrow.

For more information, contact: Amperex Electronic Corporation, Slatersville Division, Slatersville, Rhode Island 02876. Telephone: 401-762-3800.

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Circle (14) on Reply Card

RCA awarded contract

RCA Laboratories has been awarded a 24-month, \$150,000 contract by Intelsat for the development and production of the solid-state TWTA-replacement amplifier.

The device would replace the traveling wave tubes now used in satellites for transmission at the 4 GHz frequency and would provide a more efficient and longer lasting means of amplifying transmissions.

Raytheon Company has also been awarded a contract to develop and produce a gallium arsenide (GaAs) transistor for use in power amplifiers in satellite communications band at the 11 GHz frequency.

Earth station order

Scientific-Atlanta recently received an order from Southern Satellite Systems for a 10-meter diameter transmitting and receiving video earth station for Atlanta.

The earth station will consist of a 10-meter diameter parabolic antenna and the transmitting and receiving electronics necessary for two channels of video programming. The station will transmit WTCG-TV programming to the RCA Satcom satellite located 22,500 miles above the equator and then to CATV systems utilizing this service.

The redundant transmitting electronics also will be used to transmit HTN (Transponder 18)-programming to CATV receiving stations via the RCA satellite.

Cohu dividends

Cohu has declared a quarterly cash dividend of 4 cents per share of common stock, payable January 26, 1979, to shareholders of record on December 5, 1978.

McClatchy order

McClatchy Corporation, in an effort to upgrade its group station technical facilities, has ordered RCA television and radio studio and transmitting equipment valued at more than \$800,000.

Three McClatchy FM radio outlets will install RCA BTF-20, 20-kW

transmitters and BFC antenna systems. KOVR-TV will install three RCA TH-100 recorders for use in a computerized video production center.

Selenium prices up

International Rectifier recently announced a 10% to 20% price increase on selenium plates effective October 25.

Price increases on stack assemblies and other selenium products will become effective as soon as reviews can be completed.

Earnings announced

National Semiconductor recently announced revenues and earnings for the first quarter of fiscal 1979 ended September 17, 1978.

Revenues totalled \$184.8 million, up 41% over the same quarter of the prior year. Net earnings of \$8.8 million or 65 cents per share were 63% ahead of the first quarter of last year.

Penny-pinching video

Kapco Communications has introduced a service known as PPV, or Penny-Pinching Video. The duplication equipment and services will be offered to small and medium-sized organizations video users for short runs of 100 copies or less.

The actual cost per tape will run about 50 cents to \$1 over the cost of the tape to cover the overhead expenses.

Minicomputer line

A minicomputer line called the Series/200 will be marketed by National Semiconductor Corporation.

The line is totally software and input/output compatible with the Digital Equipment Corporation PDP 11/34. The Series/200 will be marketed to large OEM customers.

Detailed information on the line, pricing, service and products distribution will be announced later this year with initial shipments beginning next spring.

KTER sold

Subject to FCC approval, the Gale Broadcasting Company has purchased radio station KTER in Terrell, TX. The station operates on 1570 kHz; 250 watts days.

The buyer principals are Richard E. Zimmer and Andrew L. Pearce. Both have no other broadcast interests.

Harris order

Harris Corporation's broadcast products division recently received an equipment order totalling approximately \$13 million.

Six TV equipment and five radio equipment orders included transmitters, antennas, color cameras, studio equipment and a UHF link system.

McMartin process

McMartin Industries has developed a new process, SCA-Plus, for transmitting both aural and data programming simultaneously over the same FM/SCA broadcast channel.

The process is accomplished by a frequency sharing scheme in which those frequencies containing most of the energy of voice and music broadcasts are allocated for aural information, while the less used frequencies are reserved for transmission of specially encoded digital information.

Bell & Howell expands

A west coast videocassette duplication and distribution facility was recently opened by Bell & Howell's video group in El Segundo, CA.

The facility began operations on October 2 and has the duplication capabilities for 1/2-inch and 3/4-inch cassettes. As many as 6400 prerecorded cassettes per week can be produced.

Raytheon earnings

Raytheon Company reported record earnings per share in the third quarter of \$1.31, compared to 97 cents a year ago.

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Today's broadcasting equipment and standards let you transmit things you never could before.

Like tape hiss, cue tone leakage and turntable rumble, to name a few.

And that's precisely why you need the JBL 4301 Broadcast Monitor.

It lets you hear everything you're transmitting. All the good stuff. And, all the bad. So you can detect the flaws before your listeners do.

The 4301 is super-compact, so it fits all EIA Standard racks. 19"h x 12 1/8"d x 11 1/2"w. It costs \$168. And it's made by JBL. The recognized leader in professional sound equipment.

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Circle (15) on Reply Card

Net income increased to \$40,794,000 (36% over last year's figure). Sales totaled \$781,499,000, up 12% from the \$696,874,000 of the third quarter of 1977.

Earnings for the first nine months rose to \$112,387,000 or \$3.62 per share, from \$82,588,000, or \$2.68 per share, last year.

RCA earnings and sales increase

RCA reported that earnings in the third quarter of 1978 rose 11% over the same period last year. Sales increased 15% over the third quarter of a year ago.

Net profit for the three months ended September 30, 1978 was \$70

million or 92 cents per common share. Revenues were \$1.68 billion up from a previous high of \$1.46 billion a year ago.

For the first nine months of 1978, net profit was \$203.2 million, or \$2.66 per share, a 12% increase over last year. Sales for the nine months totaled \$4.80 billion, compared with \$4.27 billion a year ago.

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Harris advanced technology gives you high reliability with the new MSP-90. Select a combination of modules with the latest audio processing capabilities at surprising low prices.

Harris MSP-90 Audio Processor lets you set it and forget it.

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COMMUNICATIONS AND
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TBC purchase

Tongyang Broadcasting Company (TBC) recently purchased RCA broadcast equipment valued at more than \$1.3 million.

The purchase for the Channel 7 station in Seoul includes the newest studio TV cameras, videotape recording systems, and associated switching, monitoring and audio equipment.

Coastcom contract

American Satellite Corporation has awarded a contract to Coastcom for 1100 model 935 voice frequency companders over a 3½-month period. These companders will be installed in the New York, Dallas, Los Angeles and San Francisco central offices.

E-Systems expands

E-Systems has announced plans for a \$2.2 million expansion of its microelectronic design automation capabilities at the ECI Division in St. Petersburg, FL.

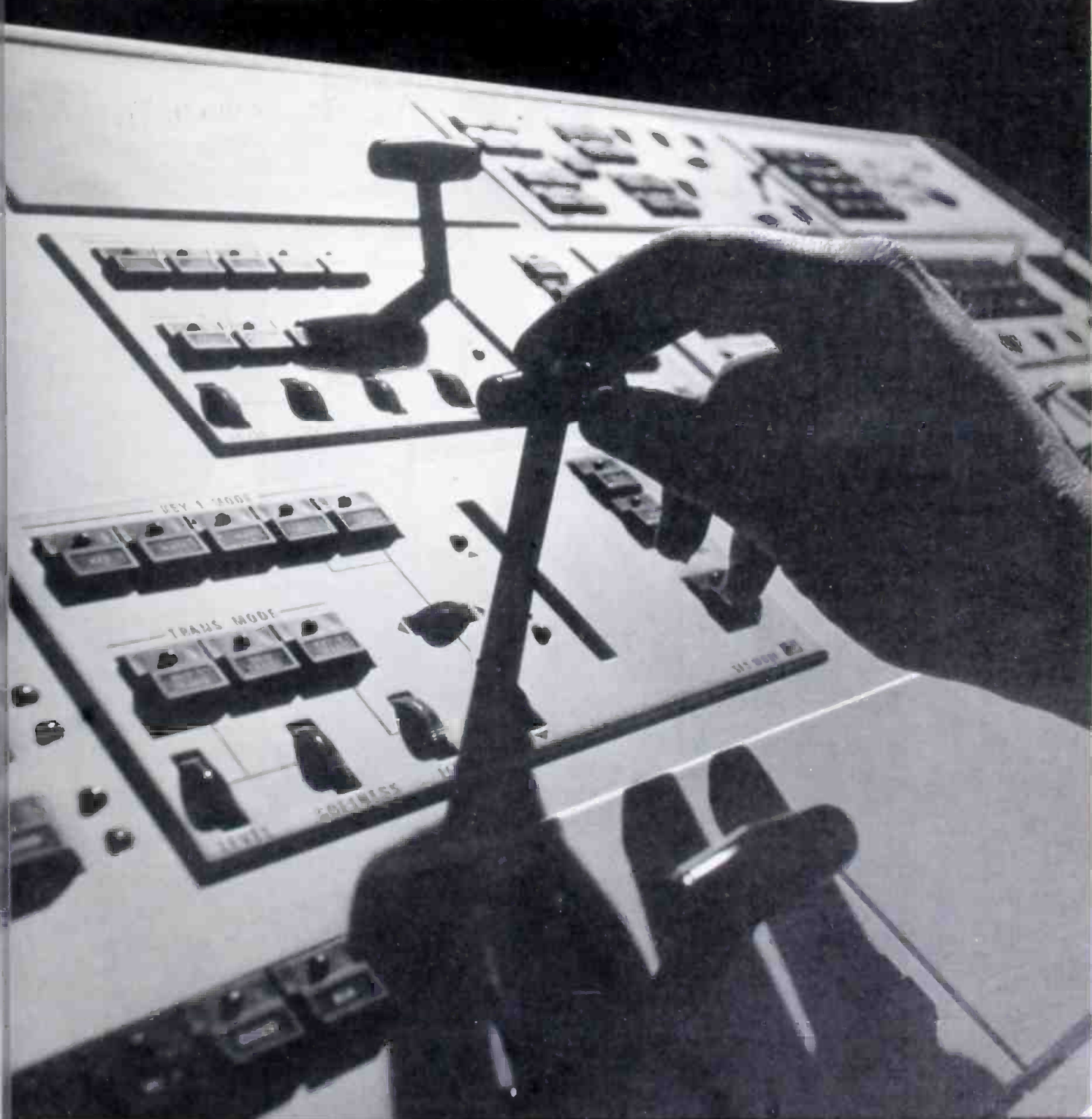
The new facility will incorporate an interactive graphic design system, a scientific computer, an artwork generator and an automated test system. Current planning indicates most of the equipment will be installed and operational by early 1979.

Wabash earnings

Wabash's third quarter 1978 earnings rose 38% to \$1,259,986 (71 cents per share), from \$915,709 (53 cents per share), in the third quarter of 1977. Third quarter sales rose from \$22,247,010 to \$26,777,007 a 20% increase. ☐

Circle (16) on Reply Card

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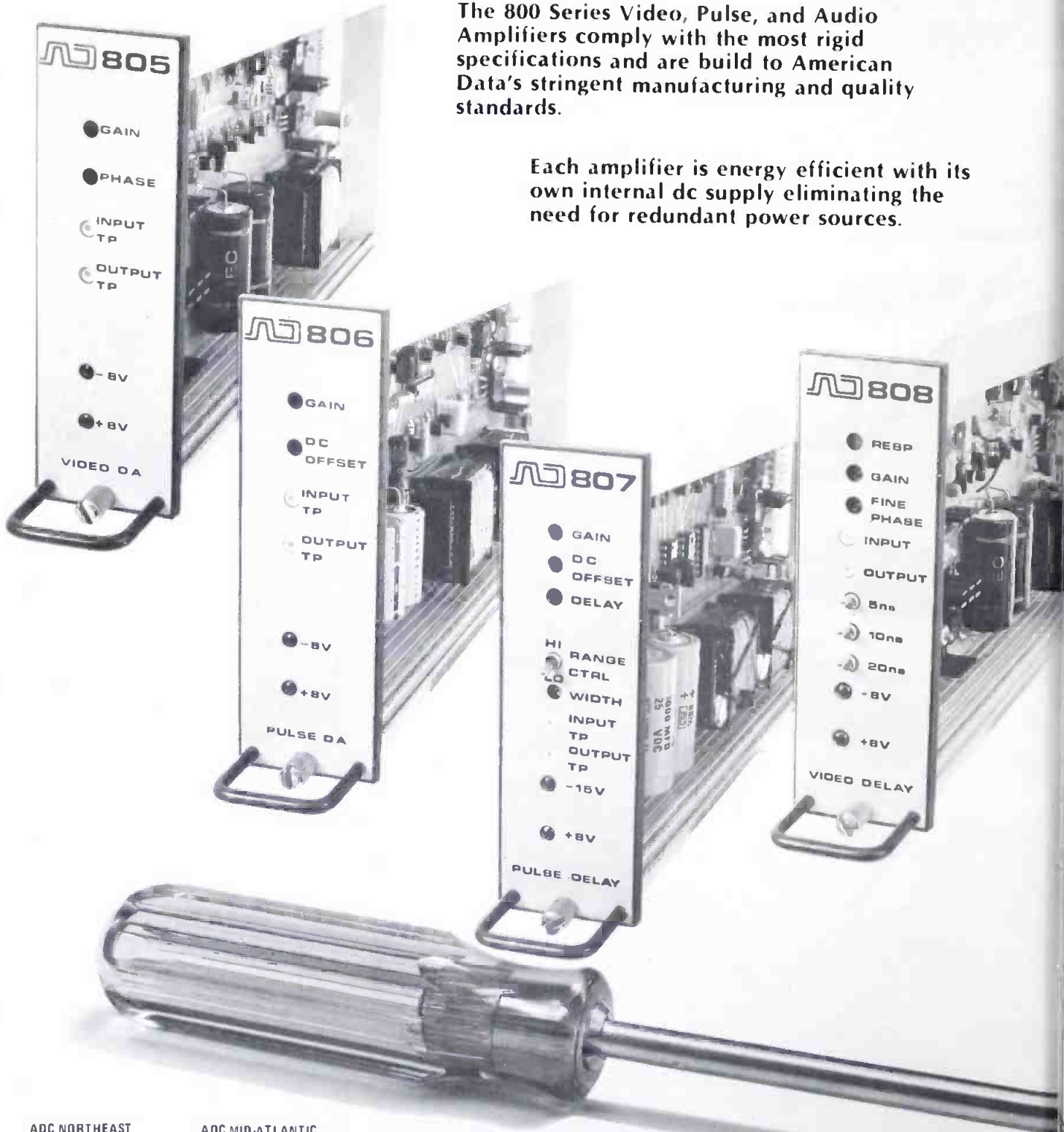
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The 800 Series Video, Pulse, and Audio Amplifiers comply with the most rigid specifications and are built to American Data's stringent manufacturing and quality standards.

Each amplifier is energy efficient with its own internal dc supply eliminating the need for redundant power sources.



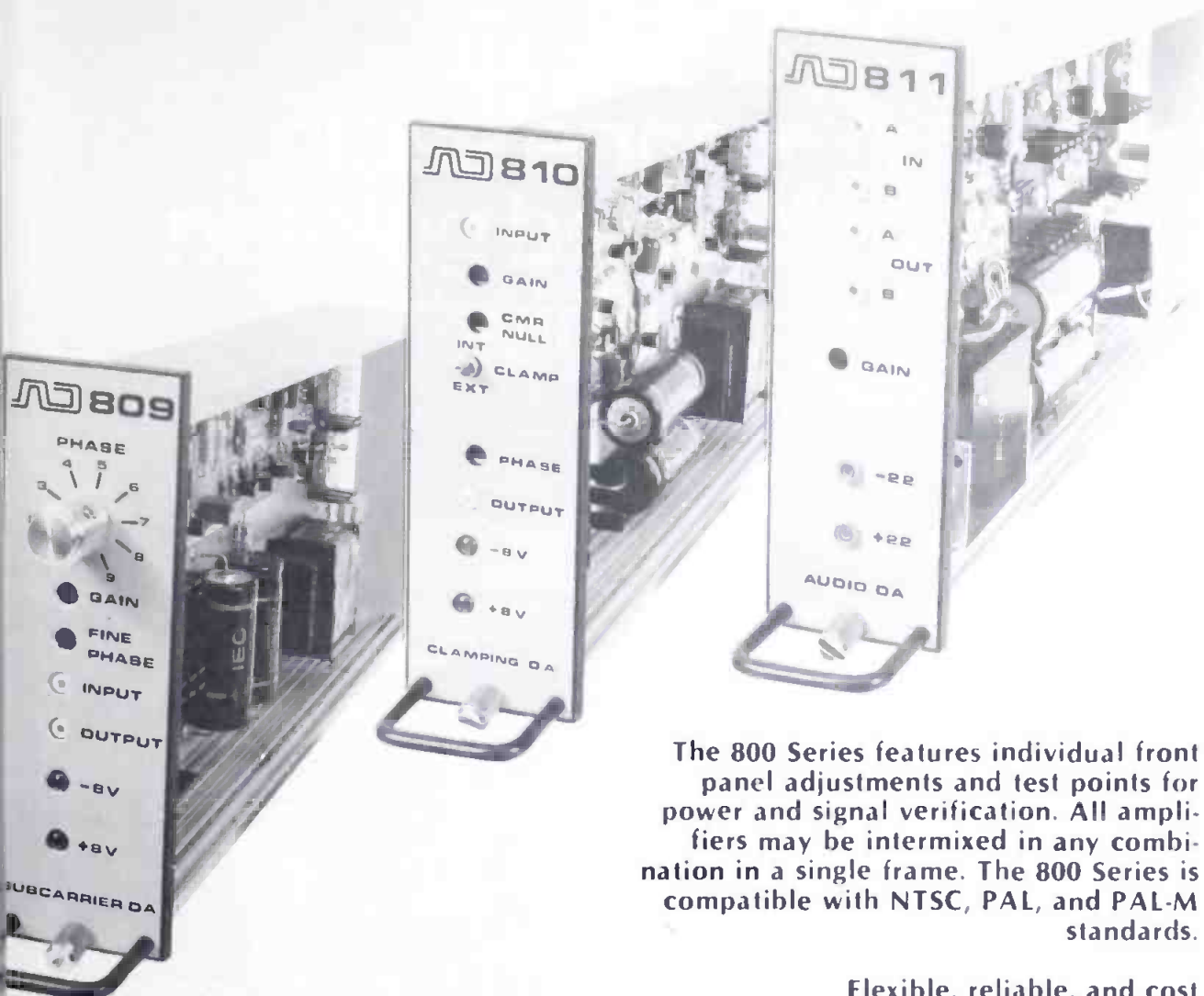
ADC NORTHEAST
Box 452
New Hartford, CT 06057
(203) 379-7840

ADC MID-ATLANTIC
5504 Waterway
Rockville, MD 20853
(301) 460-1454

ADC WEST
3760 Cahuenga Blvd.
North Hollywood, CA 91604
(213) 760-3221

ADC SOUTHEAST
2219 Oakawana Rd., N.E.
Atlanta, GA 30345
(404) 633-2100

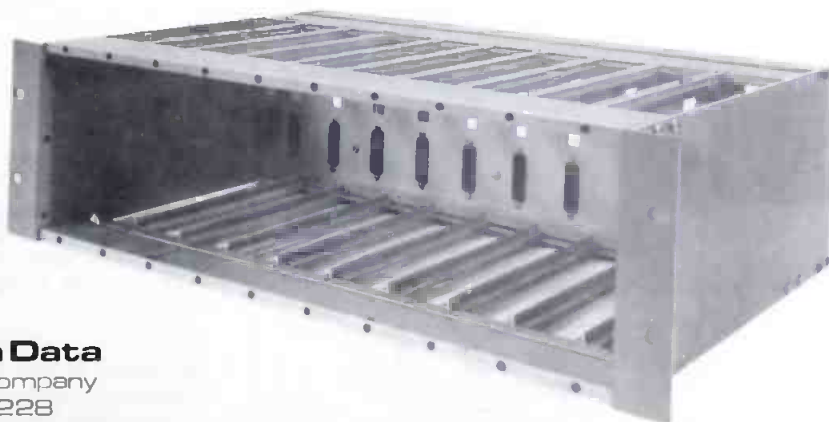
ADC MIDWEST
P.O. Box 27324
Indianapolis, IN 46227
(317) 784-3000



The 800 Series features individual front panel adjustments and test points for power and signal verification. All amplifiers may be intermixed in any combination in a single frame. The 800 Series is compatible with NTSC, PAL, and PAL-M standards.

Flexible, reliable, and cost efficient. Easy to install. Two screws and you're in business.

we're easy.

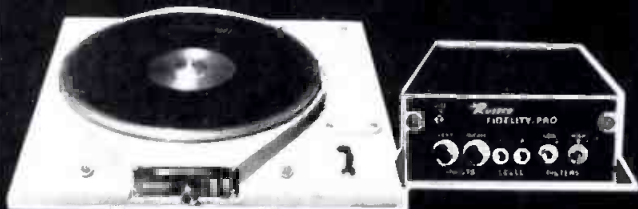


American Data

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Huntsville, Alabama 35805
Telephone (205) 837-5180
TWX 810 726-2125

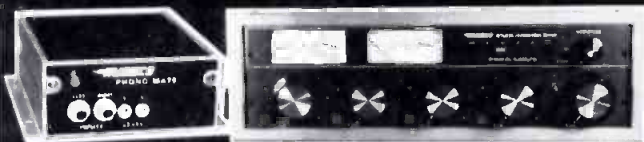
RUSSCO SOUNDS GOOD!!

If you're looking for professional audio products that will reduce down-time, increase efficiency and ease of operation and save a few bucks, come to RUSSCO! Once you get the RUSSCO story, you'll agree...RUSSCO SOUNDS GOOD!



STUDIO-PRO turntable: Rugged & simple, only 3 rotating parts, oilite bronze bearings, heavy-duty motor, no-slip starting, built-in 33/45 adapter. The industry's Standard.

FIDELITY-PRO phone pre-amps: Self contained power supply, more headroom (+18 dBm), easy-access enclosure, 8 models: stereo or mono, balanced or unbalanced.



PHONO-MATE: NEW! lowest priced pre-amp for use with external power supply for reduced hum & noise. Straight RIAA equalization, RFI proofed against interference. Stereo or mono, balanced or unbalanced.

STUDIO-MASTER 505S stereo audio mixer: 5 channels, 5th channel accepts 5 input lines for 9 channels total. Push-button switching, plug-in pre-amps, cue amp & speaker included, Mod Pots, LED indicators, Monoaural available.



MONITOR-MASTER 260 stereo amp: Long life and dependable service, 60 Watts RMS per channel. Clean solid-state sound with built-in power sensor protects against overload.

DISCO 421: NEW! Portable (5½ lbs.) 4 channel audio mixer for disco, remote, home recording, 1 channel: mono mike, 2 channels stereo, 1 hi-level input for tape, 3 band equalization, inexpensive!

• Write us for our brochures

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meetings, events & seminars

January 6-9—The 1979 International Winter Consumer Electronics Show will be held in Las Vegas.

Over 650 consumer electronics manufacturers and importers will occupy 400,000 net square feet of exhibit space and utilize the entire facilities at the Las Vegas Convention Center and the nearby Jockey Club Hotel will accommodate over 100 esoteric high fidelity exhibitors.

For more information, contact: Consumer Electronics Shows, Dept. BE, Two Illinois Center, Suite 1607, 233 N. Michigan, Chicago, IL 60601, (312) 321-1020.

January 8-12—A technical seminar on its amplitude modulation link (AML) local distribution microwave equipment will be offered by the microwave communications products division of Hughes Aircraft. The seminar is designed to demonstrate operation and maintenance procedures for AML systems to technical personnel of CATV systems.

For more information, contact: Seminar Registrar, Hughes Microwave Communications Products, Dept. BE, P.O. Box 2999, Torrance, CA 90509, (213) 534-2146.

January 15-19—Integrated Computer Systems is offering a series of short course seminars on microprocessor and minicomputers. The first session will be in Los Angeles and includes such topics as microprocessor project management, microprocessors and microcomputers, and hands-on microcomputer programming and interfacing.

For more information, contact: Kim D. Sanson, Integrated Computer Systems, Dept. BE, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, CA 90405.

January 16-19—A 4-day seminar on computer graphics is offered by Integrated Computer Systems. The event will be held in Atlanta and the fees cover the cost of lectures, materials and luncheons.

For more information, contact: Kim D. Sanson, Integrated Computer Systems, Dept. BE, 3304 Pico Blvd., P.O. Box 5339, Santa Monica, CA 90405.

January 17—The Distributor Products Division of the Electronic Industries Association will hold its eastern region meeting in New York City.

For more information, contact: Stan Lehrer, EIA/DPD, Dept. BE, 551 Fifth Ave., New York, NY 10017, (212) 661-6500.

January 21-24—The 36th annual convention of the National Religious Broadcasters will be held at the Washington Hilton in Washington, DC. The convention has scheduled a roster of speakers, musicians and broadcast experts as well as sacred music celebrities.

For really close encounters, nothing beats Fujinon's "wide guy."



It's distortion-free.

Here's the widest wide-angle, closest focusing studio zoom lens on the market. It can make your smallest studio look like a concert hall. It can get you in closer, without attachments, than any other studio lens. And it does it all with a lot less light, too.

The "wide guy" is Fujinon's 10 x 15 f/2.8 zoom for 1 1/4 inch Plumbicon* cameras. With its 59° field of view, you get wall-to-wall coverage. You get an M.O.D. of less than 1 foot throughout the full 10X zoom. What you don't get is distortion. Edge to edge, corner to corner, the image is distortion-free.

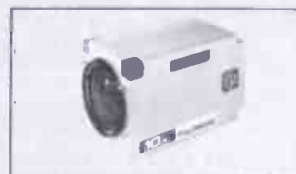
There's more. The "wide guy" delivers outstanding performance with extremely high resolution and contrast. It gives you the spectral and flare

characteristics that have made Fujinon the envy of the industry. See for yourself. Ask for a side-by-side demonstration. The "wide guy" will convince you.

Meet the "wide guy's" little brother. There's no wider, closer focusing studio zoom for 1 inch Plumbicon cameras. (10 x 11 f/2.1)

*Plumbicon® is a trademark of N.V. Philips of the Netherlands.

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Meetings, events & seminars

and specialists in the field of religious radio and TV.

For more information, contact: Ben Armstrong, National Religious Broadcasters, Dept. BE., Box 2254R, Morristown, NJ 07960.

January 22-24—The 1979 Regional Television Lighting and Staging Seminar presented by Imero Fiorentino Associates will be held at the WFAA Communications Center, Dallas, TX. The seminar will feature such experts as E. Carlton Winckler, David Clark and John Leay and is designed for those engaged in broadcast, as well as non-broadcast, television production operations.

For more information, contact: Education Division, Imero Fiorentino Associates, Dept. BE, 10 W. 66 St., New York, NY 10023, (212) 787-3050.

February 2-3—The 13th Annual Television Conference of the Society of Motion Picture and Television Engineers (SMPTE) will be held at the St. Francis Hotel in San Francisco, CA. Subjects will include production and post-production operating experience with 1-inch videotape, digital video effects and digital video recording. Equipment relevant to the technical program will also be on display.

For more information, contact: SMPTE, Dept. BE, 862 Scarsdale Ave., Scarsdale, NY 10583.

February 11-15—The second annual Management Conference of the National Electronic Distributors Association will be held at the Vacation Village in San Diego, CA.

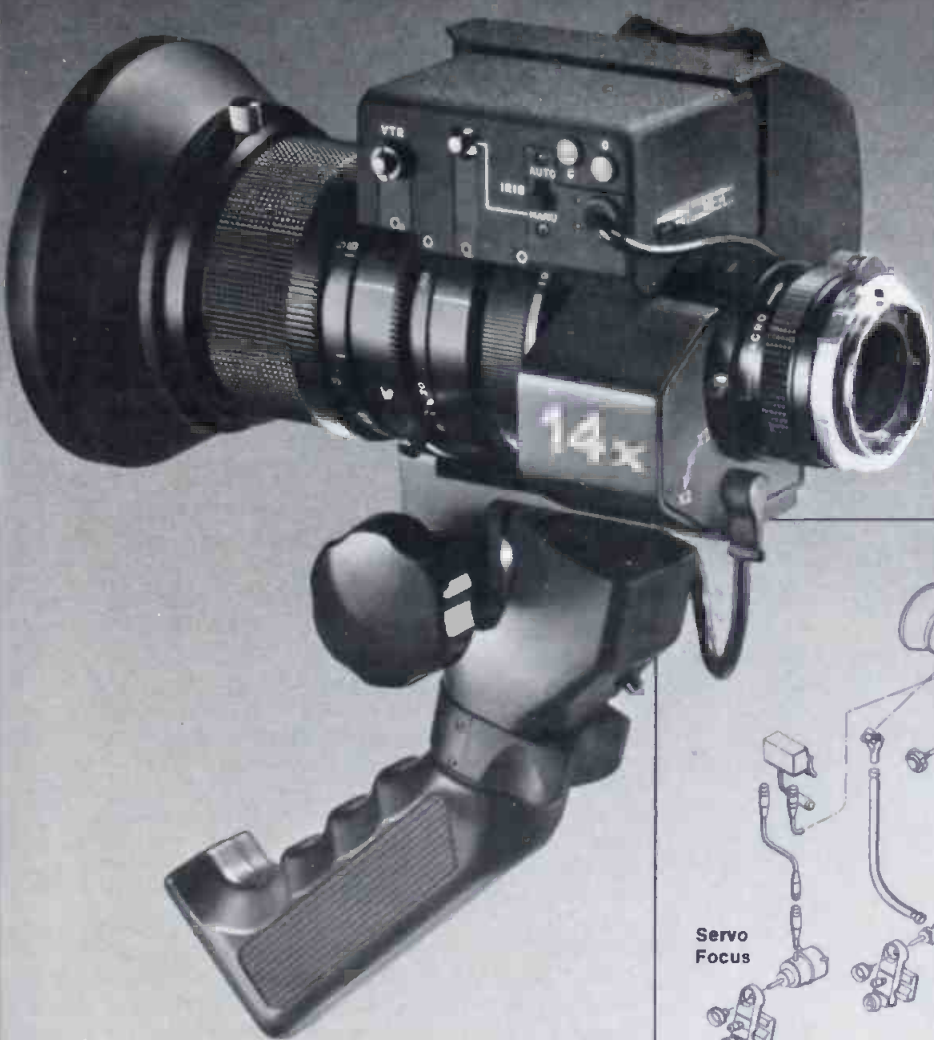
For more information, contact: Toby Mack, NEDA, Dept. BE, 3525 W. Peterson Ave., Chicago, IL 60659, (312) 583-8535.

February 26-March 2—Intelcom '79 international exposition will include such speakers as Joseph Charyk and John A. Johnson from Comsat; Henry Geller, assistant secretary of commerce for communications and information; and Dr. Mahoud Riad, secretary general, Arab Telecommunications Union. The event will be held at the Dallas Convention Center.

For more information, contact: Horizon House International, Dept. BE, 610 Washington (800) 225-9977.

July 17-20—The second joint INTERMAG-MMM conference, jointly sponsored by the Magnetics Society of the Institute of Electrical and Electronics Engineers and the American Institute of Physics, will be held at the Statler-Hilton Hotel in New York City. The purpose of the conference is to provide a forum for the interaction and exchange of ideas between scientists and engineers working in fields of both fundamental and applied magnetism. For more information, contact: Dr. F.E. Luborsky, Dept. BE, General Electric R&D Center, P.O. Box 8, Schenectady, NY 12301. □

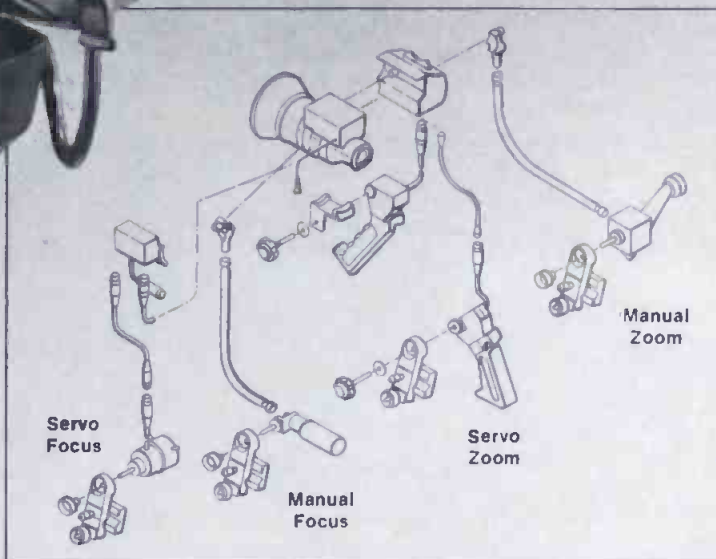
Portable, flexible, convertible. Incredible!



1.8X teleconverter



.78X wide angle attachment



How else would you describe Fujinon's exclusive 14X zoom lens? It has everything built-in, including a lever controlled 2X extender. Not to mention its dual controlled servo zoom and focus, manual zoom and focus, macro focusing, adjustable back focusing, dual VTR switches, momentary iris switch, auto/manual iris, and optional studio conversion kits.

On a portable camera, it's compact, lightweight and easy to operate. It gives you f/1.9 speed and the flexibility to tackle any field or production assignment. You can zoom from 10 to 280mm. Focus down to 13 inches. And then you can select from Fujinon's conversion accessories to use the same lens on your studio cameras. With any combination of servo and manual

zoom and focus controls on the pan bar.

Want more range? Add the new front mounted 1.8X teleconverter. That'll give you an awesome 36 to 510mm zoom (equal to 922mm on a 1-1/4 inch format). Or to spread things out, there's a new .78X wide angle attachment giving you 7.8 to 220 mm.

Check the specs. Check the price. Ask for a free side-by-side demonstration. You'll see the difference for yourself. It's Incredible.

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Do not accept lesser quality—Insist that the STANDARD TAPE LABORATORY name is on the label.

We will ship to any Radio or TV station in the U.S.A. on open account. Write or phone for fast delivery. Also available through select dealers throughout the world.

BROADCAST CARTRIDGE TEST TAPES

Specify—Aristocart, Audiopak, Fidelipac 350, or Mastercart cartridge

CATALOG #			DESCRIPTION	PRICE (EACH) (FOB HAYWARD, CA)
Mono	Stereo	Mono/Stereo Compatible		
34-1	34-2	34	Reproduce Alignment— NAB 1976 $\omega/50\mu\text{sec}$ 160nW/m level, voice announced frequencies from 50-16000 Hz, 12.5 kHz azimuth, 1 kHz level set.	\$40.00
P-34-1	P-34-2	P-34	Pink Noise— 20-20000Hz, $\omega/50\mu\text{sec}$. For stereo phase check, and frequency alignment when used with a $\frac{1}{3}$ octave analyzer.	35.00
F-34-1	F-34-2	F-34	Sweep— 700 to 15000 Hz, 100 ms log sweep repeated for 4 minutes with a dead section between sweeps to facilitate scope synchronization—Useful for fast response checks	35.00
—	—	L-34	Level Set— 1kHz, 160 nW/m, $1\frac{1}{2}$ min.	25.00
—	—	A-34	Azimuth— 12.5 kHz, $1\frac{1}{2}$ min.	25.00
—	—	35	Flutter & Speed— $1\frac{1}{2}$ min. 3150 Hz, tape accuracy —.03% RMS Flutter— 0.1% Speed at 74°F.	25.00
—	—	36	Flutter & Speed— $1\frac{1}{2}$ min. 3000 Hz, tape accuracy .03% RMS Flutter— 0.1% Speed at 74°F.	25.00
—	—	Q-34	Q Track Test— Upper and lower limit frequencies, upper and lower limit levels, long and short duration, on and off at zero crossings. Voice announced.	35.00

STANDARD TAPE MANUAL

Recently announced, this data book is a must for the audio tape recordist, engineer, and designer—priced at \$45.00.

FREE CATALOG

For a full description of the manual and a complete listing of all cassette and reel to reel test tapes please send for our latest catalog.



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people in the news

Radio/Television

The seven-station system of the Maine Public Broadcasting Network recently hired three news-oriented producers. **John Greeman**, a former newsman for WCKT-TV in Miami, FL and KBJR-TV in Duluth, MN, will assist in the production and creation of public affairs shows, documentaries and specials. **Cate Cowan**, a radio producer from WCUW-FM in Worcester, WBUR-FM in Boston and the Northeast Public Power Association, will work on a nightly spot with **Don Bumpus**, former news director for WLAM, Auburn, WIDE, Biddeford, WABK, Gardiner, and WRDO in Augusta.

Fred Horowitz has been appointed general manager of Universal Subscription Television of Boston (USTV), scheduled to begin broadcasting its over-the-air subscription television service in December. Horowitz will manage overall operations of the Broadcast Entertainment Subscription Television (BEST).

Robert D. Sassaman has joined the Akron Public Schools system as chief engineer of their radio station facilities WAPS. Sassaman was formerly general manager and chief engineer of the Northwest Local Schools radio station WNWR in Canal Fulton, OH.

Manufacturers/Distributors

Elmo Franklin, former ITC division president, will serve as chief executive officer of International Tapetronics Corporation. He will have final responsibility for all three operating divisions: ITC, Field Electronics and ITC Communications.

The Optima division of Scientific-Atlanta has announced the addition of **Howard M. Berman** as field representative in the Leonia, NJ sales office. Berman will provide increased customer support in New York and Connecticut for the Optima enclosure line.

James D. Ketner has been appointed supervisor, test and alignment, for Hughes Aircraft Company's microwave communications products. Ketner was formerly manager of field engineering for the line.

Robert C. Stack has been appointed manager of communications for Convergence Corporation. Prior to joining the firm, Stack served as manager of marketing services for Telefile Computer Products.

The new treasurer of the Videotape Production Association is **Caddy Swanson**, president of the Reeves Teletape Television Facilities Group. Swanson has been a leader in videotape production for the past 14 years.

We didn't have to make a better 2 track than our RS-1500. So we made a 4 track. Introducing the RS-1506.



Ingenuity is truly rare. Repeated ingenuity is true genius. Like the Technics 4-track RS-1506. It offers twice the program time of our 2-track RS-1500.

It also offers the award-winning RS-1500's "Isolated Loop" tape transport with a quartz-locked, phase-controlled, direct-drive capstan.

By isolating the tape from external influences we minimized tape tension to a constant 80 mgs. Providing extremely stable tape transport and low head wear. While reducing modulation noise and wow and flutter to a point where they are barely measurable on conventional laboratory equipment.

Electronically, too, Technics RS-1506 provides the same level of professional control as its predecessor. A separate microphone amplifier. Mixing amplifier. And separate three-position bias/equalization switches. While IC full-logic function permits absolute freedom in switching modes. Also available is an optional full-feature infrared wireless remote control (RP-070). It lets you operate

all transport functions and record from up to 20 feet.

For the same performance as the RS-1506 with the convenience of auto reverse, there's the RS-1700.

Compare specifications. Even with the best 2-track decks. TRACK SYSTEM: 4-track, 2-channel recording, playback and erase. 2-track, 2-channel playback 4-head system. FREQ. RESP.: 30-30,000Hz, ± 3 dB (-10 dB rec. level) at 15ips. WOW & FLUTTER: 0.018% WRMS at 15ips. S/N RATIO: 57dB (NAB weighted) at 15ips. SEPARATION: Greater than 50dB. RISE TIME: 0.7 secs. SPEED DEVIATION: $\pm 0.1\%$ with 1.0 or 1.5mil tape at 15ips. SPEED FLUCT.: 0.05% with 1.0 or 1.5mil tape at 15ips. PITCH CONTROL: $\pm 6\%$.

Technics 4-track RS-1506 and auto-reverse RS-1700. A rare combination of audio technology. A new standard of audio excellence.

Technics

Professional Series

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Reel it.

FOR EASY HANDLING

We've got the reels you need to handle and store all the cable you use for remote broadcast operations... microphone cable, power cable and coax. The best way to handle broadcast cable is to REEL IT.



Send for complete selection guide.

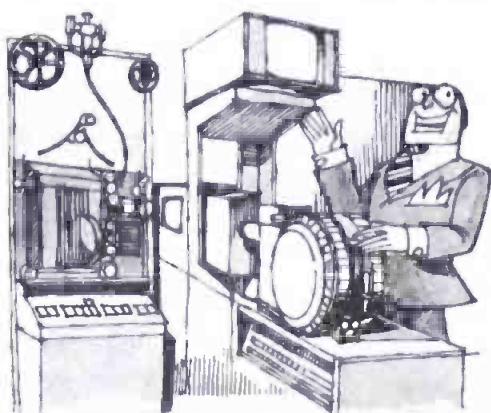


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The Vidtronics Company has named **Hugh Hole** a vice president with responsibility for organizing and servicing sales accounts. Hole will be working with producers and advertising agency executives as well as the Vidtronics sales staff.

Ewald J. Consen has been appointed vice president of marketing of United Recording Electronics Industries (UREI). Formerly the national field sales manager, professional products division at JBL, Consen will be responsible for all phases of marketing of the company's professional audio products, both for domestic and export.



Hole



Consen



Wilkenloh

Frederic N. Wilkenloh has been elected vice president of optical communications at Valtec. Wilkenloh was promoted to the corporate position from Valtec's coaxial cable subsidiary, the Comm/Scope Company where he was vice president of engineering.

Bob Ozark has been appointed to the position of sales manager, microwave component products at International Microwave Corporation. Ozark has been in the component products field for years formerly associated with Hamilton/Avnet and Diplomat/Lakeland.

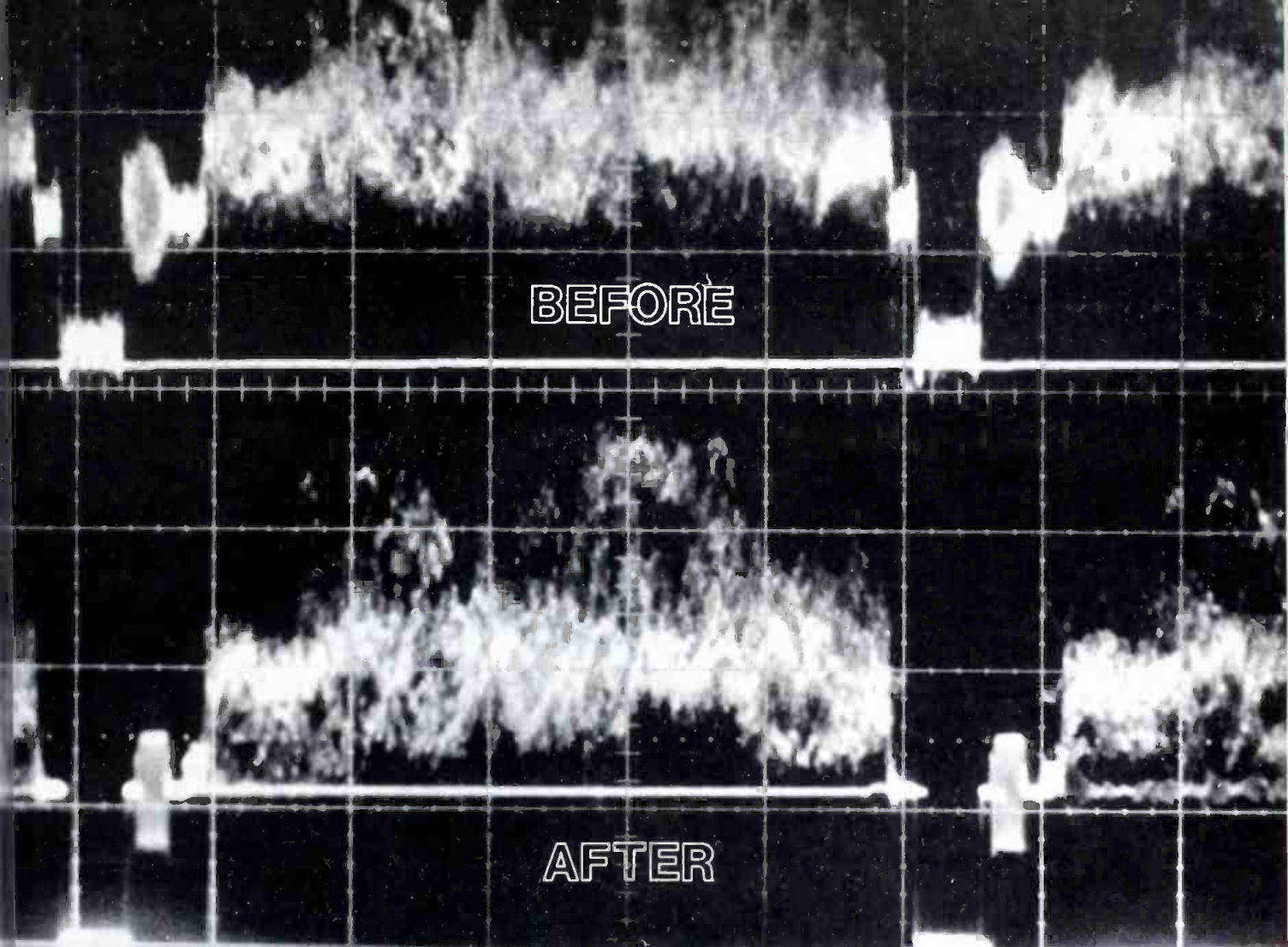
The appointment of **Fred Bergstrasser** as national sales manager for Ikegami closed circuit TV cameras and related products was announced recently. Bergstrasser was formerly marketing vice president for video products at Sound Systems.

David H. Croner and **W. James Pashley** have been elected vice presidents of the RCA sales corporation it was announced recently. Croner, who was formerly manager, color TV merchandising is now vice president of retail merchandising. Pashley is now vice president of the central region.

Chuck Gring has been appointed as music sales manager for Electro-Voice and will be responsible for all music speaker and music microphone distributor sales.

Two men have been added to the technical staff of IGM. **James Walniakowski**, former station engineer for radio WRIT, is a customer service representative. **Scott Burkhart** is now in the engineering department.

John Herbert Orr, founder and chairman of the board at Orrox since 1968 has retired from that post, and the directors have unanimously named **William H. Orr** as his successor. Orr has served as president, board member and CEO at Orrox for the past five years. □



DOES YOUR SYSTEM PERFORM TO ITS FULL POTENTIAL?

Restore your signal to the quality you should expect
with the Sigma Electronics video processing system.

Sigma's video processing system consists of the field-proven genlock
sync generator, CSG-300, and the new video processing amplifier, VPA-100.
Optimize your video signals by independently controlling
video, chroma, burst, sync and blanking.

YOU CAN AVOID PRODUCT REDUNDANCY

Sigma's VPA-100 will perfectly mate to your existing sync generator.



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We gave you one-inch.

In the last few months, you've had a chance to do some serious thinking about all the new products displayed at this year's NAB Show. Sony Broadcast products. And products by other manufacturers, too.

You've read about them.

You've talked about them.

You may even have seen some of them in action.

And by now, one fact should be obvious.

There's a new dimension in broadcast equipment. One-inch. It's here, and it's here to stay. The SMPTE Type C Standard proves it.

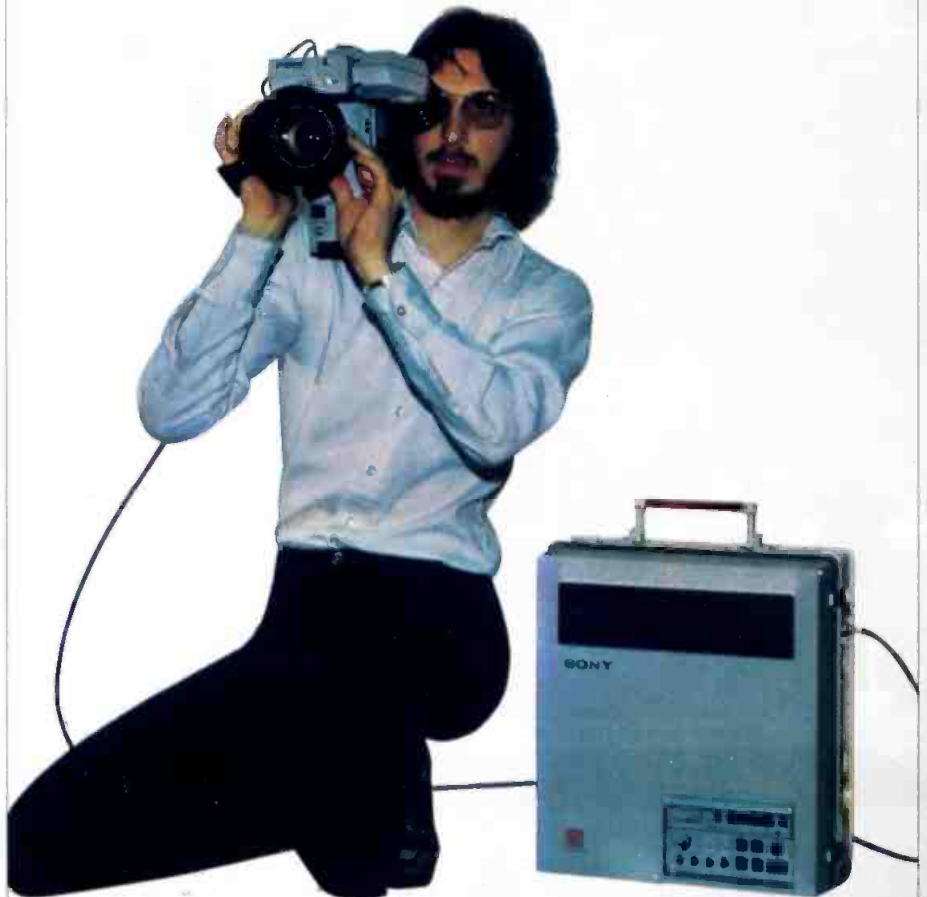
The width of things to come.

Sony Broadcast BVH Series 1" recorders, as we've been saying for some time, are part of a change that will affect every aspect of video production and broadcasting.

But it's one thing to say it. And it's another thing to see it happen.

Because broadcasters and production facilities have taken our one-inch equipment, and run with it.

From coast to coast, Sony Broadcast BVH-1000 recorders are lending their unique advantages to more and more



professional video applications.

Advantages like BIDIREX. That gives you full bi-directional search capability in both forward and reverse, with recognizable picture – even at more than 30 times normal speed. And also lets you position the tape reels as if by hand, for the "film" feeling top creative editors demand.

Advantages like single-camera technique. Because you've got 100% post-production creative freedom, you can use the one camera/one recorder setup once possible only with film. No more dependence on "on the fly," editing using

production switchers. Yet you still retain all the economic advantages of video.

And other economic advantages, too.

The BVH-1000 costs less to acquire. Takes up less space, so you save room in the studio. Cuts down on maintenance costs. And gives you the dramatic savings of 1" videotape, that costs only about half as much as 2" tape.

With a system this good, we predict you'll go far.

And the advantages of one-inch recording don't end in the studio.

Now there's a fully porta-



Now take it a mile.

ble 1" recorder from Sony Broadcast. The BVH-500.

The BVH-500 weighs just 43 pounds, including tape and battery. Operates for 90 minutes on a single rechargeable Ni-Cd battery. And delivers more than an hour of non-stop recording time from each reel of 1" videotape.

To give you continuous usable video for the full length of that tape, the BVH-500 features auto back-space assemble editing. Which achieves scene-to-scene transitions without picture breakup.

And naturally, there's more. Full monitoring capability. A unique video confidence head, to tell you your RF signal is on the tape. Digital servo system, to minimize gyroscopic error. Built-in SMPTE

time code generator. And rugged housing, that stands up to extreme field conditions.

But here's the best part. Our BVH-500 is fully compatible with our BVH-1000.

That means you can record in the field, on 1" tape. Then bring it home and edit or broadcast without converting to another format.

To wrap things up, we've got the best tape.

We gave you a 1" recorder that's revolutionizing studio and field production techniques. The BVH-1000.

We gave you the 1" portable recorder to go with it. The BVH-500.

And in case you hadn't heard, we'll let you in on the best 1" tape to use with your Sony Broadcast 1" equipment.



That's right. Sony 1" tape.

We make all of our V-16 Series 1" High-Band Master Videotape ourselves. That makes us different from just about any other manufacturer of video recorders.

Since we make both recorders and tape ourselves, we know how to produce a tape that gets the most from our equipment. After all, we want our tape to make our recorders look good. And vice-versa.

So for wide frequency range, high signal-to-noise ratio, minimum dropouts, and precision winding, always choose Sony V-16 Series videotape for your Sony Broadcast BVH Series equipment.

That's our story.

Now it's your turn. Write Sony Broadcast, 9 West 57th Street, New York, N.Y. 10019. Or call us direct. In New York, our number is (212) 371-5800. In Chicago, we're at (312) 792-3600. And in Los Angeles, at (213) 537-4300.

We've given you one-inch.

Now, give us a chance to prove how far it can take you.



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SONY BROADCAST

Circle (27) on Reply Card

StarTruck, TPC Communication's newest addition, hits the road

■ Since TPC Communication's "StarTruck" was christened last June, the remote production truck has provided its services to all three major networks as well as to independent producers.

The 43-foot air-conditioned unit began its career when TWI producer Shirley Friendly and CBS director Bernie Hoffman struck the truck with a solid champagne stroke at the nationwide telecast of the Milwaukee 150. Since then, StarTruck has performed for an

ABC Monday Night Baseball game, several NFL football games, Barry Manilow, Wide World Weightlifting and several other events.

The newest addition to TPC's mobile fleet consists of a custom built and designed 41-foot trailer constructed by the Gurtzslager Company in Wooster, OH. Many units have been built by them for the major networks and independent TV stations.

StarTruck was designed by the TPC staff. It consists of

four separate areas providing a work area for production, audio, engineering and tape or disc with three separate entrance doors for the different areas. Provisions have been made for people to work comfortably inside the unit, though the number of people would vary depending on the requirements of the production. Adequate air conditioning has been provided for equipment cooling and comfort by personnel.

Dallas Clark, TPC vice president of engineering, says the





Scotch 479 Master Broadcast

SCOTCH IS FIRST IN BROADCAST. GIVE OR TAKE AN INCH.

Scotch® has been state of the art in broadcast videotape for more than twenty years. It's an industry-wide fact that nobody knows tape like 3M.

So when the industry looks at a new format, the industry looks to Scotch.



In broadcast quality one-inch, it's Scotch Master Broadcast 479. 479 has all of the qualities you've come to expect from a tape named Scotch.

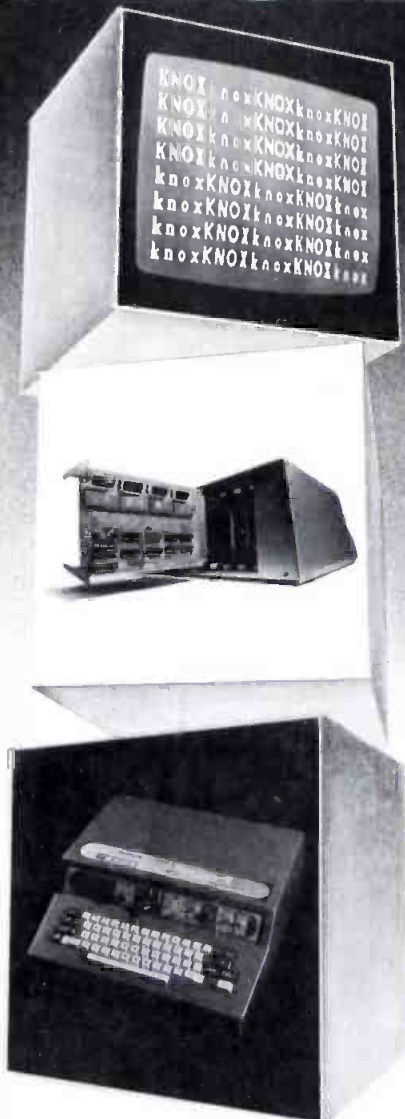
Like superior color noise and signal-to-noise. And nobody gives you better RF output.

Scotch Master Broadcast 479.

When you come to that new format, you'll have an old friend.

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The K128 Character Generator is something to build on.

Every innovative feature found in today's K128 can easily be added to our very first K128 — and to every unit we've built since.

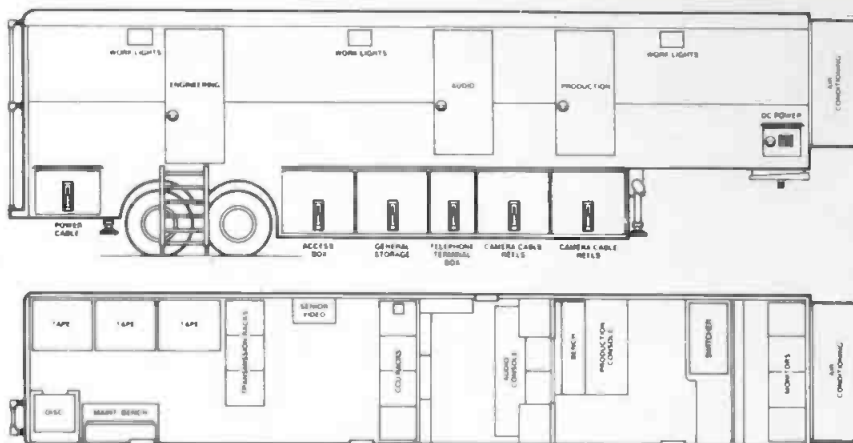
The Knox design assures that the K128 you buy today can always be upgraded to include all of the latest functions of tomorrow's K128.

Get your hands on a Knox — and build something.



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(301) 459-2106

Circle (29) on Reply Card



StarTruck contains four separate areas: production, audio, engineering and tape or disc. Three separate entrance doors ensure uninterrupted working conditions. Fifteen people can work comfortably in the mobile remote production unit.

News feature

mobile unit was designed to perform as well on a general sports telecast as on the most complicated television production. The production area consists of a switcher console as well as a production console. This arrangement makes it possible to seat the production people that would be required on almost any size production. Twenty-five monochrome and color monitors by Barco and Sony have been arranged in a front wall so any source can be monitored and seen by the director.

The switcher installed was chosen for its versatility and reliability from the Grass Valley group. It consists of 24 different input sources with 16 output busses providing separate feeds for tape machines, disc, outside feeds or air feeds to the telephone company. The switcher is equipped with the latest effects and other devices that give this mobile unit mixing capabilities equal to any other.

The audio area is designed to provide facilities for very large productions. The custom designed audio mixer by Audiotronics can handle 44 different

input sources with up to 24 output channels. Complete equalization and reverberation is provided and extended patching facilities were designed to provide flexibility. A private entrance was provided for the audio compartment for undisturbed operation.

The engineering and VTR departments are combined in one area and provide facilities for up to six Norelco, Fernseh/TPC or RCA cameras; three Ampex VTRs; an Ampex slo motion disc machine; and a work bench area with adequate monitors, switcher inputs and audio monitoring for each unit. This area also houses the racks containing the terminal equipment, such as Leitch sync generators, video and pulse distribution amplifiers, patch panels and Tektronix waveform monitors.

Dick Clouser, TPC president, calls StarTruck "the most sophisticated remote production truck to come to the television industry." Besides operating three other mobile production units, TPC Communications provides a full range of services utilized in making television commercials, sports and industrial productions as well as broadcast television programs.

Audio-Technica introduces five new microphones... and a pleasant surprise.



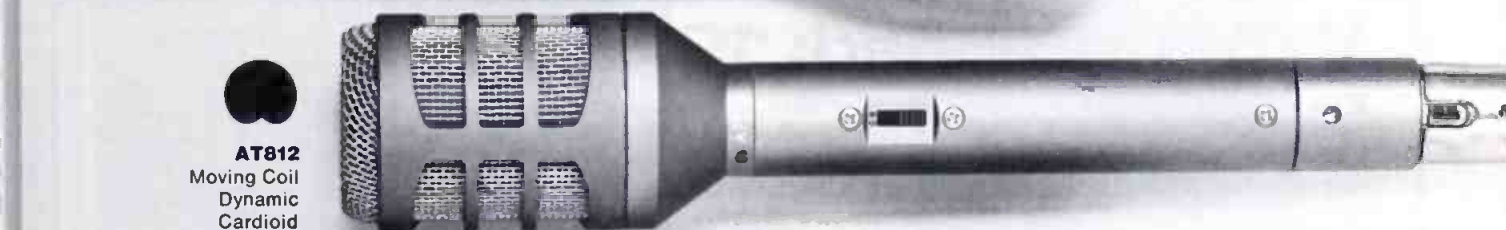
AT813
Electret
Condenser
Cardioid



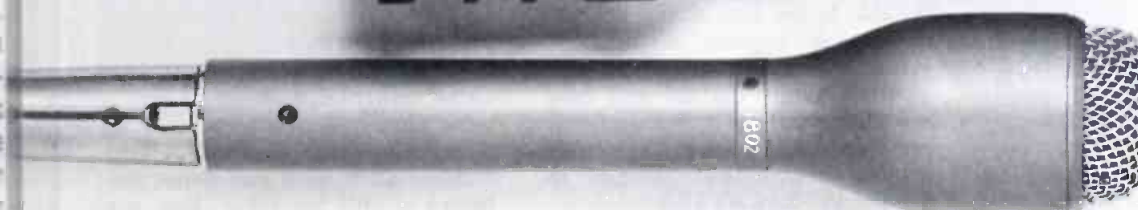
AT811
Electret
Condenser
Cardioid



AT801
Electret
Condenser
Omnidirectional



AT812
Moving Coil
Dynamic
Cardioid



AT802
Moving Coil
Dynamic
Omnidirectional

Take a close look at these new Audio-Technica microphones. Three electret condensers and two dynamics. Plus two clip-on miniature electrets (not shown). All are superbly finished. Carefully thought out in every detail. With the right "heft" and feel. Professional A3M Switchcraft output connectors, of course.

Then listen in your studio. Full-range, peak-free, clean and crisp. With

no distortion even when used close-up to high-level performers. And the balanced, phased Lo-Z (600 Ohm) output matches pro and semi-pro mixers alike.

Now for the surprise. The price. Both omnis are nationally advertised at just \$60, for either dynamic or electret condenser element. The two basic cardioids are just \$80, while the AT813

electret condenser with integral wind-screen is pegged at \$95. All complete with full one-year warranty.

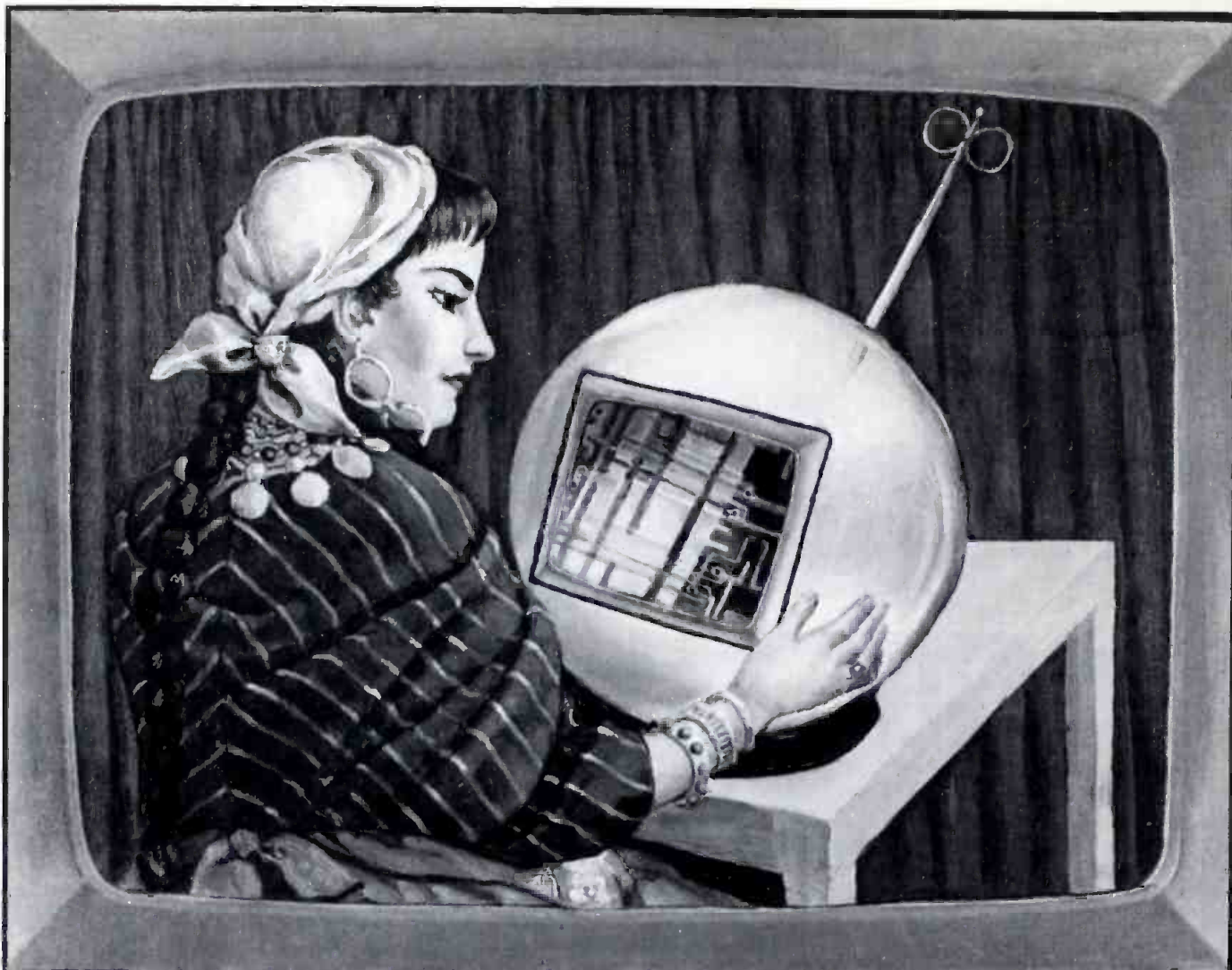
Once you've seen and tried these new Audio-Technica microphones we think you'll welcome them. Not just because they cost so little...but because they do so much. Available now from your Audio-Technica Professional Products dealer.



audio-technica. *Great sound. right from the start?*

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December 1978 *Broadcast Engineering* 39



What's ahead: 1979-?

By Bill Rhodes,
editorial director

■ He who has walked along the path of predicting the future knows well the pitfalls along the way and the tragedies that can befall him. He who has not walked this way would be wise to listen to tales of travelers before him.

I have walked these paths often and have had my share of glory and failure. So, in preparing this issue I find myself on familiar, but nevertheless obscure, grounds. In looking ahead I see many aspects of technology, business, legislations and standards which can significantly affect the future of broadcasting. However, my crystal ball is not clear enough to define how these forces will interact and affect future trends of our profession.

In considering again this tough job of predicting the future, we conceived the above graphic. On the monitor is shown the traditional gypsy gazing into her futuristic crystal ball that is

receiving data, processing it and displaying what the future might be in electronic circuitry that could affect future broadcast equipment. Inherent in this graphic is the fact that a hidden camera is peeking in on this scene and transmitting it to our monitor. While the old and new are illustrated here, the fact still remains that nobody has that magical crystal ball needed to predict the future.

Since our own crystal ball was too cloudy for use in preparing this issue, we elected to ask other sources for help. We asked leaders in instrumentation, consultants, station and network people, FCC specialists and educators to review their thoughts on the future and share them with us. For various reasons, many were not able to do this, but others were willing to attempt this formidable task.

Because we asked many sources to look into their individ-

ual crystal balls, several aspects of this "What's Ahead" presentation should be noted. First, individual presentations are printed here at random as material became available. Second, the topics vary widely and along individual interest lines. Third, some sources saw the future more clearly than others.

After all is said and done, the future is still not clear. But, we at BE are looking forward to an exciting 1979 and many good years to come. So, we hope you enjoy walking through the following pages of the "future" in broadcasting with our contributors. We'll pass this way again a year from now and see how well our sources foresaw what's ahead. We'll probably even make another attempt then of this subject because we are persistent. Meanwhile, have a Merry Christmas and a prosperous New Year. □

WILKINSON

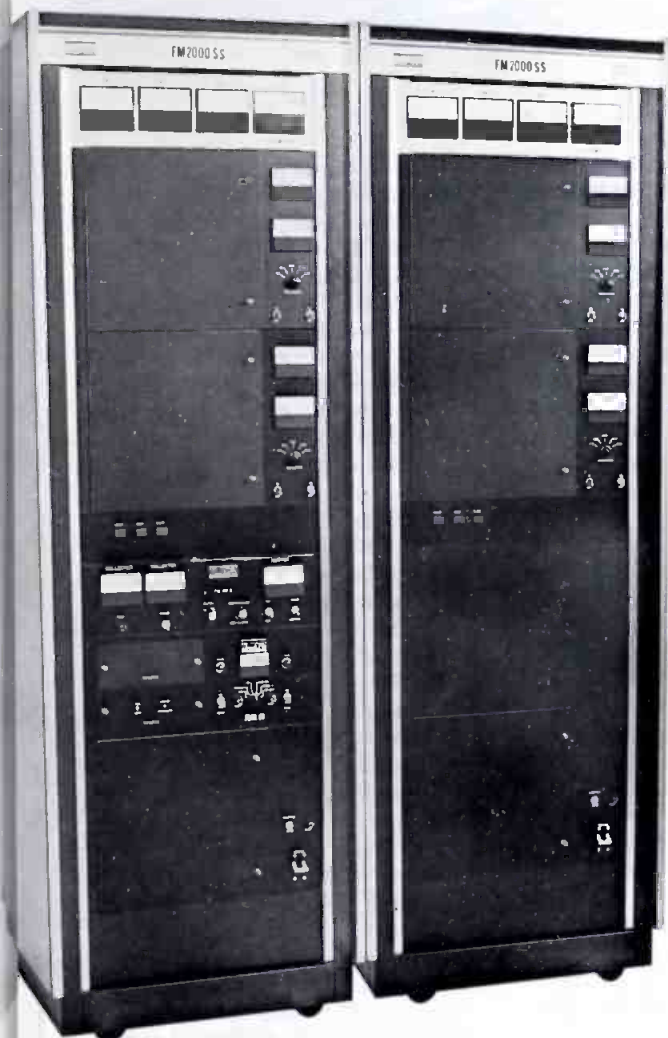
ELECTRONICS, INC.

FM 2000 SS 2KW

SOLID STATE FM TRANSMITTERS

FM 500 SS/FM 1000 SS .5/1KW

SOLID STATE FM TRANSMITTER



FEATURES

Absolute Reliability With Multiple Amplifiers and Power Supplies

Low Operating Cost - No Tubes - No Filament Power - High Efficiency

An Incomparable Exciter

So Drift Free it Requires No Oven
Noiseless -70db below 100% Modulation
Distortionless .2% 20 to 15000 Hz
Response 1/4db 30 Hz 350 KHz

Proven Solid State IPA — Over 100 in Service

Solid — Solid State 500 Watt Power Amplifier Modules

Broad-banded Power Amplifiers So Stable Requires No External Tuning Controls

VSWR Protected With Automatic Power Reduction

Individual Power Supplies For Each Section

Unique Heat Exchanger Cooling Operates in Nearly Any Ambient Temperature or Altitude

Circulator Combining For Low Loss and Reliability

Circle (30) on Reply Card

www.americanradiohistory.com

PBS legislation and its implications

By President Jimmy Carter



■ I am pleased to sign the "Public Telecommunications Financing Act of 1978." This bill carries out my commitment to a strong, secure public broadcasting system.

Public broadcasting has made great strides since President Johnson signed the "Public Broadcasting Act of 1967," setting the framework for today's public system. The television system has grown from 124 local stations to 282 and the radio system from 93 to 215. Public television and radio have set new standards in children's programs, drama, music, science and history. Documentaries, news analyses and live coverage of speeches and hearings have brought government closer to the American people.

Public broadcasting has also proved itself a valuable teaching tool for both in-school and adult instruction. It has pioneered such innovations as captioning for the deaf, subchannel reading services for the visually-impaired, and signal transmission by satellite.

The bill I am signing will enable public broadcasting to continue this impressive record of development and service. It accomplishes almost all of the objectives I set out in my Message to Congress on public broadcasting a year ago.

In addition to extending federal support at increasing levels through 1983, the bill makes important changes to the system:

- It revamps the facilities grant program, with the goal of extending the reach of public radio and television signals to the tens of

millions of Americans who cannot receive them. The program is also opened to allow use of the most efficient technologies, including cable TV and lower power broadcast stations.

- It will increase participation of minorities and women in public broadcasting and ensure full enforcement of the laws against discrimination.

- It strengthens fiscal accountability and limits administrative overhead.

- It minimizes the involvement of the board and staff of the Corporation for Public Broadcasting (CPB) in program selection, thereby strengthening the system's insulation from political control.

- It requires public broadcasters to operate in the sunshine, with meetings and records open to the public.

- It will increase participation by independent producers and will help them by having CPB act as a clearinghouse for information about funding sources.

- It requires CPB to initiate long-term planning for the system.

Under this bill, public broadcasting will be able to step up production of first-rate radio and television programs here in the United States. CPB has already moved to increase the proportion of funds going to this purpose toward the levels suggested in my message. Now that the bill has passed, CPB and the stations can go to work creating the institutions that will assure a constant flow of excellent, innovative programs. CPB can use multi-year grants to build up production

centers to focus on such areas as news coverage; programs aimed at women and minorities; and children's programming. Such centers, along with vigorous local programming, can help continue public broadcasting's progress toward a central role in our nation's communications system.

I do have one reservation about this bill. I regret it retains the provision forbidding public stations to editorialize. I recommended deleting that clause because public broadcasters should have the same First Amendment rights as other broadcasters.

In addition to signing this bill, I am issuing guidelines on direct grants by federal agencies. This bill does not cover those grants, but they provide a substantial proportion of the funds available for innovative programming. The guidelines will improve coordination of these grants, help inform producers and public broadcasters about their availability and help ensure that these funds are used for improper political control of program content.

The public broadcasting system is constantly evolving, in response to the public's needs and to the opportunities presented by new telecommunications technologies. This bill is a step in that process. The House Communications Subcommittee is already considering future steps as part of its comprehensive effort to modernize the Communications Act. I look forward to the report of the Carnegie Commission on the Future of Public Broadcasting, due this winter, to help chart public broadcasting's course for the 1980s. □



The authors
Preben Hejberg (left) and Stuart Rauch collaborated on the future of automated VITS. Hejberg is with Philips in Copenhagen and Rauch is with Philips in Mahway, NJ.

Measuring TV signals: Automatic VITS analysis

■ Today, only 75% of the television signal can be utilized for transmitting picture information from the studio to the television viewer because of the horizontal and vertical blanking intervals. What would be more natural than to use this "empty" space to improve the transmission quality and produce a superior TV picture on the viewer's screen?

In the early 1960s, it became normal practice to insert simple test signals in the vertical blanking interval (VITS), signals which would give a quick impression of the transmission quality. They were fairly easy to evaluate with a waveform monitor, even in the presence of noise in the signals. As the level of technology advanced, and color was introduced, the demands with regard to transmission quality were increased. More parameters had to be checked; and, consequently, the complexity of the VITS had to be increased. As everyone tended to create their own personal VIT signals, support for an international standard for VITS developed in order to make exchange of programs less complicated. In Europe, a VITS consisting of four different test signals (lines) was standardized in 1969, the so-called EBU insertion test signals. In North America, the NTC proposed an international VITS for the 525-line system in 1975, the so-called NTC-7 signals.

The EBU and NTC-7 signals are extremely complex, and a multitude of distortions can be detected from these signals. To do

complete evaluation of a VITS with a waveform monitor is not only a very tedious and time consuming job, but also special processing equipment is needed, such as a vectorscope or a differential gain and phase meter, chrominance-luminance test set, and so on. Thus, manual analysis of VITS is both a time-consuming and costly affair.

It is difficult to believe that today 95% of all measurements in Europe and 99.9% of all measurements in North America are still performed in the old-fashioned manual way, despite the fact that automatic analysis equipment has been on the market for more than two years!

We believe that the new, state-of-the-art technology in VITS analysis will take hold worldwide in the near future. In Europe and other countries, we have seen the beginnings, and in North America, the broadcast industry is finally recognizing the many advantages of automatic VITS analysis. Automatic measuring equipment offers three major advantages over the soon-to-be-obsolete manual way of measuring:

- It works very fast, just 10 seconds and more than 20 parameters are measured. In addition, measurements are performed on a continuous base.
- It measures very accurately, typically to 0.5% and with a resolution of 0.1%.
- The measurements are repeatable. The definitions and measuring procedure of each single

parameter is programmed inside the automatic analyzer, sharply reducing the possibility of misinterpretations.

The broadcast industry has become more quality conscious in recent years. New services like teletext, Hi-Fi and stereophonic sound reproduction are well advanced, and the television receivers are becoming superior with the introduction of advanced circuitry. In the US, the emphasis until now has been in the area of producing better quality television programs.

Automatic testing is still in its embryonic stages, but will be the area of greatest emphasis in years to come. Sophisticated measuring equipment will make possible a continuous base, simplifying detection of faults or degradations almost instantaneously, even at a remote monitoring center. With the installation of remote control systems, the television engineer can immediately take measures to restore regular quality service.

Ultimately the VITS analyzer and other sophisticated test equipment will feed a computer in the monitoring center with all relevant information (necessary to judge) transmission quality. The computer will report anomalies in the network, and it will correct faults automatically or make suggestions to the television engineer on how to correct faults.

Such a system is state-of-the-art in the late 1970s, and we believe common practice of the 1980s. □

The author
Author Richard K. Schafer,
Eastman Kodak motion picture
and A-V product specialist
(second from left), discusses
telecine equipment operation
at a Kodak symposium with,
from left, Bob Lovick, Kodak;
and Don Reynolds, Tele-
Mation.



Film's future in television

■ We at Kodak spend a good deal of effort assessing and anticipating technological trends and seeking ways to meet these future needs. And, in terms of Kodak's business as a supplier of photographic materials, we find future trends encouraging, not in spite of video technology, but because of it. For more than 20 years, people have been telling us that continued advances in video technology signal the demise of film as a medium for moving pictures. But if you could visit our manufacturing plants or distribution centers and look at the quantities of film being consumed every minute of every day, you would agree that rumors of its death are incredibly exaggerated.

Film growth has paralleled the growth of video for two reasons: the evolution of television technology has led to the need for vastly increased numbers of images for programming; and film has some intrinsic advantages in quality, simplicity and efficiency that make it attractive for recording, storing and displaying images. In the end, the choice of film, magnetic tape, videodiscs or other media will depend on which is most efficient.

The increased use of television has led to the need for the original image to move back and forth between real image photographic form and electrical signal form. Therefore, we have devoted much of our effort to the film-to-video interface and the video-to-film interface. One can think of the production process in three stages: original photography or original production, post-production and distribution or display.

In original recording, film is straightforward and extremely

reliable. The optical image is applied directly to a recording material for immediate storage. There is nothing between the lens of a film camera and the recording medium but a simple shutter. Indeed, in order to use that image, the film must be processed, but the original recording of that image is as simple as imposing it on the recording medium itself.

Future video technology's impact on the use of film will result from the ability to deliver more and varied images to the consumer through broadcast television, cable, pay TV, and ultimately tape and discs. This means more original programming, and for us it means an increased demand for original film recording material. It also means that Eastman Kodak Company, together with manufacturers around the world who provide devices such as telecines and flying spot scanners for transferring the film image to a video signal, must continue their efforts to improve the quality of the film-to-video interface. You can expect more and more sophisticated transfer devices and signal processing equipment to become available in the near future.

In post-production, film can simply be transferred to videotape or disc and then all the wonderful new techniques for electronic editing, effects, titles and so forth can be applied. We anticipate that once the charisma has worn off, broadcast stations and news departments will see the intrinsic advantage of film recording for full-dimension coverage, and as electronic editing systems from ¾-inch or 1-inch tape become more sophisticated and less expensive, they will be used for editing and assembling

news which was originally photographed on film and transferred to tape.

Thus, while film continues to offer the advantage for extremely simple editing and assembly methods, at the same time it offers the same exciting advantages as electronic originals in post-production using modern video technology.

In terms of distribution, our attention is drawn once again to an interface—this time video-to-film because many new images for education and industry and other needs are being created on tape with electronic cameras and film prints are needed to meet non-video display needs. We have been instrumental in developing methods for shadow mask recording, electron beam recording and have recently contributed to the technology for high quality trinoscope transfer of electronic video images to color film.

The demand for high quality film images from video is growing rapidly. We still anticipate that laser recording will play an important role in this technology as evidenced by important research being done, for example, by the Advanced Television Systems Research group of Japan Broadcasting Corporation.

This demand for film transfers resulting from the evolution of video is a good example of why we are optimistic about growth in the use of film as a result of the growth in television technology. If we look a little further into the future, high fidelity video may be delivered to the consumer on discs or by wide bandwidth cable, requiring extremely high quality image recording. Because of its intrinsic capabilities, we anticipate that motion picture film will play an important role in such developments. □



The author
Eric Landau, Motorola market sales manager, monitors comparator output on one of three Spectra-TAC receiver voting systems in the teletype room at ABC News, New York City.

Radio communications and remote pickup systems

■ One of the greatest challenges in the mobile communications field is keeping up with the demands of the broadcast industry. The long-standing emphasis on total mobility has reached the point of evolution to total portability. The message comes through loud and clear: provide a maximum of range with a minimum of equipment size and weight to be carried by talent and technical personnel.

To help meet these requirements, it appears likely that in the next few years we will see a greater proliferation of space diversity receiver voting systems such as the Motorola Spectra-TAC (Total Area Coverage) satellite receiver system. In New York City alone, the three major networks operate six different Spectra-TAC systems in support of operations ranging from local radio to TV network news and four of those systems went up in the last year! A number of satellite receivers are strategically placed throughout the coverage area; their audio outputs are connected by dedicated telephone lines to a central comparator which evaluates the audio quality of each unsquelched receiver and feeds the best signal to the various control consoles on the premises. A separate selected audio output can be provided exclusively for feed to air, as is often desired by radio broadcasters who use their remote pickup systems to carry programming.

Look for the broadcaster to use more microphones like the Shure SM-82 with its built-in compression amplifier in radio remote pickup applications. He may then turn to the more tactical portable

and vehicular land mobile equipment for his "on-the-go" remote pickup needs.

Many Spectra-TAC systems will continue to support one-frequency simplex operations, especially where the application is for operational "dispatch" type communications. Indications are, however, that more radio broadcasters with aggressive news departments will be using space diversity receiving as part of automatic relay systems per paragraph 74.436 of the FCC Rules and Regulations.

Another dimension is added when the base transmitter is used for IFB to provide cue to the talent in the field. All the correspondent need carry is a modular, hand-held Motorola MX300 series transceiver and he will receive and talk back while carrying less than two pounds of radio gear.

By use of an in-band or cross-band (161 MHz/450 or 455 MHz) vehicular repeater, the low-powered, lightweight hand-held transceiver of the correspondent will remain reliably linked to his base through a nearby mobile radio.

In the typical radio broadcast application, the Spectra-TAC system will receive signals from the field on a Group R channel (reserved for program material and cues), while talk-out from the base transmitter will be on a Group N₁ channel where operational communications such as paging is authorized. Correspondents and other personnel in the field can then carry Motorola Minitor pocket receivers as they travel around town. This belt-worn unit is switch-selectable between functioning as a two-tone sequential tone and voice

pager and, alternately, as a carrier squelch cue receiver (with accessory earpiece). The Minitor carrier squelch only and CTCSS models will also continue to grow in popularity as straight cue receivers. They are finding increased use both for wide-area radio/TV ENG and IFB operations as well as in low power studio cueing systems licensed under Part 74, Subpart H, the Low Power Auxiliary Station rules.

One-way cueing systems with low-power transmitters and Minitor cue receivers aren't the only news on the horizon for studio operations. Floor manager two-way systems are at hand, as well. Using low power auxiliary, remote pickup, or low power business radio service channels, low power repeaters can be placed in each studio. The repeater's transmit and receive audio functions are interfaced to the studio intercom microphone and speaker in the control room. The repeater transmitter is locked in the keyed mode when the studio is in use. Cameramen and others on the set are equipped with portable transceivers worn on their belts and lightweight headsets with push-to-talk switches on separate cords. The floor manager in the control room is hands-free full duplex; the personnel on the set hear him all the time and can respond to him or converse with each other through the repeater.

This has been only a capsule summary of what sort of systems you should expect to be available from your radio communications supplier. We welcome new system concepts in accordance with the ever-changing needs of the broadcast industry. □

The author Jack Finlayson, manager of BCS marketing (Kaman Sciences), is shown with a terminal from a BCS automation system.



Broadcast business automation

■In my opinion, the greatest thrust in the near future will come in the spreading of computer applications from their existing areas of traffic, accounting and engineering to virtually every department of the station, followed by programs to integrate all of these into a master station data base. This data base will allow information to be used by all departments and to be combined, sorted and used as needed by station personnel and management.

To accomplish this, data base management systems are being designed which will allow stations to virtually create their own programs and reports by use of simple tools and languages. The increased speed and capabilities of the new microprocessors and minicomputers have made this possible.

These technical advances mean a strong trend toward more use of in-station processors with less reliance on large-scale master computers. These large computers will still be necessary for extensive and complex jobs, but I foresee their use turning to massive data bases for multiple stations. Such data bases could encompass industry-wide information on ratings, syndicated product, spot scheduling, agency instructions, etc.

Let's look at several of the new developments that will be in widespread use in the next five years.

Inventory and retrieval programs—With data base management capability and sufficient in-house computing capabilities, a variety of inventory programs are available for station use. These systems provide control for

a variety of items ranging from tape cassettes to news content. We at BCS now offer programs for carts, audio carts, engineering parts, supplies, news inventory and retrieval systems, and personnel files.

News inventory and retrieval—This BCS system allows news stories to be entered into a file to be available for recall by date, organization, event, name and other criteria. It also shows if the story is filed and where. New tapes, slides and visuals can also be in the inventory.

Word processing—Word processing has burst upon the American business scene in the past few years primarily as a secretarial aid. Future development for broadcasting will come in the areas of sales, news and continuity.

Sophisticated word processing systems are now available on minicomputers which can easily run in conjunction with the traffic and other programs.

Using this, newscasts can be entered direct to the system via terminals. They then can be recalled at any time and edited in virtually any way. Preprogrammed formats assure standardized output. Editors can call up any story they wish to review, edit or insert in the correct sequence of the newscast.

Film management—BCS' recently released "Films" program allows for computerized amortization and payables. In addition, it monitors the frequency of play versus total runs allowed and time period of license.

To assist programmers, the system allows features to be selected by over 1000 combinations, including stars, type, length, date released, demographic rat-

ings, restrictions, expiration date, awards won and many others. Projecting of amortization or payments is provided to accounting.

The system will assist promotion departments by printing future schedules for TV Guide and other publications. The system is integrated to the traffic system so that all programs aired automatically update the film management programs.

Future integration will be to accounting programs and to ratings so that amortization and payments are passed to the general ledger and financial projection program and demographic information will automatically be entered to this file.

Research—Future developments, I feel, will see more in-station capability for rating research and avail submission.

Marketron and several others now offer on-line programs which allow stations to prepare sales avail submissions. We at BCS will soon introduce our own version of such a submission program. It will allow stations to search the various rating books by a variety of criteria in order to select the ideal package.

Future development will integrate the research and traffic systems so that submissions can be compared to station avails to use if they are available.

There are many other programs available now and more to come in the near future. These will all be designed to assist station operation; but to fully utilize these, systems must be developed to allow stations to integrate, merge and manipulate these varied data bases to achieve what each station feels is needed. □



The authors
From left, Robert Hopkins,
Anthony Lind and Sidney
Bendell, all of RCA, discuss a
product design feature.

CCDs in broadcast color TV cameras

■ The solid-state image sensor of the charge coupled device (CCD) type is markedly different from the classic beam scanned pickup tube in its manner of operation. Its small size, flat shape and light weight excites one's imagination when thinking of the potential impact on the design of compact, highly portable color TV cameras for broadcast service.

Advances have been seen in both CCDs and $\frac{3}{4}$ -inch tubes in the past three years. (We are discussing CCDs for use in color broadcast cameras; not CCDs for use in industrial or consumer cameras where there can be differences in trade-offs.)

The CCD SID-51232, as announced by RCA, is a self-scanned solid-state image sensor which contains an array of 512 x 320 information storage sites. These storage sites are arranged in two areas of 255 x 320 each. As shown in the block diagram, one area is exposed to light and becomes the image sensing area. It is slightly larger (12.2 vs. 12.01mm diagonal) than the projected picture area in a frame of 16mm film. The second area, which has a corresponding site for each of those in the image area, is a storage area which is screened from light.

The charge pattern developed in the image area during each field's vertical blanking period. To obtain the real time output video signal, the charge pattern

in the storage area is transferred a line at a time into the horizontal register during the horizontal blanking intervals. During the active scan period, the information is clocked out at a 6.1 MHz picture element rate to provide the normal 525 line real time video.

Each storage side (or elemental cell) consists of three adjacent gate electrodes which are stacked vertically. By proper selection of the voltages applied to the three gates on alternate fields it is possible to accomplish interlace to achieve the full 512 lines of image information per frame of scan.

In order to be a good candidate for a color camera sensor, a pickup tube or CCD must satisfy a series of key requirements. The chart compares a number of these key characteristics for color camera sensors. While some items are more basic than others, in many instances the level of performance becomes a matter of competitive trade-offs among several tubes or CCDs; yet, they are all important in establishing the degree of success of the camera.

From this chart, it is apparent that no characteristic is assessed to be less than acceptable in the case of the $\frac{3}{4}$ -inch saticon tube. Resolution and sensitivity are indicated to be good, as are characteristics of low dark current and minimal spurious synchronous signals. The performance in geometry and registra-

tion is not quite up to the performance capability of the 30mm size tubes, but we have found that with careful design of deflection yokes it is possible to obtain registration that is good. In the area of image defects, spots and blemishes tend to appear larger than with a 30mm tube because of the smaller image size of the photo conductor. Thus the relative size of the blemish is larger since the defect is probably mechanically the same irrespective of the size of the image on the photo conductor. The size, weight, and power requirements for a portable camera utilizing $\frac{3}{4}$ -inch beam scanned tubes is undoubtedly larger in all respects than CCDs. It is still, we feel, within manageable limits so that a very acceptable and very usable camera can be designed utilizing small beam scanned tubes.

Although remarkable progress has been achieved in the development of solid-state image sensors, the point of producing a broadcast color camera with performance competitive with small pickup tube sensors is not yet achievable. To fill the growing demand for small broadcast news gathering cameras that exists today, the designer's choice must still be the $\frac{3}{4}$ -inch pickup tube. However, progress is still being made in CCD development, and a year or two from now our conclusion could certainly be reversed. □

The author
Arthur Schnelder, president of
Electronic Video Industries, is
seated at one of the com-
pany's videotape editing
machines.



Post-production: The coming year

■ 1978 is almost over and we saw a general increase in the demand for videotape post-production, editing systems in particular. I have been asked many times about when I expect to see a saturated market for post-production facilities. Based on the present trends of technological development, there should be a maximum of 200 computer-assisted editing systems in four to five years in the Los Angeles area. This trend will follow in other major areas of the country because the cost of editing equipment will come down as technology improves.

At this writing, there are nine major manufacturers of computer-assisted editing systems in the US and Canada, all vying for a piece of the post-production market. As new systems are designed, they are more oriented towards the user than ever before. Neophyte users and other not-so-technically-oriented people are finding videotape editing easier to understand and use. But of course, no matter how good an editing system is, the operator is the key to its success. How well he utilizes the system to cut costs is what makes any post-production business successful. Editing in recent years has become quite sophisticated compared to what we did in the late 1960s and early 1970s. About all we had then was the Slo-Mo videodisc and a few special gimmick devices (usually designed for in-house use).

Recently, however, the digital framestore has become available for post-production use. With it, we can manipulate the video signal in almost any fashion

desired. We can flip it, twist it, zoom it, squeeze it, take it apart, reposition it and even rotate it. Next year will reveal even more sophisticated devices that cost less and do more. There will be at least two new entries into the digital framestore by NAB next year. With digital recording, the ability to duplicate images is virtually infinite with no discernible loss of quality. Expanded memories and multiple channel storage will allow the creation of anything that man's mind may conceive.

Another factor to consider is the new small format VTRs with portability and broadcast quality. Based on today's trends, I feel that 85% of new editing systems purchased in 1979 will be of the 1-inch variety, and by January, 1979, there will be at least 10 operational 1-inch computer-assisted editing systems in the Los Angeles area. The terms "off-line" and "on-line" soon will be replaced by "editing," since the new 1-inch format VTRs will allow using the editing system as a work print device or to build a broadcast quality master tape.

Along with the new 1-inch portable VTRs are new, more efficient color cameras that work in light levels so low that they seem to be making pictures in total darkness! This will give the director more freedom to shoot scenes with greater clarity in natural light, leading to shooting more single camera film style for more flexibility in post-production. It is my opinion that videotape today offers more flexibility at lower cost and provides many techniques currently not available to the film director.

Another point to ponder is that the major film studios have not yet gone into videotape production in a big way. This change is inevitable since economics will dictate the need for videotape over film when shooting situation comedies and other studio type series and specials. I would like to make one point very clear: Videotape will not replace film! Each will seek its own level and there always will be room for both.

The SMPTE standards committee is in the process of trying to establish a compatible edit list format. Hopefully, in 1979 we will see a much improved format that will be able to generate data storage in an expanded form and yet produce an output list that is free of unnecessary data. Having been involved in the sub-committee meetings, I feel confident we are near an agreement.

Because of the increased number of videotape edits on a per-show basis, edit lists most likely will be stored on floppy discs. Edit capacity is in the area of about 3000 edits per floppy disc. This is especially true when more film style editing is done on videotape. Within the next few years, data may be stored on the new "bubble memory" material in solid-state form giving us the ability to random access data instantly.

Having been involved in videotape since 1957, I have seen great strides each year in the equipment and techniques developed by fellow editors. It's exciting to be involved in television today, for tomorrow is right around the corner bringing new tools and ideas to work with. □



The author
D.F. Maase is vice president of engineering and product management at Harris Corporation.

The future of radio and TV

■ During the last 10 to 15 years, the radio and TV broadcaster has witnessed a transition from technological mediocrity to sophistication in the equipment used to provide the broadcast service. The trend is toward products that do more, do it with higher quality and are more reliable. In addition, the demand is for products that are intelligent and do their job with less human effort.

These requirements will be satisfied in part in future products by employing more digital solutions to analog problems. Reliable digital hardware coupled with unique software will be seen in a new generation of products which will begin to appear in the next two years. Although the desire is great, complete digitization of the broadcast studio facilities will not occur until cost effective means are developed to store digital audio and video. The modulation process in transmitters will remain analog for the foreseeable future due to compatibility requirements.

The transmission side of the radio business has undergone substantial change. New means of modulation such as PDM have brought improved performance and efficiency to AM broadcasting. Improved semiconductor technology has allowed cost effective AM transmitter designs to the 1 kW level. It is possible that within two years, semiconductor technology will allow design of practical solid-state transmitters to the 10 kW level.

FM broadcasting has come of age during the decade and competition among the broadcasters has pressed the equipment manufacturer to improve performance

of FM systems. Audio processing techniques to control modulation overshoots have improved FM loudness and quality significantly at the exciter level. However, ultimate performance will not be achieved until exciter-type performance exists at the output of the FM transmitter. This will be achieved in the future through the development of broadband solid-state amplifiers and new broadband vacuum tube amplifiers.

The competition between AM and FM has kindled new interest in AM stereo in the last year. During the next year the FCC will adopt a system and there will be a flurry of activity as the AM broadcaster rushes to go stereo. This new medium will improve in subsequent years such that quality will rival FM stereo.

Television technology has changed gradually in the studio environment in the last 10 years. And the Plumbicon will remain the industry standard pick-up device until solid-state high quality pick-up devices are a reality. Video storage technology, recently trending away from quadruplex to the new helical format, will remain analog for at least five years. The desire to store motion video in digital format will most likely be satisfied in the future by electro-optic means as opposed to utilization of magnetic tape. The number and types of digital products in the studio will continue to grow due to the inherent high video quality and the improved reliability and flexibility achievable. When standards are adopted, integrated digital video systems will develop and analog video will only exist at the modulator of the transmit-

ter. This change will take place in the next five to 10 years.

Television transmission systems have seen second generation transmitters in the last decade. The latest generation of vacuum tubes, coupled with new semiconductor technology, has allowed reductions in the number of vacuum tubes employed in TV transmitters, resulting in simpler designs. As modern solid-state amplifiers are employed, reduction in tube count will enhance performance and minimize maintenance costs.

Circular polarization for TV, recently allowed by the FCC, has taken hold in some markets and is showing promising results. In the VHF bands, CP will grow rapidly as broadcasters begin to realize the coverage benefits of transmitting twice the power previously allowed. The UHF broadcaster will realize benefits from CP even though maximum ERP will not be cost effective to achieve.

Satellite transmission will find wider application in the near future. As hardware cost decreases, satellite transmission may promote creation of new program networks. Direct satellite to home transmission will not become feasible until reliable, very high power satellites and very low cost earth terminals can be implemented.

While the last decade has provided exciting new technologies for broadcasting, the future appears to promise no less. Digital audio, digital video, automation, single tube transmitters, solid-state transmitters, circular polarization and satellite transmission will play a significant role in future operations. □



Ikegami HL-77

"The real disaster is when your ENG camera doesn't work."

Talk with a broadcast TV news cameraman and that's what he'll tell you. And that's why more TV news teams use Ikegami ENG cameras than all others combined. When you get only one chance to cover a news event, a dependable Ikegami is the one ENG camera to use.



ENG cameras are dependability and colorimetry. Everything else is icing on the cake. And the Ikegami combination of dependability with ruggedness, light weight, image stability, and simplified controls, is why all three networks used the Ikegami HL-33 and HL-35 ENG cameras at the 1976 Democratic and Republican Conventions. And why they were used at the 1976 Summer Olympics.

Now we have two cameras that are even better: the Ikegami HL-77 and HL-37. In the HL-77 we've done away with the 26½-lb backpack and tucked its functions inside the camera body—and still reduced the HL-77's weight (less lens, but with viewfinder) to a pound less than the HL-35 head alone. The HL-77 weighs in at 13½ lb. In the HL-37 we've split the package so the head weight (without lens) is even less, and the shoulder-sling process pack comes to 6½ lb.

Both cameras use three 2½-inch Plumbicon* pickup tubes, and f/1.4 prism optics. The viewfinder is 1½ inches. And everything else that made the HL-33 and HL-35 the real winners at the conventions is still there—just smaller and lighter.

Both the new HL-77 (the *Ike*)



and the HL-37 (the *Mini-mate*) produce broadcast-quality coverage with good color, brightness, stability, high sensitivity even in low light, and reduced lag due to bias light. Both can feed video and audio to a local or remote video tape recorder, or via microwave transmitter receiver for remote pickup.

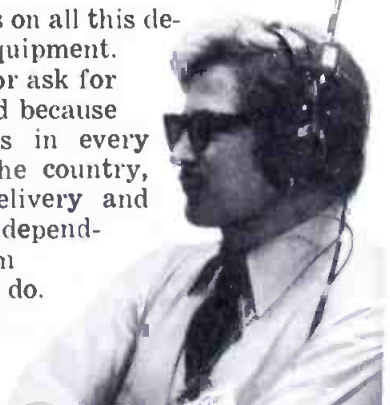
For microwave transmission from our HL-33 and HL-35 ENG cameras to a remote pickup point, we offer the Ikegami PFM-091 wireless microphone system. This backpack unit transmits the video signal on the 13-GHz microwave band; audio and command signals on the 950-MHz uhf band. Maximum range is about 1800 feet with omni antenna, 3700 feet with 60-degree horn, two miles with a 20-degree horn.

For the sound portion of the program, the Ikegami PFM-091 wireless microphone system is used to transmit program audio and receive intercom audio. It includes a compact transmitter and receiver worn on the belt, a miniature condenser microphone, and a small headset/whip antenna.

We've got the specs on all this dependable portable equipment. Just write for them, or ask for a demonstration. And because we have distributors in every major area across the country, you can get fast delivery and service. If you want dependability, you get it from Ikegami. More people do.

Ikegami

Ikegami Electronics (USA) Inc., 37 Brook Ave., Maywood, N.J. 07607 • (201) 368-9171



The author
William H. Madden, marketing
director of the 3M Company
magnetic audio/video pro-
ducts division, inspects the
3M digital mastering system
unit.



Tape and the future of broadcasting

■ Predicting the future is easy. If, in the future, the predictions do not come true, we can always say that "due to unforeseen. . ."

In any case, when **BE** asked 3M to gaze into its crystal ball and tell what we see, we welcomed the opportunity. For, if the pundits who say that the future is written in the deeds of the past are correct, the future of communications will be bright indeed.

Our past performance in the tape and broadcast industries is noted for its many firsts. The most important is that 3M was the first company in the United States to commercially market magnetic tape. It was first, too, with videotape for commercial television; and first with color capable videotape for broadcast use.

We learned that most of the advances that caught on were steps, rather than leaps, into the future. We have come to realize that each future advance must interface with existing technologies.

This is not to say that we don't see some far out technologies for future application—things we can hardly conceptualize as products today. Many of these future technologies are now being discovered in the research laboratories of companies like 3M.

It took us 14 years to develop a metal particle tape to the point where we could announce a new product for the market. A sister operating unit at 3M, the Mincom Division, invested many years in the development of a digital system for recording master audiotapes.

These two advances, metal tape and digital audio, are part of the present. Last year they were future technologies. Our crystal ball tells us that there are other technologies ready to become usable products. In the next decade we see:

- Optical discs for program syndication and archival purposes becoming an important communications tool. One problem with the system today is that it's very expensive. But, this problem will be solved.
- Laser and fiber optic technologies that will make it possible for broadcasters to carry more services to end users.
- Miniaturization, which means portability. We're seeing some of this now with 1-inch and ¾-inch videotape formats.
- Microprocessor for storage. As a matter of fact, one key to the next major advancement in professional television production is the digitizing of the video signal.
- Framestore devices and time-base correctors, both of which make use of digital technology, are the links between today's standards and the many digital equipment improvements we will see in the future.

In addition to the technological advances, we see the electronic communications medium itself becoming more and more important to the public. It's due, in part, to the fact that telephone companies have wired up America.

New technologies will bring broadband and narrow band signals of video, voice and data for high speed and simultaneous transmission in either direction.

The new technologies will improve transmission performance and service provided by telephone companies; offer CATV to households that have inadequate off-the-air TV reception; pushbutton access to library information, product guides, housing listings, travel schedules, legal proceedings; home and business security with surveillance and fire and burglar alarm hook-ups; teleconferencing and telemedicine.

We see, too, a resurgence of AM radio, this time with stereo. In order to survive, AM radio will have to find a way to combat the inroads made by FM. The most obvious solution to date is with stereo.

Along with the advance of AM stereo, we will see a corresponding advance in the equipment being used by the present AM stations. It's our belief that during this appraisal period, the more business-oriented stations, those who will survive, will consider nothing in the old studio sacred. Not the carts, not the record library, nothing.

These future-thinking stations are beginning to realize that AM stereo is providing them with the perfect reason to upgrade and become competitive. And future-thinking people are the ones we're proud to have known through the years we've been associated with the broadcasting industry. As part of a company whose life blood is a flow of new products, we look forward to having lots of reasons to be associated with those people in the future. □

The author

Author Harold Bailey (right), marketing manager for Cetec Jampro TV antennas, and David George, vice president of Imagineering Ltd., congratulate each other on successful installation of a CP/TV antenna for WQTV, Boston.

Growth of CP/TV transmission

■ First announcement of any breakthrough technology always seems to stir up immediate excitement, followed by legitimate doubts cast by certified experts, followed by a period of silence (while theories are being translated into hardware), followed by introduction of the product and a wait-and-see period.

Many times, significance of a new technology isn't read accurately in the early stages. I don't remember anyone willing to predict the tremendous impact the microprocessor would have, even as recently as three years ago.

Circularly polarized (CP) television transmission won't match the microprocessor revolution, but it is likely to become a factor in the TV viewing of tens of millions of Americans who presently watch their favorite programs along with "ghosts," "snow," and distortion. And we believe it will become an important factor sooner than some industry predictions have indicated.

CP/TV is a breakthrough technology—the first real advancement in the way video signals are transmitted in about 35 years. It has gone through all of the steps outlined above. Many broadcasters are in the wait-and-see period of evaluation; some have been convinced by what they've seen and heard, and are moving toward CP/TV installation immediately.

Because there are fewer than 10 CP/TV stations presently in operation, and because the new

technology appears to some observers to include elements of black magic, there is no all-out rush to change over from single-plane (horizontal) polarization of the signal to circular polarization. But there is great interest and activity, and as the on-the-air evidence corroborates what we have seen on the Cetec Jampro test range, we believe the growth-rate of CP/TV conversions will accelerate dramatically.

A conservative estimate would be that 20% of US TV stations (or about 200) will be transmitting a circularly polarized signal within five years. That represents only a portion of the market, however.

The eventual number, and the rate of growth, is as likely to be influenced by the viewing public as it is by station operators. In any market, the station that delivers a clearer, sharper picture, relatively free of distortion and spurious video noise, has an obvious competitive advantage. This will be even more evident when a UHF station, through CP/TV transmission, starts to deliver a picture of a consistent quality that matches the VHF stations in the same service area.

It is for that reason, and despite the fact that it is an expensive enterprise for UHF stations to re-equip for CP, that we believe UHF conversions will make up the major share of the potential market.

Cetec Jampro aimed its early research and development at

solving the technological problems of circular polarization of ultra high-frequency channels, and our first Spiral antenna was designed for FCC-authorized testing in cooperation with KLOC-TV (Channel 19) in Modesto, CA. Jampro and Bogner are the only two manufacturers presently offering antenna designs for all VHF and UHF frequencies, but it is probable that the potentially large UHF market may soon attract others. If so, both technical know-how and manufacturing and testing expertise will move forward more rapidly.

Both the technology and the hardware may thus become more readily available to station operators not now able to deliver a video signal of consistent high quality throughout their service areas.

The wait and see period may not last long. Chief engineers' reports from WBPT (Channel 2) in Miami, and KBYU (Channel 11) in Provo, delivered at the last NAB, were enthusiastic about their thoroughly tested CP/TV systems. The first full-power UHF installation is scheduled to be on-the-air in Boston this month (WQTV, Channel 68). In addition to the five stations presently operating, eight more have licenses and are in various stages of converting to circular polarization.

By mid-1979, there will be solid evidence of CP/TV performance from Waco, TX to Bangor, ME. At Cetec Jampro, we are convinced that the evidence will be overwhelmingly favorable. □

The author
Kevin Dauphinee, FM development manager for Dolby Laboratories, is responsible for the sales and technical support of Dolby FM equipment to radio stations.



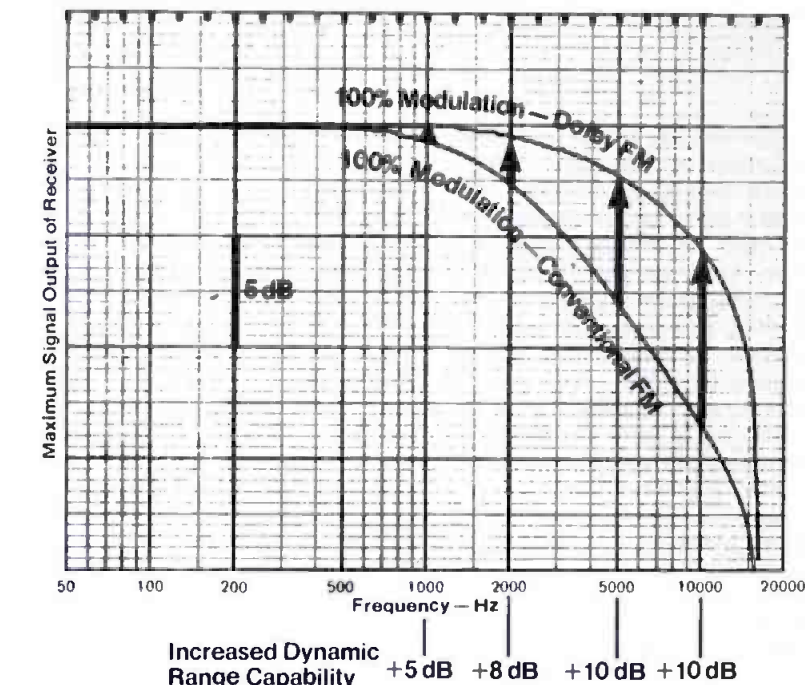
1979: A new interest in Dolby FM?

■ In the broadcast industry, as in the audio industry, a heavy emphasis is placed on new technology and new products. At every trade show we are asked: "What's new? What new products do you have?"

Those questions don't apply in the usual way to Dolby Laboratories. Our business is audio noise reduction systems and their many uses. Unlike those manufacturers who depend on a flow of hardware improvements both significant and superficial, our business depends on an understanding of the benefits of a concept, one which can be accepted widely only if the concept itself does not change. Thus we are particularly concerned with new developments which might affect the use of an existing concept.

Dolby FM is a case in point. Introduced in its current format a number of years ago, Dolby FM is a method for significantly increasing the fidelity of broadcast signals to program material. B-type Dolby noise reduction encoding is applied to the signal, along with a reduction of pre-emphasis to 25 μ s for a substantial improvement in high-frequency headroom. While often misunderstood and no longer new, Dolby FM has achieved a modest success: There are over 100 FM stations in the US using the system full time, and more than 80 consumer FM receiving products are equipped to take advantage of it. Two new developments could increase interest in the concept over the next year, on the part of both consumers and broadcasters.

First, we have been developing a pilot-tone system which could be used by Dolby FM stations to identify the format and to trigger the decoding circuits in receivers



As shown here, Dolby FM gives more signal, less noise. Note the improvement in the maximum high-frequency output level with Dolby FM. Contemporary wide-range program will not "fit" under the 100% modulation limit of the 75 μ s conventional FM curve; the signal must be high-frequency limited (or reduced in overall level) enough to do so. However, such program material will fit under the 25 μ s Dolby FM curve.

automatically. This would reduce the consumer's current inconvenience, whereby he must first know which stations broadcast Dolby FM, and then remember to switch on his receiver's Dolby circuits when listening to those stations. Experimental broadcasts with the pilot-tone system have been under way for several months, and it is anticipated that FCC approval will be sought during 1979.

Second, and perhaps of even greater long-term significance, is the development of AM stereo. The acceptance of a stereo AM format would eliminate the currently unique capability of FM to provide stereo signals. It is likely that many FM broadcasters will seek additional means to distinguish the FM format from AM, and within that group there are

likely to be a number of broadcasters who wish to exploit FM's still unique capability for very high quality signals. The elimination of FM's stereo edge, coupled with the ever-increasing audience concern for good sound, could very well cause a larger number of broadcasters to investigate Dolby FM's capability for full dynamic and frequency range.

Thus, we anticipate increased interest in the Dolby FM system in 1979. The development and ultimate adoption of an identification pilot-tone system will mean increased listener convenience, while the fact that Dolby FM signal quality cannot be equalled by AM broadcasts may take on new significance, as a result of AM stereo. It should be an interesting year. □



The author
Author Gary J. Worth, Mutual's executive vice president, points to a CRT displaying program bus for Tom Vardaman (left), technical director of operations, and Larry Hartwig (seated), assistant director.

Network radio takes a quantum leap forward

■For more than 52 years, network radio has been limited to transmitting its programs to radio stations with one half the quality of AM and one third the quality of FM. Stereo transmission on network radio had been virtually unknown until March 3, 1978, when the Mutual Broadcasting System filed an application with the FCC asking for approval to construct more than 500 10-foot satellite earth receiving terminals at Mutual affiliates through the US and possessions, taking network radio transmissions from their 5 kHz quality to 15 kHz stereo. To fully appreciate this system one need only look at the evolution of network radio.

When TV became a major force in 1952 and radio turned to the DJ and pre-recorded music with 5 kHz transmission lines, network radio couldn't compete in the programming arena. It was relegated to a voice service specializing in news, sports and special events.

The syndicated music programming used by many stations now could easily be distributed via satellite. Since the filing of its application, Mutual has been approached by syndicators, background music services, operas, music associations and many others. To understand the magnitude of this use of satellite technology which has been available (but simply not utilized) by network radio, we must look beyond the 15 kHz stereo delivery of network programming.

Mutual will initially uplink three 15 kHz channels; which,

along with others added later, will be received at every 10-foot terminal located on the ground at a transmitter site or on roofs. The terminal itself, small because of micro-circuit technology, can hold up to six demodulators, which can bring down two 15 kHz channels each. Improvements in the terminals will reduce the power requirements on the satellite enabling sixteen 15 kHz channels per transponder.

Ultimately, Mutual could have twelve 15 kHz channels available to each satellite terminal within the footprint of the Westar I satellite. Initially, Mutual will use the three channels to maintain clock time feeds of commercial programming. But those same three channels will also be used to carry separate programming when needed (such as sporting events on one channel and the continuation of news on another).

But the use of the technology does not stop there. Each 15 kHz channel can carry a cue channel which each terminal can decode. As many as five data circuits could travel in it which means that the traffic information, program changes and billboards for news feeds will all travel piggyback with one channel and be printed out at the station's satellite receiver. These tones can totally automate the relationship between a station and a network, but with satellite transmission they'll be inaudible because they'll travel in the cue channel.

The full capability of one cue channel has not been utilized. Virtually all wire services could simultaneously travel in this one

cue channel, all piggybacked on one 15 kHz channel. And, if that's not enough, we could put a cue channel on every program channel and add fax, other data and wire photos.

So what does all this mean? For the programmer, the station and the public, it means an increased opportunity for new programming to be available simultaneously on a nationwide basis. Today network radio programming must compete for a single thread of transmission time and only programming for the masses ever reaches the network airways and in turn the stations. That is why programming with a limited appeal nationwide, at least in terms of the total number of stations and listeners, such as hockey, skiing, the opera and much more, never reaches the national network airways. But in the future this can all change.

Multiple transmission capability will enable the Mutual network stations to receive and choose from hundreds of programs at a very nominal cost. Thus, some of the sameness in programming formats may disappear and the programs to the public considerably improved.

With FCC approval, 15 kHz multiple channel stereo transmissions will become the new standard of the radio network industry, the local radio station may become the communications center of its community, and network radio transmissions will experience their first noticeable improvement in 52 years. It's been a long time coming. □

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vices to TV equipment manu-
facturers.



What's ahead for the videodisc?

■ Since I have been chairman of the SMPTE's Videodisc Study Group for almost two years, you might expect this column to be a definitive prediction of its exciting future. That's not so! To see why, let's look at what's behind the videodisc: years of press promises that this Christmas season would see the start of a test marketing program; promises of \$500 players and \$10 hours of entertainment, such as *Airport* and *Laws II*; glowing consumer articles on applications such as 54,000 art treasure pictures on a single record, how to cook or improve your golf swing or practice yoga; technical papers on new design breakthroughs; and the list goes on. Maybe 1979 will finally see the end of the behind and the beginning of the ahead. But maybe it won't!

You're no more confused than I am about the true state of engineering/manufacturing/market demand activities in the US at the end of 1978. At the last demo I attended (Magnavox's Magnavision in New York, October 19), company officials stated at the outset that they could not talk about player price, availability or test market location, but that they would have a definitive announcement shortly. All questions about titles, prices and availability of records were deferred to MCA, which did not have a representative present.

Rumor has it that Atlanta is the market, and January, 1979, the start date. I believe, as I write this in early November, that regardless of what consumer market pioneering Magnavox undertakes in January, both 1979 and 1980 are going to be repetitions of the last several behind years. This isn't pessimism, but

realism based on my experience in organizing and sustaining any kind of consensus forward motion in the SMPTE Videodisc Study Group. In meetings held over the last year, this group has had adequate representation from manufacturers, programming and services suppliers and buyers to generate some movement. But it hasn't for several reasons.

First, manufacturers have invested tens of millions into developing the videodisc, and each system is proprietary, but not compatible with others. This situation is complicated by the fact that these firms are also marketing 1/2-inch VCR systems with varying degrees of success. Furthermore, there are several tentative standards involved, constraining manufacturers from setting up long production runs.

Second, the frenzied product announcements for PCM electronics to convert VTRs and VCRs to super stereo audio recorders is a deterrent to videodisc development.

Finally, there is the concern that standardization should be slowed until the desirability of a single TV/stereo audio player development is examined. That has happened, at least temporarily. A DAD (Digital Audio Disc) Standardization Conference established in Tokyo by 29 Japanese, European and US firms earlier this fall will reportedly also consider videodisc format standardization. And it will function outside the US, it was reported, to avoid antitrust problems which might arise if the meetings were held in the US.

With this background, let's look at what's ahead.

• (From the manufacturers' standpoint) One day there will

be a videodisc standard and a substantial business in player and record sales in the US. But the standard will be labeled EIAJ, and the players will mostly be manufactured outside the US. (If you don't like these impending facts, write your Congressman, the President, the State Department, the Justice Department or Emperor Hirohito, but don't write me or the SMPTE.)

• (From the users' standpoint)

There is a huge, but fractionated, latent demand for the videodisc because of its many advantages over any other tape, record or film format for information distribution and accessing. As many as five or six standards could exist side by side. There are three levels of applications (and concomitant systems design sophistication) which have long been recognized by all the announced manufacturers: consumer, institutional and professional.

Consumer—random access playback only, continuous or single-frame viewing;

Institutional—the random access playback only, continuous or single frame viewing, plus viewer interaction with the system;

Professional—real-time continuous or interrupted recording, but not including erase and re-record capability, and random-access continuous or single frame playback.

When will this demand be satisfied? My crystal ball clearly sees videodisc systems by the tens to hundreds of thousands in use in the US in the 1985-1990 time period. What occurred in 1979 to 1984 to create this booming market I cannot yet predict, however. But I think I'll start studying Japanese. □



The author
Ernie Burkhart, president and chairman of the board of IGM/NTI holds the patents on Instacart and Go-Cart and has been involved in broadcast products design for 10 years.

Equipment: A changing scene in broadcast technology

■ Predicting what will happen to broadcast technology is analogous to asking what the future of air transportation would be prior to the Wright Brothers. Techniques of broadcasting progress with the availability of equipment. Today one man, a DJ, can manage a whole station while yesterday a vast crew was necessary.

Integrated circuitry has drastically reduced the physical size of equipment. One of IGM's automation systems contains in a single rack all of the capabilities that might have filled a conference room 20 years ago. Miniaturization and the use of microprocessors in all types of broadcast equipment will continue. The biggest step will be solid-state storage of audio, however, it may still be 15 years away as a practical tool due to cost factors.

Digital recording of music on tape will undoubtedly come first. The broadcaster will play such tapes back on cart machines or reels with vastly improved quality. With current analog methods of recording, errors do creep in and multiply as one goes from tape to tape. If the process were retained digitally from inception, there could be no deterioration. Until digital recording does become common, analog recording will continue to improve with techniques to eliminate noise and distortion.

Once digital storage of audio becomes practical from a cost

standpoint, bubble memory may be a means of data storage. A spin-off from bubble memory technology may be a voice approach to controlling an automation system. Voice command controls are already available, but the chief trouble in such commands is categorizing a voice. Far greater memory capabilities make it feasible to design units that analyze voices, because number-crunching for such analysis requires complex circuitry and programming. Providing a machine that talks back to you by voice will come sooner than talking to the machine. IGM's Basic A system already has the programmed capability of communicating with the operator via visual means on a CRT.

Although some people feel that less and less mechanical equipment will be necessary in the future, IGM feels that as long as the industry uses any kind of tape, hardware is needed. Improvements will continue to be made of control systems for cartridge playback and other hardware, with attention to ease of entry and simplicity to make operation understandable to anyone. Multiple cartridge playback machines, pioneered by IGM with its instant random access Instacart, will continue to exhibit improvements, bringing them up to equality with reel-to-reels and records. We should see a diversity of larger capacity machines in various sizes and configurations.

As solid-state memory progresses, a four to five-rack automation system may be reduced in physical size to a system of only one rack. Another development is the videodisc which uses laser technology to store large amounts of digital information.

The trend toward direct satellite broadcast to stations will continue. There are those who predict satellite broadcasts directly to homes, but this appears to be a dangerous direction if freedom of communication in this nation is to be maintained. All too easily, some philosophy could capture the minds of the entire populace if broadcast data were to emanate from a handful of sources.

It is probable that more local broadcast stations may use cable-type systems, rather than transmitters. Still other means of transmitting/receiving may be utilized increasingly. Because of the difficulty of installing a cable system, Anchorage, AK, now has a system that amounts to cable without cables. A local transponder transmits over a high frequency; individual homes have receiving antennas pointed at the transponder site.

In summary, though, equipment still carries out the essential elements of broadcasting (music, news, sports, local information) just using differing means of achieving communication with the listeners. □

The author
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He joined Comsat in 1966
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Satellites and international TV: The future

■ International TV via satellite, now commonplace, is made possible by INTELSAT, a 102-member nation organization which provides international telecommunications services to most nations of the world. During the last 13 years, satellite capability to provide international TV transmission has been significantly enhanced.

In 1965 when INTELSAT I was launched to provide communications services, it carried only one color TV channel, or 240 voice channels, and any TV transmission required the relinquishing of all of the voice traffic. Today, an INTELSAT IV-A satellite can relay 12,500 voice circuits plus two TV channels. The technological sophistication which has been responsible for such significant advancements in satellite communications continues to alter dramatically the nature of international TV broadcasting.

Technological advance has not been exclusively reserved for satellites, but has also characterized earth stations. The standard A earth stations of the INTELSAT system have gone through five generations of improved antenna and circuit design since the early days. Additionally, the requirements for huge terrestrial antennae has been reduced because of the increased power of today's satellites over earlier generations. This has influenced development of the standard A design (antenna diameter size of approximately 30 meters) as well as having contributed to the development of INTELSAT's standard B earth station (approximately 10 meters in diameter).

Because of their relatively low costs and maintenance require-

ments, such standard B earth stations have been extensively utilized by the developing countries in order that they meet their growing domestic telecommunications requirements in a cost-effective manner.

Paralleling continued technological advancements will be declining charges for satellite utilization. Historically, the INTELSAT system has an enviable record in reductions of its charges for voice service as well as for the international transmission of TV signals.

Recent changes in the US regulatory environment should stimulate international television broadcasting. The recent Spanish International Network decision by the FCC will permit international broadcasters to obtain satellite services from COMSAT directly, thereby facilitating international telecasts.

Let's now examine several applications utilizing international TV broadcasting which may well characterize the future.

First, international teleconferencing may become a viable and frequently chosen alternative to business travel by corporate executives, special interest groups (such as the medical profession); and international culture exchange.

The skyrocketing costs associated with international business travel, plus the length of time spent by corporate officials in transit, underscore the desirability of an alternative. Essentially, international teleconferencing would comprise the involved parties assembling in television studios located on their corporate premises in their respective

countries, being linked by a satellite providing both image and voice transmission.

Television transmission via satellite can provide other benefits in the future to developing countries. The recently conducted SITE experiments are clearly illustrative of this fact. This joint Indian-US sponsored experiment broadcasts signals to Indian village television sets directly, via NASA's experimental ATS-6 satellite, without the typical re-diffusion by conventional VHF stations. It had been observed by the Indian development planners that satellite transmission in this manner was the most cost-effective alternative in order to provide remote Indian villages with programming on such topics as cultural entertainment, family planning, agriculture, etc.

Finally there may potentially occur dramatic changes in the future of cable television. Specifically, a satellite could be utilized internationally in a manner similar to that which is used for the domestic distribution of cable television programming. Their multideestination capability renders satellites as a particularly attractive medium for widespread distribution of international programming.

In conclusion, these four types of applications testify to the fact that the combination of satellite technology and capability with that of television holds a significant degree of potential for the future. The underpinnings of this, of course, are technologically rooted and it is to these areas that effort must continually be directed to make feasible these applications, as well as other ones, and their benefits. □



The author
James Hurley, president of
the Society of Broadcast
Engineers, sees more partici-
pation by SBE members on
future standardization
committees.

SBE: The challenge and response

■To see what the future holds for the engineering side of the broadcasting industry, one must first take a quick look at the past. For the last few years, the growth of the Society of Broadcast Engineers has been meaningful, constant and gratifying. For the last two years, we have re-organized the Indianapolis office and, with that change, have gained the confidence of much of our membership.

During these years, many of our society's leaders were hard at work preparing a certification program. The first step of that program, grandfathering, was completed in late 1976. The outcome of the first series of tests produced the results envisioned. Questions were written so that extensive practical knowledge and formal training were required to successfully complete the examination. The certification committee recognized that changing technology requires periodically rewriting the examination and using essay questions to prevent someone from publishing a memory study guide.

In early 1978, at the society's annual membership meeting, it was decided that communication between the national office and the chapters had to be improved. For the first time in our history, we held a national chapter chairmen's meeting on November 16, 1978, in Kansas City. It was well attended and actively participated in by all. The number of inquiries about our society, received by both the national office and the chapters, has revealed that the industry's awareness of our programs has substantially increased.

We envision a future membership in excess of 10,000 and an

outstanding society journal. To achieve these goals, we need active support from all the broadcast technical community, both management and non-management. As far as I know, the SBE is the only organization that is dedicated solely to the technological aspects of broadcasting. It follows that SBE must take an active part in formulating technical standards.

Other societies have been active in these areas for a long time, and they are to be congratulated. SBE does not intend to impede the progress of those groups, but rather to add firsthand knowledge from our industry.

Our participation in these committees, under consideration for some time, requires selecting the right person(s) to represent the society and financing. While there is a wealth of knowledge among our members, placing that knowledge at the disposal of the committee, while maintaining corporate interests is quite another matter.

Financing, as has already been mentioned, will require some solutions unto itself. Some societies establish a single-purpose contribution fund from its members as the vehicle by which they can financially support special projects. At this time, a solution for funding has not been found, but must be dealt with as the program reaches maturity.

The society has held two significant meetings within a 5-week period: the National SBE Board of Directors meeting, held on October 17 in Atlanta; and the First National Chapter Chairmen's meeting, held on November 16 in Kansas City. Both groups

enthusiastically endorsed the need for the society's participation in standards committees.

We have been asked to participate and have played a limited part in two such committees: the working group for standardization of digital control of television; and the EIA ad-hoc committee on revision of RS-170A, or that committee dealing with the horizontal and vertical blanking problems. (We should also have been involved with the AM stereo and the FM quad committees.)

We have, in the past, submitted opinions to the FCC on the individual's licensing issue, ATS and re-regulation. If the commission is asking for opinions, it is presently within our structure to respond with a position as filed by our attorneys, but a completely different matter to help pound out standards for the commission to adopt.

I feel strongly that there are those among the SBE members that have not been contacted, but have the resources, time and presence as well as the knowledge to represent the SBE on crucial issues. This being the case, you should contact one of the members of the SBE Technical Standards Committee (Bill Powers, WSB-TV, Atlanta; Ralph Green, CBS Radio, New York; or Robert Jones, consultant, La Grange, IL) and inform him of your desire to participate. If it is more convenient for you, contact me. I will in turn forward the information to one of these people on the standing committee.

As the Society of Broadcast Engineers grows in membership and stature, we will be represented in all phases of our industry where our expertise can be utilized. □

Circularly polarized antenna rises above Boston

■ After a typical sequence of hitches, all the clearances were in place for "the great Boston airlift" on Sunday, October 22. Technicians and a few hardy onlookers climbed the last iron ladder to the Prudential Tower roof at about 6:30 AM as dawn was about to break. Principal topics of conversation were weather and wind. Had the rain squall really moved out to sea? Would the winds

stay at tolerable levels for seven critical lifts?

But luckily for the team setting up the circularly polarized (CP) transmitting antenna for WQTV (Channel 68), it turned out to be a just-about perfect Indian summer day. The wind was never a threatening factor to Boston's newest TV station.

The professionals who built the 3-bay Cetec spiral antenna (mounted

on three tubular supports and a heavy steelwork base) appeared no more ruffled than if they were putting together an erector set in somebody's game room.

The lineup included the Carson Company (Percasie, PA), whose chief pilot, Blackie Carney, was the commander of the day; the riggers from Sky Hook (Brampton, Ontario); the Rico ironworkers from Boston; and the engineers of Imagi-neering Ltd. Two Jampro engineers were on hand too, ready to scramble up the tower at the end of the day to check for damage to the antenna.

The helicopter pad was a parking lot about ¼-mile from the Pru and clearly visible from the roof. Support tower sections, antenna bays and one heavy box of guying materials were all laid out in the proper order. A self-propelled hoist was used to tilt each piece to near-vertical for attaching the lifting cable as it dangled from the helicopter.

It was 9:30 AM before the first lift began and at 3:30 PM the riggers and the pilot saluted each other for the last time. Six sections of tower and antenna were permanently in place, bolted and guyed and secured in just about six hours. With the addition of the 130-foot antenna and tower, the Prudential Tower now measured 887 feet from the ground to the top of the Channel 68 beacon light.

Making history

There are several "firsts" in the WQTV installation, and some are significant to broadcasters.

- This is the first TV transmitting antenna to be erected within the city of Boston. In this case, the medium is the message. A circularly polarized antenna can work close-in to the high-rise Boston skyline; the horizontal antennas of the city's other stations are all on 1000-foot towers near the suburb of Dedham and just off Route 128.

- This is the first full-power CP/TV installation in the UHF frequency range, excepting Cetec Jampro's year-long test series at Channel 19, KLOC-TV in Modesto, CA. Those tests preceded FCC authorization in the United States. There is a low-power Bogner translator anten-





Cetec Jampro technicians inspect Spiral antenna bay prior to airlift. Sections were trucked from Sacramento to Boston.

na serving WTVG, West Orange, NJ, from atop the World Trade Center in New York.

- This was the first helicopter airlift to the top of the Prudential Tower.

- WQTV is the first station designed "from the ground up" for CP/TV, by Imagineering Ltd. of Toronto. The five other US stations represent upgrades to CP/TV.

Owned by the Boston Heritage Broadcasting Corporation, WQTV is a FCC licensed UHF station that will feature a traditional program mix, including syndicated series, situation comedies and children's programs.

Universal Subscription Television (USTV) has purchased the broadcasting equipment for longterm lease to Boston Heritage Television. USTV will operate an over-the-air TV subscription service for part of each WQTV broadcast day, with the rest devoted to conventional programming.

At this writing, USTV and WQTV officials expect to be broadcasting in early December, having completed FCC on-the-air tests and other preliminaries.

Circular polarization

"The circularly polarized antenna is the first major technological breakthrough in TV transmission to benefit consumers in 35 years," according to Joseph Niccoli, general manager of Channel 68.

Authorized by the Federal Communications Commission in mid-1977, the circularly polarized antenna transmits in both the horizontal and vertical planes, offering benefits that are unattainable with the conventional (horizontally polarized) television transmitting antennas.

A circularly polarized antenna

essentially eliminates video signals that bounce off buildings or hills and show up on the screen as "ghosts;" it significantly reduces electronic noise that shows up as "snow;" it reduces fuzziness and enables areas that have had poor television reception (blind spots) to receive a good video signal.

Although Cetec Jampro now offers Spiral designs for all VHF and UHF frequencies, its early research and development was in the UHF antennas, beginning in 1973. Of the four CP/TV antenna manufacturers in the marketplace, RCA and Harris have concentrated thus far on VHF antennas, while Bogner has indicated it will cover both VHF and UHF frequencies with field-convertible antennas.

Operating performance data published for the Channel 68 antenna include near-perfect circularity (± 1 dB), and axial ratio of 2 dB, and a power gain of 24.

To provide its subscribers with a ghost-free, snow-free video image, USTV has paid a great deal of attention to detail.

The antenna will be powered by a 60 kw RCA transmitter. Subscribers will be furnished with CP receiving antennas, tuned for Channel 68. All subscriber connecting cable will be control boxes for scrambling and unscrambling messages are being made by Blonder-Tongue to USTV specs.

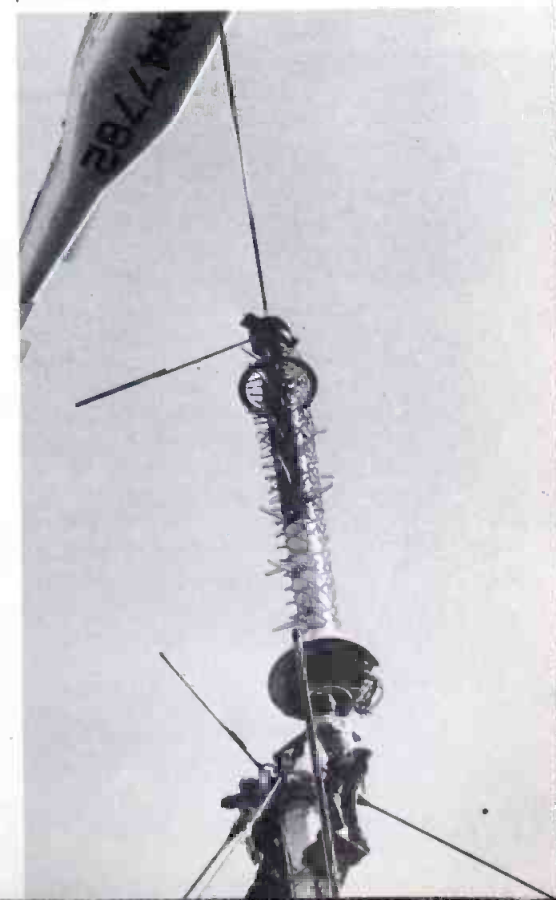
Rinaldo Brutoco, president of USTV, says "we are going to be able to deliver a signal that's as good as any station on the air. That's what a CP system can do for a UHF station."

Editor's note: Our thanks to Cetec Carpinteria, CA, and to Newsome & Company of Boston for contributions concerning this installation. □



Spiral antenna bay is tilted vertical and technician attaches cable to hovering helicopter.

Riggers "hand-talk" antenna section into place. Note open bay in helicopter so pilot can see the cargo position.





Much took place at the NRBA Convention in San Francisco that is not being covered here under radio automation.

The keynote address by Representative Lionel Van Deerlin was delivered live from Mutual Broadcasting's headquarters in Washington, DC, to the convention via Western Union's Westar I satellite. In the bottom left photo, the California Microwave earth station outside the Hyatt Regency hotel receives the transmission.

In the top left photo, Van Deerlin was presented the Golden Radio Award for courageous efforts toward maintenance of a free radio broadcasting system. Representative Louis Frey (right) accepts the award for Van Deerlin from Jim Gabbert (left), NRBA president, while Bernie Mann (center), NRBA secretary, looks on with a good deal of pleasure.

In the photo above, BE's editorial director, Bill Rhodes, operates an IGM automation system on the convention floor.

Radio automation at NRBA

■ At the NRBA Convention held in San Francisco September 17-20, 1978, a number of manufacturers of automation systems and software displayed their products on the floor and in hospitality suites.

We had intended to include their activities in our November issue, but we ran out of space. Consequently, we have continued this coverage here with photos and captions of systems and printouts to conclude this topic.

It should be noted that other firms are deeply involved in radio automation which, for one reason or another, elected not to participate at NRBA. These firms were not included here but may be found listed under appropriate categories in the BE Annual Buyer's Guide published in September.

If you did not attend the NRBA, you may use our reader service card to obtain radio automation literature from firms that were there.

Ampro Broadcasting was offering audio consoles with four interlocked pushbutton switches per input channel, four level LED stretched peak

indicators on each output channel, remote start switching, phase test switch and balanced transformer preamps on all mic and high level inputs. (100)

Automated Broadcast Controls displayed several broadcast automation products: the 2400R multiple cartridge player, using a 4-channel tone detector card; the 2500 25 Hz tone sensor featuring tone removal filter and adjustable stop contacts; the 2500G 25 Hz tone generator, which starts tape transport and actuates muting; the 1200C time program controller, providing 10 programmable exact time points per hour; the 6000T time announce control, allowing control of two single play automatic tape cartridge machines, two reel-to-reel transports or a combination of one cartridge and one reel-to-reel transport; and the 8000L English print out logger for displaying, editing and encoding data. (101)

Automation Electronics displayed the Autotron Radio Management Computer System, an in-house, mini-computer system for traffic, man-

agement, billing, payables, payroll and general ledger. The computer used is the Honeywell Level 6 Model 36, with the Texas Instrument 810 printer and the Owl-1200 CRT. The company also offers Musilog, a music library system and Ultra-text, a word processing system. (102)

BIC Computers/KWIX Radio offered the BIC (Broadcast Information Center) system. From the one time entry of the order, BIC prints the daily logs, sends the statements and prints sales reports. It utilizes a Burroughs B-80 computer system. (103)

Bloomington Broadcasting presented the Data General computer system for sales, traffic, billing, general accounting, payroll and management information. The system consists of the Nova 3 central processor, a Data General LP2 printer, a rack cabinet and Data General model 6053 CRTs. (104)

Bonneville Data Systems featured its BTA-101 broadcast traffic/accounting system. The system is built around a General Automation SPC

16/440 minicomputer. The VDTs are Hazeltines, consisting of three or four units, while the printers are usually a combination one Centronics 306C and one Teletype model 40. (105)

Broadcast Electronics displayed the new Control 16 program automation system. The many features include load/print electronics, flagging invalid events during automatic memory load, 5 exclusive CRT displays, separate keyboard/monitor design and automatic restart following power failure. In addition, the company exhibited various tape cartridge machines and audio consoles. (106)

CCA Electronics offered the FM2500R transmitter, CCA Constellation series consoles, L&H series circularly polarized FM antenna, AM1000S transmitter, automatic transmitter and exciter switching systems. (107)

California Microwave exhibited multi-purpose Small Aperture Terminals for broadcast wire service and data users. The terminals consist of the antenna with RF conversion equipment and the SCPC demodulators. A variety of services may be accommodated, including high fidelity audio, cueing channels, teletype signals and other high-speed data services. (108)

CaVox Stereo Productions offered its Library Programming Service. It is designed for use on all manufacturers' automation systems and is available in all track and reel configurations, in mono or stereo. The user selects the music from a variety of categories: contemporary MOR, standard pop, easy listening, good music, conservative tempo and beautiful music. (109)

Cetec Broadcast Group exhibited the series 7000 automation system for radio programming automation. It comes with microcomputer power, 1000-event memory capacity for 16 audio sources; dual stereo program buses; separate, dedicated video terminal; and the ability to expand and diversify. (110)

Consolidated Electronic Industries featured Cuerac, a fully automatic,

computer-controlled, air program storage and reproducer automation system. The computer is expandable to control 500 cartridges (one library) to 2500 cartridges (five libraries). The programming capacity for 4000 events is standard and can be expanded. (111)

Dolby Laboratories featured the 334 FM broadcast unit which provides FM broadcasting stations with encoding of stereophonic signals for Dolby 8-Type noise reduction and with simultaneous conversion of the standard 75 microsecond pre-emphasis to an effective pre-emphasis of 25 microseconds. (112)

Harris Corporation exhibited the SC-90 program automation system. They also offered the new MSP-90 audio processor which allows tailoring the sound to the station's format. It features AM positive peak modulation adjustable 100% to 130% with extensive LED metering and RFI protection. (113)

IGM/NTI displayed the Basic A audio control system described in detail in the November, 1978, issue of **Broadcast Engineering**. (114)

Kaman Sciences (BCS) offered the BCS Traffic and Account Systems for radio, in addition to the BCS "News" retrieval and inventory systems. Some features are data entry and inquiry in English, no time limit on storage or entry of information, comprehensive editing capability, dual product protection for



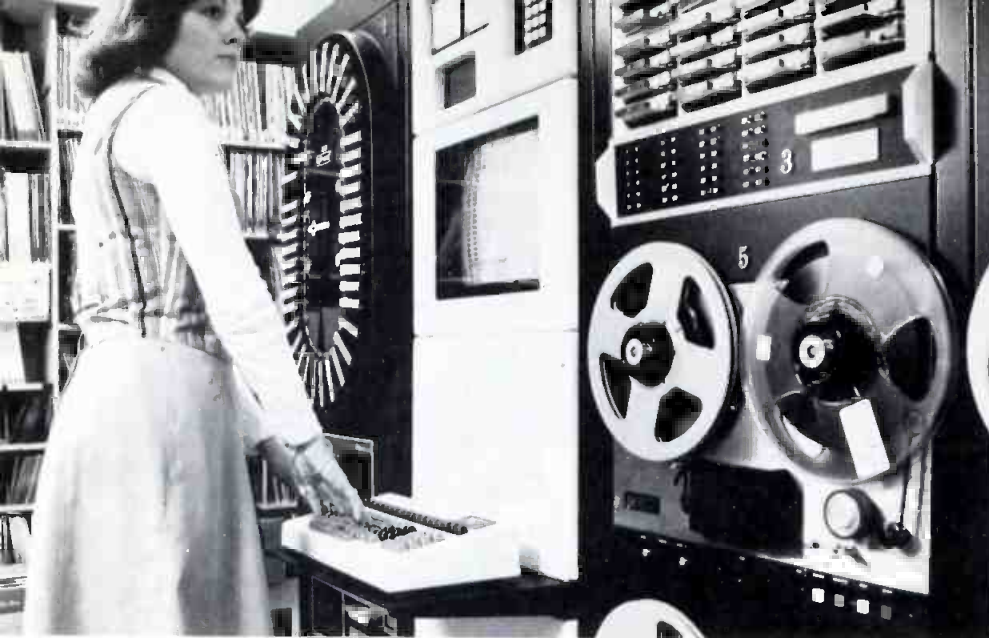
The Bloomington Broadcasting system uses both a floppy disc for electronic storage of historical material, and a hard disc for storage and fast, continuous access to current and future information.



The Harris MSP-90 audio processor can be ordered in many configurations: mono or stereo AGC amplifier; AM limiter; dual AM limiter; mono or stereo FM limiter; AGC amplifier/AM limiter; or AGC amplifier/FM limiter.



The Cetec Schafer System 7000 is a programming and management system featuring third-generation multiprocessor electronics. It converses in English and sets all-new standards in radio automation versatility.



NRBA: radio automation

PSAs, and convenience and control through in-station printing. (115)

Marti Electronics exhibited digital remote control systems, STL for AM Stereo, STL for FM Stereo, automatic repeater stations, mobile repeater stations, and TSL (transmitter-studio link). (116)

Microprobe Electronics displayed a fully operational Log II automation system featuring the new MEI model 100-B programmer with remote control. The system consists of Scully, Otari or Revox tape machines; Ampro cart machines; Orban audio processing equipment; and Ampro consoles. (117)

Moseley Associates featured digital, microprocessor-oriented remote control systems; aural studio-transmitter link systems for AM and FM, stereo and monaural; TFL-280 audio limiter for FM, FM stereo, FM quadruphonic, FM SCA and TV aural service; stereo and subcarrier (SCA) generators; FCC type-accepted remote pickup links; and the model TRL-1 telemetry return link. (118)

Mutual Broadcasting System presented news, information and features programming. Daily mini-features offered include *Al Wester Inside Sports*, *Astrology Today*, *Consumer's Buyer Guide*, *One Man's Opinion*, *Capitol Assignment*, *The Curt Gowdy Show* and several more. Many are classified as public affairs and all are guaranteed to fit any format. (119)

O'Connor Creative Services offered programming, including comedy, music specials, information features, entertainment features and commentary. (120)

Orban exhibited the Optimod-FM audio processing system and the new Optimod-FM system. Both units are designed to improve loudness, quality and coverage. Other products offered include the model 418A stereo limiter compressor, the model 516EC dynamic sibilance controller, the dual spring reverb, the model 245E stereo synthesizer, the models 622A and 622B parametric equalizers. (121)

Otari featured the ARS-1000 automated radio station reproducer. Widely used in automation systems, the reproducer offers two speeds, adjustable front panel cue control,

The Basic A audio control system from IGM features memory management, because of its modular concept of programming. A group of entries constituting a format and comprised of several commonly used schedule events and a given label, is entered once into memory and thereafter, only one entry is needed to summon that group of entries so labeled.



Hallikainen & Friends' Program Logging System utilizes the model 43 Teletype printer. The system has nine user definable alarm inputs whose status is printed whenever they are set.

Kaman Sciences' BCS 1100R traffic/billing system provides sales avail reports on printouts such as this one.

KBCS-RADIO AVAILS										
		MONDAY	TUES	WED	THU	FRI	SAT	SUN	TOTAL	COST
01 AM DRIVE 6-10										
2	GR. UNITS - 06/06	100	100	100	100	100	100	0	600	\$ 849.00
3	UNITS AVAILABLE	18	21	11	7	2	12	0	71	\$ 11.00
	SOLD, FIXED	40	40	47	50	62	39	0	278	\$ 13.00
4	SOLD, ROS	30	25	30	43	36	46	0	210	\$ 9.00
	SOLD, BT1	8	14	12	0	0	3	0	37	\$ 6.00
	SOLD, BT2	4	0	0	0	0	0	0	4	\$ 4.50
	TENS SOLD	2	3	2	3	2	3	0	15	\$ 7.00
8:00AM - NEWS										
	GR. UNITS 06/06	4	4	4	4	4	4	0	24	\$ 351.00
	UNITS AVAILABLE	1	0	1	0	1	0	0	3	\$ 17.00
	SOLD, FIXED	2	4	2	4	2	4	0	18	\$ 18.00
	SOLD, ROS	1	0	1	0	1	0	0	3	\$ 9.00
	TENS SOLD	0	0	0	0	0	0	0	0	\$ -0-

1 Name of Daypart	7 Average cost of each rate section/level
2 Total units available in Daypart/Program	8 Average cost of 10 sec. spots; these averages are included in total value of Daypart but are not computed in average cost of all spots
3 Units left to sell	
4 Number of units sold at each rate section or level	
5 Total value of Dayparts for the week	
6 Average value of each commercial	

recessed front adjustable output level and head azimuth, and plug-in professional grade PC boards and relays. The company also offered a full line of professional recorders. (122)

Pacific Programming Consultants featured the 20/40 adult format. The programming is produced at a radio station (KEZR) and all music information is stored by artist, tempo, key, year, and more by computer. Weekly computerized rotation charts are available for improved rotation in regard to reel, segment and daypart rotation. (123)

Pacific Recorders and Engineering exhibited the multimax audio processor/AGC amplifier. Low and high-band AGC offset controls permit precise tuning for the spectral balance required by the format. Designed to mate with Pacific Recorders' Multilimiter, the unit is compatible with other broadcast limiters. (124)

Radio Arts offered three demo discs of their programming formats: Sound 10 (adult contemporary music), The Entertainers (adult MOR), and Bright 'n Easy Country. (125)

Ramko Research featured their full line of audio products, including consoles, amplifiers, audio distribution amplifiers, cart and cassette loaders, turntables and accessories. (126)

Scully Recording Instruments presented the Dictaphone 400 Logger, the S84B-8 recorder and the new 250 recorder/reproducer. Configurations of the 250 include full or half track mono, two or quarter track stereo. (127)

Station Business Systems exhibited computerized traffic/accounting systems, featuring the new BAT 1700 system with fully-automatic traffic scheduling, all accounting and payroll capabilities. The BAT 1700 is one of seven new BAT systems, including the BAT 1600 system, which was announced at the show. (129)

Sono-Mag featured broadcast automation systems, automatic logging, and cartridge recorders and playbacks. The ESP-1 (Extremely Simple Programming) is a modern microprocessor controller with a 4000 event memory, plus subroutines. (128)

Studio B offered demos of their features: From Studio B (Year 1), From Studio B (Year 2), Capt.

Kremment, and Encounters: Past-Present-Future. (130)

Time & Frequency Technology exhibited the model 7640 Telescan, a computer assisted option for the model 7610 remote control system. It can also be used to assist the operation of any remote control equipment or used as an independent system in data acquisition, status monitoring and logging. The company also offered remote control accessories, an EBS system, STLs, remote control and a status monitoring system, among others. (131)

UMC Electronics featured automated news recording systems, audio consoles, cartridge tape equipment, splice finders, audio heads, replacement motors, amplifiers, turntables, cassette decks, reel-to-reel decks, speakers, and head phones. ART (Actuality Retrieval Terminal) consists of 20 Beaucart Type-10 cartridge decks, a common record amplifier, an equalizer, four silence sensors, and a computer logic, control sequencer. (132)

VIF International displayed automation equipment, tape recorders/reproducers, graphic equalizers, stereo reverbs, monitor speakers, production mixers, earphone, phono cartridges, and microphones. The fully automatic models 3000-STB stereo and 2000-B monaural intermix provide transferring between the sequential program sources keyed through silence sensing, with switching taking place about seven seconds after the end of each program selection. (133)

The Webster Group offered the Target system for radio selling. It reduces the importance of ratings and increases the value of the audience. Also offered was the Desk Top Seller, with its More From Your 4% presentation. (134)

Western Union featured broadcast radio by satellite via the Westar satellite. The downlink connection, the Small Aperture Terminal (SAT) features a 10-foot diameter receive-only dish antenna and an electronic controller. (135) □



The SMC/Sono-Mag programming system, ESP-1, features 4000 events memory capacity; 20 stereo sources, with all source cards in place; and monitor and source cue included.

One of the five exclusive video displays of the Broadcast Electronics Control 16 program automation system is the program log display, which shows the last 10 lines of the logging data exactly as they are printed on the program log printout.

04:02:06P	PLAY	02:00	CONTROL 16	:15	CA
04:02:16P	0012	PLAY	11-00		
04:04:52P	0009	PLAY	04-00		
04:05:02P	0010	PLAY	13-00		
04:07:36P	0011	PLAY	02-00		
04:07:53P	0012	PLAY	01-00		
04:09:22P	0006	PLAY	05-20	SUNBEAM BREAD	:30 CA
04:12:37P	0501	LINK	06-01	I DIN B D K A E	:00 C
04:13:07P	0503	LINK	11-00		
04:13:36P	0009	PLAY	03-00		
04:13:45P	0010	PLAY	06-43		

New Standard for Portables... LDK-14



In the great tradition of Philips portables:

1968...PCP-70 The industry's first portable. The one that started it all.

1969...PCP-90 Step two. World famous Minicam.

1975...LDK-15 First generation of triax field production cameras.

1976...LDK-11 A smaller, lighter, lower cost field and studio camera.

1977...Video 80 An innovation in lightweight camera and production system...LDK-15L Latest version of the LDK-15.

Evolving from this long history of portable equipment leadership, Philips' engineers have created a new concept in portable and field equipment. *The LDK-14 broadcast systems camera.*



A futurized camera offering three advanced configurations for field and studio use...all achieved without equipment repackaging:

1. **ENG**—studio quality portable; self-contained, one piece; film camera handling; weighing less than 15.5 lbs. (7 Kg) lens included; less than 12 lbs. (5.5 Kg) without lens.

2. **EFP**—studio quality portable, with remote control; timing and phase adjustable gen lock; instant convertibility to studio camera use by simple change of viewfinders.

3. **Studio**—compact, maneuverable; full broadcast quality; 5" viewfinder.



The LDK-14 combines innovative design and unique capabilities in a state-of-the-art 2/3 inch camera that is *much lighter* and *uses significantly less power* than the competitive ENG-only camera. Plus the LDK-14 gives you additional advantages in size, picture quality, stability, maintainability and cost.

Among its many other unique features for portable and studio use are:

- Only 27 watts power consumption (almost 1/3 less than the ENG-only competitive portable) gives longer continuous operation with choice of battery belt or small battery pack affixed to camera. A standby switch further conserves battery power between takes.



- Viewfinder displays include: contour enhanced camera picture or external video signal; status monitors for video level, color balance, bars on, battery discharge, VTR functioning, intercom call and camera tally.
- Automatics include: color balance; white and black level; centering; noise reduction when operating with extra gain; auto iris with set and hold facility.
- Externally switchable black stretch and contrast expansion.
- Dynamic Beam Control (DBC), regulates beam current to suppress comet tailing and blooming.
- Circuitry designed to maximize advanced capabilities of the latest rear-loading Plumbicons.

- Optional remote control facilities.
- Easy access for set-up and maintenance. Rear casing flips up for access to five main plug-in circuit boards.
- The rugged magnesium housing and titanium quick-release lens mounting holds all optical and electrical components in absolute registration. (Lens mount is strong enough for the heaviest extended range zoom lenses.)
- Rain, splash and RFI proofed.
- Other features include electronic raster rotation for better registration; linear matrix for optimal and Philips compatible colorimetry; and 360-degree hue-selectable chroma key.
- Other competitive cameras may have some of these LDK-14 features—no one has them all.

Camera-Recorder Systems

With this unmatched combination of performance and portability, the LDK-14 is also the ideal camera for field recording of ENG and EFP.



And just as Philips has always offered the widest selection of portable and studio cameras to meet your specific needs, the same policy now applies to your choice of 1" VTR's and TBC's. Offering 'C' format and 'B' format VTR's in both portable and studio configuration, Philips can provide the greatest objectivity and cost-effectiveness in packaging systems to match your requirements.

Philips, the company that started it all, now introduces the latest portable breakthrough, the LDK-14 broadcast systems camera. It will be the industry standard for years to come. And for a camera-recorder package to match your requirements, your choice of 1" VTR formats. Only from Philips.

For all the facts on this innovative new camera or camera-recorder system (please specify) write: Philips Broadcast Equipment Corp., 91 McKee Drive, Mahwah, N.J. 07430 (Canada: Philips Broadcast Equipment, 601 Milner Ave., Scarborough, Ontario M1B 1M8)

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Guide to color

By Elmer Smalling, consulting engineer

■ One of the most challenging aspects of broadcasting since the advent of color television has been the televising of color film. Because of differences in the film and television processes, film programming and film-to-tape transferring have suffered due to a lack of understanding of technical aspects of both media. The subtractive film process and additive color television process, along with other various constraints, have made for a tenuous union of these media.

This article should aid in clearing up some misunderstandings for those who desire to accurately analyze color television film problems. Four areas will be discussed: film, test and measurement equipment, the television film camera and electronic television film color correction devices. All of these play an integral role in the process up to the final product: an accurate rendition of an original film on the color television system.

Film

Ideally, film to be "played" through a television system should be shot with this usage in mind. The contrast ratio (density or luminance levels between pure black and pure white) should be kept to a level of approximately 50-to-1. This can be accomplished by controlling the taking illumination and the structure of the scene as well as selecting a film stock that has a limited contrast range.

Film for direct projection on a motion picture screen may have contrast ratios of as high as 600 to 1 for an outdoor scene or approximately 150 to 1 for an indoor scene. Expecting too much in the way of contrast ratio or discernible levels between black and white will cause a noticeable difference between the picture one sees on a viewing screen and one viewed on a television system. Since chrominance values are linked to luminance, certain subtle or pastel shades on direct projection will not be discernible through the television system.

The second major area of misunderstanding is direct projection. Because of the contrast ratios, color processes, light sources, absolute illumination of the viewing screens, and electronic constraints, one should never attempt to compare projected film with television viewed film.

The major cause for the difficulty

in color processing of film for television is due to the way pictures are produced by a film system and television system. Color film employs a subtractive process, where colors are reproduced through a combination of amounts of yellow, cyan, and magenta dyes. If the primary color blue is required, for example, reducing the amount of yellow dye will produce and increase the amount of blue. If red is desired, the amount of cyan dye is varied in the same way, and varying the amount of magenta will vary the amount of green in the picture.

Producing colors by varying and reducing the dyes (subtractive process) on a film base will not reduce the amount of light to the degree that adding filters or filter layers would. Light passed through the dyes on film will have the same intensity in color as in black and white film. When dyes are incorrectly deposited on a piece of film stock, improper coloration or color rendition will result because of their admixture with light. It is important to keep in mind that white light contains all colors, so that a chromatically aberrant element (filter, dye, etc.) will vary parts of the spectrum and produce distinct colors.

Therefore, varying the amount of yellow, magenta and cyan dye on a film will produce the amount of blue, green and red colors in the resultant picture. Viewing standard split field color bars on a vector display unit will show each film dye color 180 degrees out of phase opposite in phase to its red, blue or green derivative.

The additive process common to all television systems requires breaking down the color picture information into its red, blue and green primary colors. This is true whether the picture information is to be encoded (live cameras, film cameras, chroma keying, color correction, etc.) or decoded (television projection, color monitoring, color television receivers).

Instead of the absence of a dye or filter to produce a particular color (subtractive process), the three primary colors are combined to form the desired colors. This combining is done by adding filters to a white light source or colored phosphors to a picture tube or by combining three colored light sources (red, blue, green) to produce a color picture. Although the additive pro-

cess works well electronically it has some major drawbacks:

- Adding filters in a light path reduces the amount of light.

- Three dot phosphor mosaics in picture tubes create less resolution of fineness of detail and are difficult to register.

- Manufacturing precise color filters as well as tint free or neutral glass is a tedious and expensive process and subject to error.

Consequently, viewing film on a direct projection system should not be used as a common operating practice.

Film Problems

1. Dense film does not transmit much light. Colors seem very intense (or saturated) and low-light areas of scenes have little or no detail. On a properly set-up color television film camera, there will be limited range when attempting to obtain a proper white level when bright scenes appear on the film. Improving the quality and brightness of this film by increasing the video black level will only remove contrast from the final picture. The print should be returned to the film lab and a less dense print requested.

2. Thin film transmits much light and has little or no true black areas. On a properly set-up television film camera, there will be a limited range to obtain a proper black level when dark scenes appear on the film. Improving the contrast on the film by electronically reducing the video black level will "muddy" or remove the detail in the dark area of the film on the picture. A denser print should be requested from the film lab.

3. Film base or substrate color impurities result in coloration in areas such as black, white or neutral frames. This fault, introduced in the printing or developing process, can be corrected with extensive work in the film lab.

- 4A. Opening the iris too far on the original film camera or the film printer will produce a contrast ratio which is difficult if not impossible to control. The effect is discernible on a waveform monitor, with the average video signal reading between 70 and 90 units on the vertical scale.

- 4B. Closing the iris too far on the original film camera or film printer will produce a film which lacks details in the highlight areas. The effect is discernible on a waveform

monitor, with the average video signal reading between 20 and 50 units on the vertical scale.

In both cases of an improperly-set taking iris, little can be done if the taking camera operator was at fault. However, if the film negative is acceptable, a new print can be made with proper film printer iris settings.

Measurement equipment

The waveform monitor, (scope) is the most important signal assessment tool in television. Prior to any measurements, the calibration of the waveform monitor should be checked. In dealing with video signals of one volt, the one-volt calibrate pulse should fill the graticule from tip of sync to peak white -40 to +100. If the calibrate pulse is off more than 5 units, maintenance is required.

Next, the response switch setting should be on "flat." Many technicians argue that the IRE roll-off position (monochrome standard) should be utilized for assessing video. However, chrominance information in the IRE roll-off mode is useless, providing only the video signal luminance information usable for monochrome-video. Chrominance and high frequency components of the video signal can be assessed in the flat mode.

The vector display unit (vector-scope) plays a part in color video operation apart from its standard use for analyzing color burst and color vector phase. Color film chain balance and optical irregularities can be uncovered quickly by expanding the gain of the vector display unit with an open gate or questionable film substrate while noting any coloration.

A cross chip test glass of the metal deposited variety should be used during color film camera set-up. Film strips or test slides are not acceptable, for unlike the glass deposited metal test device, film and slides have a tendency to bleach or change color quickly. When small density changes are apparent (1%), a change in the test source may make a big difference in test results and film chain balance.

Color television film camera

For brevity, it is assumed that the operating engineer has a rather complete knowledge of the film camera and the production oriented reader cares only about the operational aspect. Because of its inherent complexities and variables, it is my contention that most of the labor applied to making the color television film camera function properly

is applied prior to the actual process of airing or transferring film. The television film video operator should only have to adjust the levels of the camera during an airing or transfer. With these factors in mind, the following checklist applies for both set-up and operation.

The encoder combines the outputs from the color channels (red, blue, green, luminance or variants) into the final composite color television picture as well as generating the color television standard test signal-split field color bars. Before proceeding with the camera setup, make certain that the color bar test signal meets phase and level specifications utilizing the waveform monitor (level and pulse width checks) and the vector display unit (measuring the phase and amplitude of the color vectors as well as the subcarrier reference color burst). Prior to setting up the camera, the projector and optics should be examined for lint or coatings of discoloration. A quick check for discoloration due to smoke tar, smog, or fingerprints can be made by showing an open gate of illumination into the camera, setting the camera peak level at 100 units, expanding the gain of the vector-scope out of calibrate to its full range, and noting any random color vectors.

Set-up instructions for the color television film camera are listed in the manufacturer's operations and maintenance manuals. The following list of set-up operations summarizes key points.

a. Check and adjust registration so that the geometries of all pickup tubes are similar and scan the same area of the imposed test slide. A cross hatch or ball slide can be used at the operator's discretion.

b. Check and adjust the optical and electrical focus of the film chain using a wedge slide, indian-head, etc. Make certain that focusing is done with no aperture correction introduced which will confuse the evaluation.

c. Check for proper shading of the film camera. Using an open gate and color monitor, look for uniform level side-to-side and top-to-bottom of the picture.

d. Check and adjust the color balance of the camera. Using the waveform monitor in a horizontally expanded mode, balance out color subcarrier in the white and black areas using the color balance glass.

e. Check for proper tracking of all the pickup tubes from black to white by setting proper (7.5 unit) black level and varying the white level control. Some find it best to use the

parade display where each tube output can be seen side by side, others prefer the mode where all of the tube outputs are superimposed.

f. Make certain the white clip control (which cuts off all video greater than a predetermined amount) is set for no more than 110 units. Examine this on the waveform monitor in the flat mode.

g. Crushed black and white video should be avoided. Crushed video in the white or black area manifests itself as a limit of the dynamic range of the color television film camera.

h. Video enhancers can be found as integral parts of most television film cameras or as separate in-line components. This category of equipment generally includes image enhancers, aperture correctors, contour generators, edge sharpeners and crispners. They are a mixed blessing for, as generators of artificial sharpness and/or crispness they tend to be overused.

All of these units create false sharpness or edging in the color television film camera picture. When properly operated they do "enhance" pictures that are soft because of minute focusing, registration and even frequency response problems. But more often than not they are improperly operated. Incorrect operation produces pictures that run the gamut from an emphasis on small skin discontinuities, such as freckles or blemishes, to creating a narrow white line around each object in the picture. To set up the edge enhancement in a film system, the number of system artificial edge devices must be noted and each device carefully controlled so that none compensates or counters another.

Now that the film has been checked, the test equipment calibrated, and the color television film camera set up, the telecine or television film system should be capable of producing excellent results with proper (for television) film as an input. To check the system, run a piece of test film known to be television compatible and look for all of the parameters and possible problems mentioned.

Color correction devices

Color correction is the final element in the color television film process, whether airing film or transferring it to videotape. There are many cases where film problems cannot be dealt with because of time factors or general limits placed upon the film lab because of the raw material. A few cases of color correction candidates will be discussed before the operation of

Guide to color

the color correction system is described.

Case 1. Because of a protracted shooting schedule, the raw footage was taken to a number of film labs at many different times. Because of differing developer temperatures, chemical purities, chemical strengths, printer lamp coloration, or scene color temperature changes (indoor incandescent lighting mixed with cloudy sky cool light), color correction is needed. By viewing the complete film on a television film system and making notes of radical color changes, it may be necessary to make scene-by-scene color corrections—a time consuming process. If the color seems to be incorrect to the same degree throughout the complete film, color correction need only be adjusted at the "head" of the film and unaltered until the film's completion.

Case 2. A feature film shot for the cinema is to be run on television. It is likely that many adjustments will have to be made affecting video levels, chrominance and gamma if the motion picture was not made correctly for television. (Do not confuse the production term "made for television" with its technical counterpart!) One way to check on this is to contact the film seller or production group. If this is impossible, view the film on a properly set-up color television film system to assess the dynamic contrast ratio and coloration, white to black for acceptability.

Case 3. It is often necessary to integrate a piece of film into a program where one or the other has some out-of-standard parameter such as heavy saturation, cartoon coloration, warm or cold lighting or off-color product shots (pastels in particular). In any of these cases, and although a color correction process is utilized, color modification would be a more apt descriptor. Here, artistic or subjective painting is usually required.

Prior to any adjustment of the color correction system, make certain the unit is zeroed. To do this, a standard color bar test signal should be fed to the corrector and the corrector adjusted so that the

output signal matches the input. Once the unit is adjusted for zero effect, remove the color bar signal from the input to the color corrector and apply the output of the color television film camera to be corrected.

A color corrector breaks down the composite color television signal into its luminance and three color (chrominance) components so that each can be varied or controlled separately. After the components are separated, the following parameters can be varied within the unit: red, blue, and green gain; red, blue and green black level; red and blue gamma; and chrominance level. After these components are separated and made variable, they are mixed back together and added to the main signal, providing a device which can control or vary the most important elements which make up a color television video signal.

Red, blue, and green gain controls are adjusted while viewing a white area on the scene. Whites should be pure; but if coloration in white is noticed, adjust the respective control (red, blue or green) to minimize the coloration. Since the tinting may be a combination of colors, it will take the newcomer a while to get a feel of which controls affect each hue and degree of coloration in whites or highlights. Common highlight miscoloration problems to be balanced out are off-color blond, gray, white, light hair, off-color skies, snow, large light surfaces such as walls, and some flesh tones. Remember that altering the color of the film highlights (area between 60 and 100 units of video) for any one object will affect all other highlight areas. If a gray-haired person is standing under a colored light in a scene, this is what the film director wanted; trying to correct this will also affect any other area of the same relative luminance level such as the wall, clothing, or, most importantly, the hair and fleshtones of anyone else in the scene who is not standing under the colored light. The notations of the director of the original film should be understood by all concerned with the correction process.

Red, blue, and green black level controls are adjusted while viewing a lowlight or black area of the picture. On the waveform monitor this level exists between 7.5 and 30 units of video. If coloration is noticed in dark areas, the black level controls must be adjusted in the same manner as the white level controls, and with the same cave-

ats. Most black coloration problems will be noted in dark hair, dark furniture, rocks, etc. As with white coloration caused by purposeful lighting, some scenes will be difficult to balance.

Red and blue gamma controls are used most often when color correcting film for television, for they deal with that area of the picture where video is between the limits of approximately 10 to 60 units. Since green video is used as a reference, only the blue and red channels are adjustable on the color corrector. Midlight areas of scenes such as fleshtones, clothing, fauna and flora reside in the gamma area. Many films will require only gamma correction with a slight amount of white and black level touch-up.

Colorimetry and color balance are the two major operating modes of the color corrector and are selectable with a switch. The color balance mode is used when it is desired to change the luminance white and gray level along with the chrominance when color correcting. Since color film colors are normally closely related to film luminance values, this mode should be used for film correction. The colorimetry mode is generally used when matching various video sources during a production, because in this mode, color levels (red, blue, and green) may be changed without changing their respective luminance levels.

When color correcting film for television, and from a purely operational standpoint, the color balance mode seems to have a much greater effect than the color mode when adjusting any of the three color or gain controls and a firmer control over colors in the gray level areas as well as white is realized. A simple way to get a feeling for the dynamics of the color corrector in both modes is to view the cross chip glass, purposely unbalance one of the colors on the camera using the white balance controls, and switch back and forth from colorimetry to color balance while adjusting that same color gain control on the color corrector and note the difference.

The next functions to deal with on the color corrector are labeled **Log** and **Lin** on the function switch. These simply stand for logarithmic or linear correction. In the linear correction mode, the black level balance controls (red, blue, and green) will most noticeably vary the amount of color in the black or lowlight areas of the picture but will also (and here's the function of linear correction) vary to a degree the gray and white (midlight and highlight) areas with regard to the

amount of coloration for the control being adjusted. In the logarithmic mode, only the lowlight or black areas of video are affected by the black level control being varied. It is easy to see that, when there are many nonlinearities, the logarithmic control will provide a much more accurate adjustment for film color correction.

The operator should make the same test utilizing the cross chip glass and vary the film camera black balance for a chosen color as he switches between log and lin on the color corrector.

Last, and probably least unique, is the **Chrominance Level** control. This control merely varies the chrominance gain or chrominance level of the color corrector the same way that the color control varies the amount of color on a standard home television receiver. If, for any number of reasons, the colors seem too pastel and lacks vividness (saturation), increasing this control will "beef up" the colors. If colors seem too strong, decreasing this control should produce more pastel-looking colors. The final color level adjustment should be made while viewing a vectorscope, not a color monitor,

so that correct levels will be aired or recorded. Too much saturation will enhance the apparent noise of the picture as well as raise havoc with some videotape machines and television transmitters.

Computer controlled color correction is utilized by most of the larger television post-production houses around the country. When many people hear the word computer used in connection with the color correction process they immediately feel that the process is new or superior with regard to the quality of the final corrected product or that hopelessly ill-processed film can be made visually pleasing and technically acceptable.

Computer controlled color correction can save time and acrobatics. The computer is used to replace the color corrector operator after all scene-by-scene corrections with proper addresses or film locations are entered during the initial run-through.

As the film is viewed and color problems are noted, corrections are made using the controls of the color corrector. These control settings are read by the computer along with the spot on the film where they apply

(frame addresses). With some computers (depending on the size of their memory), up to 1000 changes can be made on a film. Once the corrections with their addresses are loaded (noted by the computer), the film is run from the start, and the computer now makes all the changes it has been given as rapidly as required without any operator intervention. Because of the number of controls and possible changes for each area on the film, it would be impossible for an operator to vary them in rapid succession.

Computer controlled correction is necessary for frame-by-frame or scene-by-scene correction and is warranted where rapid corrections must be made within a particular film. It is important to note again that the quality of color, contrast ratios, hue and noise of the final product lies within the realm of the four areas of this tutorial-film, color film camera, monitoring equipment, and color corrector.

A thorough understanding of the processes will eliminate much wasted time and production-engineering headaches that often come about because of "by rote" knob twisting. □

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Catalog/literature roundup

■The following is a list of catalogs and literature on some of the latest products of broadcast technology. To receive any of these catalogs or brochures (supplied by November 1978 **Broadcast Engineering** advertisers), simply circle the corresponding reader service number.

ADC Products

- (195) The Sound Connection
- (196) ADC Jackfields
- (197) ADC Components 1977 Catalog

Ampex

- (198) Video Production Recorder-2
- (199) Video Production Recorder-20
- (200) Broadcast Color Camera-10
- (201) Broadcast Color Camera-14
- (202) Helical Production Editor-1

Ampro Broadcasting

- (203) Station Planning Guide
- (204) Full Line Console Brochure
- (205) Full Line Cart Tape Brochure
- (206) Full Line Tri-Dek Brochure
- (207) Full Line Monomax Brochure

Andrew Corporation

- (208) Antenna Systems Catalog 30

Broadcast Electronics

- (209) Studio Equipment Catalog
- (210) 5300A Three Deck Tape Cart Machine
- (211) 4000 Series Tape Cartridge System
- (212) 3000 Series Tape Cartridge Machines
- (213) Control 16 Program Automation System Brochure

Cetec Broadcast Group

- (214) Audio Equipment/1 (consoles)
- (215) Audio Equipment/2 (cabinetry, control centers)
- (216) Transmitters
- (217) FM Antenna Pattern Service
- (218) Automation System 7000 (radio programming)

Cohu

- (219) Short Form Broadcast Catalog
- (220) 1550 Telecine
- (221) M-3 Multiplexer
- (222) 9900 Series Color Encoder, Image Enhancer & Automatic Balance
- (223) 9800 Video Cable Equalizer

dbx

- (224) 142 Broadcast Noise Reduction System
- (225) 148 Broadcast Noise Reduction System
- (226) 165 Professional Compressor/Limiter
- (227) 162 Stereo Compressor/Limiter
- (228) 160 Single Channel Compressor/Limiter

Datatron

- (229) Datatron 2000 (editing system)
- (230) EditMate I Edit Decision Lister
- (231) EditMate II Editor
- (232) EditMate III Editor with Edit Lister
- (233) Tempo 76 Series Videotape Editing System

Digital Video Systems

- (234) DPS-1 Mainframe
- (235) DPS-1 Fieldstore Synchronizer
- (236) DPS-1 Time-Base Corrector
- (237) DPS-1 Optical Effects
- (238) DPS-1 Framestore/TBC synchronizer

ESE

- (239) Clocks and Timers
- (240) Master Clock Systems
- (241) Time Control Systems

Electro Controls

- (242) 1730A ILS (memory control lighting)
- (243) 7367A Parellisphere (spotlight)
- (244) Playmate Portable Dimming Systems
- (245) Playmaster Dimming Systems

Grass Valley Group

- (246) 1978 Television Equipment
- (247) 1600 Series Production Switcher
- (248) 3400 Series Distribution Equipment
- (249) 400 Series Routing Switchers
- (250) Digital Video Effects

Harris

- (251) FM-40K 40 kW FM Transmitter
- (252) TC-80 Camera
- (253) Cyclotran System
- (254) MSP-90 Audio Processor
- (255) M90 Modular Audio Control Console

International Tapetronics Corporation

- (256) 750 Reproducer
- (257) 750 Recorder/Reproducer
- (258) 850 Series Reel-to-Reel
- (259) ESL-IV Cartridge Tape Eraser/Splice Locator
- (260) RP Series

Marconi Electronics

- (261) Marconi Instruments Short Form Catalog 1978-79
- (262) Objective TV Measurements
- (263) Television Interval Timer, TF2920
- (264) Mark IX Color Camera

Orban Associates

- (265) The Reverb Industry's Price Performance Leader
- (266) 245E Stereo Synthesizer
- (267) Just What the World Needs: Another Limiter
- (268) A Really Good De-Esser Shouldn't Do Anything Else
- (269) The Professional's Parametric Equalizer

Potomac Instruments

- (270) AT-51 Audio Test System
- (271) FIM-71 VHF Field Strength Meter
- (272) SD-31 Frequency Synthesizer/Coherent Detector
- (273) Solid-state Field Strength Meters (AM Band)
- (274) Type 19 Antenna Monitors

Ramko Research

- (275) Professional Audio Equipment 1978/1979 Catalog
- (276) The DC38 Series Broadcast Consoles
- (277) The DC12 Series Broadcast Consoles

- (278) Turntable Preamp Comparison
- (279) The ARA-1612 Audio Router/Amplifier

Spectra Sonics

- (280) 109 Line/Distribution Amplifier
- (281) 505 Electronic Filter
- (282) 701 Power Amplifier
- (283) 610 Complimiter
- (284) 1100 Line/Microphone Audio Mixer

Standard Tape Laboratory

- (285) Audio Test Tapes
- (286) Audio Recording Manual

Studer Revox America

- (287) A800
- (288) TLS 2000 Tape Lock System
- (289) A80/RC Two Track Tape Recorder
- (290) A80/VU Multi-Track Tape Recorders
- (291) B67 Tape Recorder

Tektronix

- (292) Television Products 1978
- (293) Answer (automated TV measurement)
- (294) Measuring Picture Monitor Resolution, Television Products Application Note 27
- (295) Timing Adjustments in 1410 Test Signal Generators, Television Products Application Note 28
- (296) Testing of Synchronous Demodulators, Television Products Application Note 29

Telex Communications

- (297) Professional Tape Components
- (298) Magnequad Cart Machines
- (299) Magnequad Recorders/Reproducer
- (300) Our Logger is a Turtle

(301) Broadcast & Communications Headsets

Thomson-CSF Laboratories

- (302) Vidifont Character Generator System
- (303) Microcam Portable Color TV Camera, 1 & 2 Piece Configurations
- (304) Digital Noise Reducer
- (305) Color Correction System
- (306) 950 MHz Diversity RF Microphone Systems

Utah Scientific

- (307) AVS-1 Switcher Matrices
- (308) AVS-1 Distribution Switcher Control Panels
- (309) CAV-7 Switching System

Vega (Cetec)

- (310) The Ultimate Portable Receiver For Wireless Microphones
- (311) The Ultimate Portable Diversity Receiver
- (312) Wireless Microphone Systems
- (313) Signaling Products

Vital Industries

- (314) Squeezoom
- (315) Video Production Switching System
- (316) Production Switcher Automation System
- (317) Vimax 200 (TV automation programming)
- (318) VIX-115-4 On Air Switching System

Wilkinson Electronics

- (319) GCA-1/S AGC Amplifier
- (320) TMM-1A AM Modulation Monitor
- (321) SG1-E Stereo Generator
- (322) FME10 Exciter
- (323) LA2-C/LA2CS Limiting Amplifier ☐

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station-to-station

Transistors solve tube problems for the 529

By Kenneth O. Dixon, maintenance supervisor, WHA-TV, Verona, WI

Having a hard time locating 7788 tubes for the vertical output of your Tektronix 529 waveform monitor lately or do you object to the high tube cost for routine maintenance? Replacing the tubes with transistors provides longer life and reduces maintenance costs.

WHA-TV uses 28 of these fine scopes, but tube location and replacement costs are becoming significant. So, after receiving another trouble report from operations complaining of "sync compression in the monitor scope," we decided that the 7788 tubes had to go.

The 529 schematic shows that a transistor could directly replace each 7788 tube if it had the following characteristics: a V_{cbo} exceeding 360 V; dissipate 6 W of heat; have a good f_T ; and a package which could be mounted to a heat sink with a low capacitance. The RCA 2N3439 transistor seemed to be a good choice with its V_{cbo} of 450 V; P_T of 10 watts; f_T of 30 MHz; TO-39 case; and T_J of up to 200 C.

During checkout of the scope after modification the following values were either measured or computed:

	Nominal	Maximum
I_C	24 mA	50 mA
V_{ce}	147 V	211 V
P_d	3.53 W	3.88 W
Case Temp.	98 C	99.1 C

This data indicated that there should be no problems using the 2N3439 transistor.

The method of transistor mounting was an important aspect of the modification due to the amount of heat dissipated by the transistor. (The 2N3439 can dissipate up to 10 watts at a case temperature of up to 25 C, de-rated to zero power at 200 C.) The transistor in this application dissipates approximately 3.5 W. Another significant consideration is that the transistor collector when mounted must have an absolute minimum of capacitance to ground. The Wakefield series 260-6SH5B cup was used with its beryllium oxide insulator and 4 pF capacitance. Beryllium oxide is also a much better heat conductor, permitting the collector to run cooler. (Be sure to use an adequate amount of thermal compound when installing the transistors and mounting clips.)

The circuit changes are relatively easy to perform following this step-by-step procedure:

1. Remove V-164 and V-264; they are no longer needed.
2. Replace R-153 (154 K) with a 15 Kohm, 1 W resistor.
3. Replace R-150 (22, 6 K) with a 27 V, 1 W zener diode.
4. Add a 100 ohm 1/4-W resistor between Q-164 collector and pin three of V-164 socket.

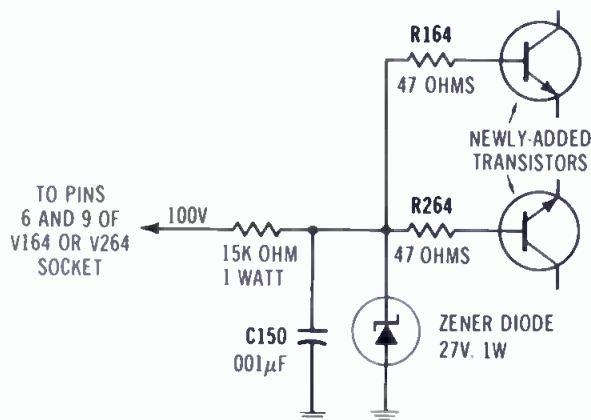


Figure 1

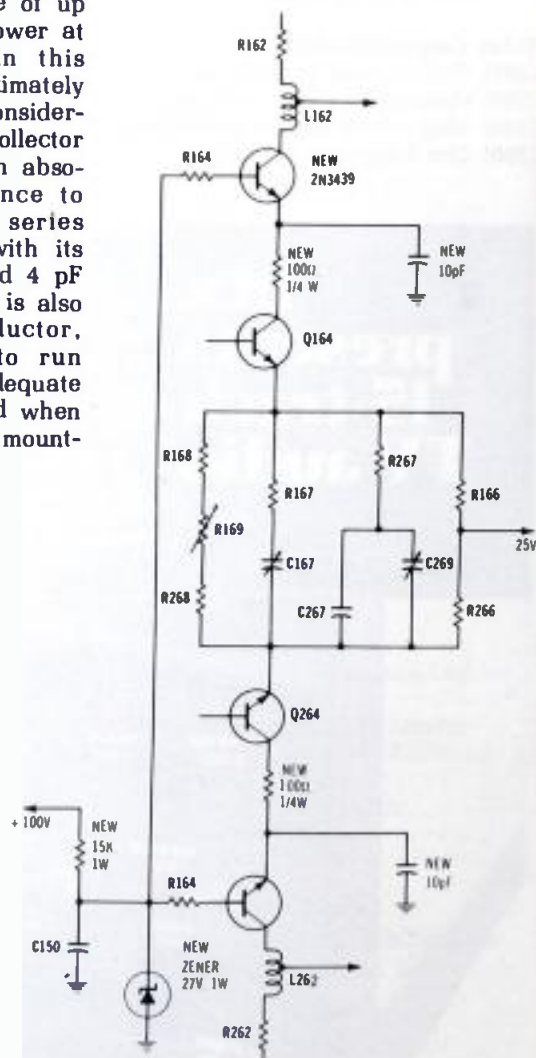


Figure 2

5. Add a 100 ohm 1/4-W resistor between Q-264 collector and pin three of V-264 socket.

6. Install a 10 pF silver mica capacitor from pin three to V-264 socket to ground.

7. Install a 10 pF silver mica capacitor from pin three of V-264 socket to ground.

8. Mount and connect two 2N3439 transistors. Base to pin two, emitter to pin three, and collector to pin seven of V-164 and V-264 sockets.

9. R-163, C-163, R-165, R-263, C-263, and R-265 are not required but may be left intact. They will not affect proper operation.

On the older series of scopes R-164 and R-264 were 47 ohms and were connected to the bases of Q-164 and Q-264, respectively. For these scopes, leave the resistor values at 47 ohms but remove the ends which connect to the base of Q-164 and Q-264. Reconnect the free ends of R-164 and R-264 as shown in Figure 1.

The bases of the newly added transistors are now fixed at 27 V. This voltage keeps all four output transistors operating linearly and

also ensures that the 40 V breakdown rating of Q-164 and Q-264 is not exceeded.

The transistor mounts are secured in the regular 529 scope by drilling two holes in the top of the scope chassis just above the sockets of V-164 and V-264 (number 36 drill, 6-32 tap). For the RM529 scope, remove the mounting screws from L-162 and L-262 and use the cup clip studs to remount them.

After all changes have been accomplished, recheck all connections, plug in the scope, apply composite sweep (or multiburst if sweep is not available) to the scope and adjust C-269 for flattest response. It may also be necessary to adjust L-162 and L-262 for best response near 10 MHz. If, after making the adjustments, the gain near 10 MHz is still too high, remove the 10 pF caps (which were added in steps 6 and 7). If the high frequency response is too low, increase the capacitor values to possibly 68 or 100 pF. Experience has shown that most 529s do not require the capacitors but the RM529s do. Calibrate the scope vertical gain with R-169. The modification will have increased the gain

by about 30%. Confirm that channels A and B both operate correctly.

Scope pictures were taken of frequency response and of multiburst before and after modification to transistors. There was essentially no change in the 529s performance.

WHA-TV's annual scope maintenance has averaged about \$1700 (2 tubes at \$30 x 28 scopes). At current catalog prices, the modification to transistors costs about \$8.40 plus two hours of technician time—say, \$25 per scope. The immediate savings plus long-term gains in low maintenance are obvious.

To maintain flexibility and eliminate patching problems involving feeds to our Ampex AG-440 recorders, we decided to build our own switching matrix.

We have two AG-440 recorders, one 4-track and one 8-track. Our Cetec 40LM audio board is divided into two parts. One part is for production and the other part is for editing. Each side has four output lines.

One channel on each recorder is reserved for SMPTE time code. This means that our matrix should have a balanced 8-line input capacity and a balanced 10-line output capacity.

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Station-to-Station

For each one of the 10 output lines there is an octal coded switch. This switch will select any one of eight input lines and feed it to the recorder. This matrix gives the operator the flexibility of selecting any one of eight sources and feeding it to any of seven channels on the 8-track recorder and any of three channels on the 4-track recorder without the hassle of patching.

We started with the MC4051 analog multiplexer chip, DC4010 buffer, the LM747 dual operational amplifier, a 600:600 Ω output transformer, and an octal coded selector switch.

Since we had balanced inputs, two MC4051s were required for each output line. The CD4010s were used between the octal switch and the MC4051 line selector. No elaborate debouncing circuit was needed because switching is done before recording. The LM747 op-amps are used as buffer drivers for the 600:600 Ω transformer.

Our recorders are controlled by a CMX-340 editor and consequently the tape is not lifted from the heads during rewind and fast forward. In

either of the two modes, the audio line and voltage from the audio board will reach 20 to 23 volts and this will overdrive the input to the MC4051s causing severe crosstalk and latching. When one recorder was in play or record and the other in rewind or fast forward, crosstalk would show up in the play or record recorder. Placing two 7.5 V zener diodes across each input line limited the audio input to 15 V, which is the power supply output also. This eliminated the crosstalk problem.

The power supply consisted of a 200 mA, 36 V transformer, one 7812 and one 7912 voltage regulator, one Bridge rectifier, filters and two 7.5 zener diodes.

The on/off switch was placed in the back of the unit to prevent accidental turn off. The MC4051s should always be powered up before any input signal is applied. That will prevent the chip from latching up.

We used wire wrap techniques to build the boards, being very careful to dress the audio wires neatly and in a straight line (not crossing each other) and using shielded audio wire for all inputs and outputs.

We built an 8x10 matrix (80 crosspoints) and contained it in a

1½"x19"x15" package. The cost was less than \$8 per crosspoint. Crosstalk between channels on the MC4051 is specified at 100 dB. On our output lines, crosstalk was between 70 and 80 dB down.

Serving two program origins with one STL receiver

By William F. Desmond, Jr., M.I.T.
Lincoln Laboratory, Lexington, MA

Recently, in my work, I had a problem with the alternate receiving of two different program origins at one receiving location, via microwave. I needed a remedy quickly and didn't have time to consult commercial outfits or go into any timely design procedures. I experimented with RF transfer switches manufactured by the Transco Company. The receiver was like the conventional STL receiver. My antennas were two 5-foot diameter dishes (similar to the Scala Paraflector).

As you can see in Figure 1, I used a DC voltage to energize the transfer switch solely because of

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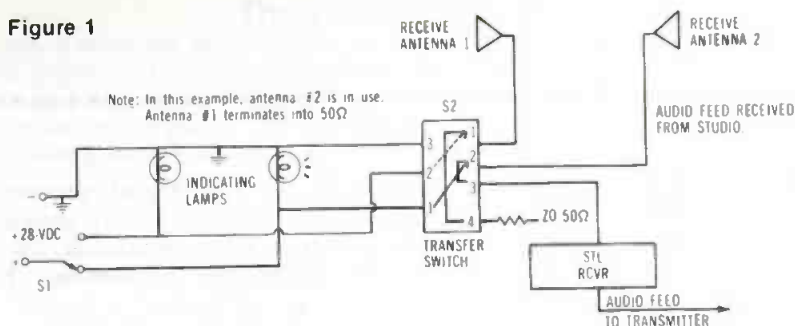
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Figure 1



the availability of this particular switch at this time. (There are AC versions of this switch on the market.) I used port 3 of the switch for the common receiver input. Ports 1 and 2 serve the two antennas. Port 4 automatically terminates the unused antenna into 50 ohms.

Figure 2 shows a rough mechanical layout of the switch and its four ports. A low power 50-ohm RF load is suitable to terminate port 4.

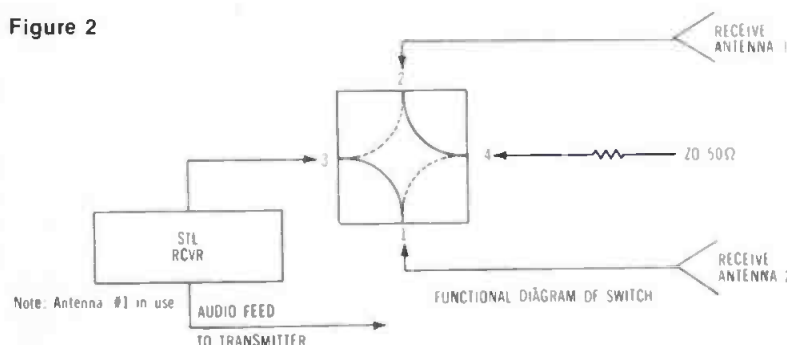
The switch is of the latching type so it only uses voltage and draws current for the instant that it switches. The 28 VDC power supply is also used to light the indicating

lamps which show the antenna currently in use. Two different colored pilot lights may be used.

I used this particular switching arrangement on a research and development project at MIT. However, I am sure this idea could be used in various situations in the broadcast industry.

Using this system in broadcasting would require two STL transmitters, licensed for the same frequency, operating alternately from different locations. Therefore, I would suggest consulting the Broadcast Bureau of the FCC to be sure your station's operation is consistent with FCC rules. □

Figure 2



Split Second Time Machine

The Telex/Magnecord 1400 recorder. Split second timing with a grid of 524 lines passing a quartz crystal control reference each capstan revolution. This senses, and corrects the speed of the DC servo drive some 4000 times per second*. Speed stability is so accurate the National Weather and the Environmental Satellite Services selected Telex/Magnecord 1400's over all others to record meteorological display data.

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December 1978 *Broadcast Engineering* 77

letters

Editor's Note: The following letters were written in response to "Results of the FM signal processing survey" by Dennis Ciapura in the September, 1978, **Broadcast Engineering**. The original survey appeared in the April, 1978, issue. If you care to respond to this or any other article appearing in the magazine, please take a few minutes to write down your thoughts and send them to: Letters, **Broadcast Engineering**, P.O. Box 12901, Overland Park, KS 66212.

Dear Mr. Ciapura:

I read with interest your recent survey on FM signal processing in the September **Broadcast Engineering**. I couldn't resist getting a "pet peeve" off my chest. Maybe you can mention this following problem in a future article on FM audio.

Up until recently, I was a resident of the central New York State area. At my home, I noticed that there was a wide variation in the perceived loudness of the local FM stations. In an effort to investigate this phenomenon, I connected a scope to the demod output of my tuner (Kenwood KT-7500). After calibrating the scope to a reputable FM station that uses an Optimod, I checked the peak modulation levels of all stations in the area. Of these, only about half were peaking within 10% of the estimated 100%. There were few cases of overmodulation, however, many stations were well below 85%.

One particular offender was a top-rated automated top-40 station which uses very excessive compression. This station always seems to have a noise problem, which is naturally worsened by the compression. The ironic part of it is that they are using Dolby processing, which is of little use, since most noise comes right into the Dolby encoder. After many checks using the scope, I have concluded that this station has never modulated over 65% to 70%.

Obviously, this station is not aware of this problem. One must conclude that their modulation monitor is way out of calibration, since their stereo pilot injection is also low. They must never listen to any other stations. The problem is apparent even without a scope.

This seems to be a widespread problem, especially in medium and smaller markets. The quality of FM could be greatly improved if stations would only check their peak levels with a scope, rather than trusting their monitors. Excessive limiting and compression could be reduced, modulation could be turned up where it belongs, and everyone would benefit. Perhaps you could mention this situation in a future article.

Mark D. Humphrey
Station Manager
WJSL-FM

Dear Dennis:

Are detailed copies of the **BE** questionnaire responses available? I would be particularly interested in how answers differed in small, medium, and large markets. It is not surprising that most chiefs are in favor of better fidelity versus loudness as the primary determinant in signal processing. Yet, market penetration for small and suburban stations must surely reflect some loudness consciousness on the part of the responsible CEs.

Classical, beautiful music, and soft rockers, etc., are undoubtedly complemented by high fidelity processing (or lack of) in markets where serving the principal retail area is not in question. Yet for smaller stations, it is a fact of life few clients will buy what they can't hear, and sales does pay the freight. As a CE and sales manager, I learned this the hard way.

Finally, I take exception to the notion that most chiefs "would be at least as irritated as most listeners are if they could hear the effects of overprocessing." Excepting a minority of elite, discriminating listeners, (to paraphrase Polonius) 'tis true 'tis pity and pity 'tis 'tis true that most listeners have no concept of overprocessing versus high fidelity.

Michael R. Starling
President, general manager and chief engineer
WKYY-AM/FM, Amherst, Virginia

The Humor Corner

Editor's Note: We began a series on humor in broadcasting on page 89 of the November issue. A poll was included to ascertain your thoughts on this new department. Although the results are not in yet, we have heard from enough of you to continue this column until the poll is completed. So, here's another installment.

A new winter series

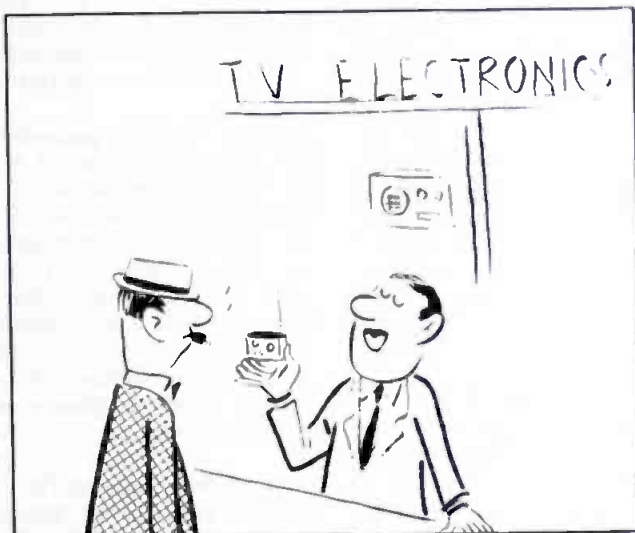
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Met a snip with a whip to her hip
Sald he with glee
A rich fee there'll be
For my lip and your hip on TV.
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The human fuse

There once was a careless nitwitter
Who accidentally sat on his transmitter
When he shorted to ground
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An equestrian tail

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Grazed by a station in a shower
During the rain and the hail
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Opinion poll and contributions

Last month in this space we presented an opinion poll to see if you would like us to continue a humor corner. If you did not cast your vote and wish to do so, use last month's reader service card.

If you would like to submit an entry to this department (limerick, poem, short story, cartoon idea, bloopers or whatever lends humor to our profession), please address it to the editor. We welcome your contributions. We won't pay for them, but we will credit you if we publish your entries. ☐

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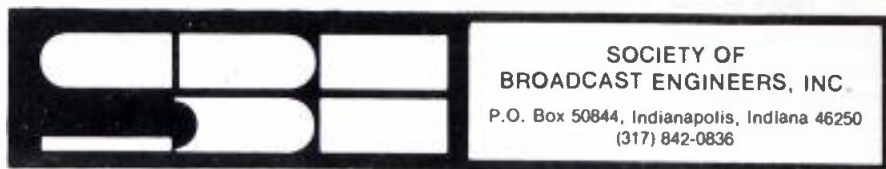
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association news



CHAPTER REPORTS

Chapter 1—Binghamton, NY

"Fundamentals, Applications & Future of Optical Waveguides" was presented by Thomas Dunne, senior sales engineer & William Simpson, senior applications development engineer of the Telecommunications Products Department, Corning Electronics, Corning Glass Works on October 10.

Chapter 11—Boston, MA

Nicholas Balsamo, broadcast sales engineer, Automated Processes, presented the program on broadcast audio switching and communications with microprocessors October 17 at WGBH. The system functions as an audio routing switcher, intercom, interphone and IFB system, controlled by a microprocessor, with PROM and disc memory.

Chapter 14—Connecticut Valley

Steve Dresser of Apple II Computer Systems presented a very interesting demonstration on the Apple II computer which was followed by a question & answer period October 25 at WFSB-TV.

Chapter 16—Seattle, WA

Ben Dawson, Hatfield & Dawson Consulting Engineers, reported on the recent NRBA Convention in San Francisco as well as audio processors used in AM and FM broadcasting October 11.

Chapter 18—Philadelphia, PA

Richard Crompton, president of LPB, explained and described the functions, uses and technical aspects of low power broadcast equipment October 17.

Chapter 20—Pittsburgh, PA

James Faint of Duquesne Light presented a talk on the electric power company's role in providing reliable and economic power October 19.

Chapter 24—Madison, WI

This was a joint meeting with the Milwaukee SBE Chapter October 17 in WITI-TV Studios. Tour of the new facilities included a presentation by their chief engineer, Bob Truscott, who described the facility.

Chapter 25—Indianapolis, IN

This was a joint meeting with AES October 24. Bob Todrank of Valley Audio Services presented a program on "Interfacing the Monitor Speaker System and the Room." Valley Audio Services specializes in custom studio design and installation.

Chapter 26—Chicago, IL

Andy Turner, district sales manager and Bob Hasentufel, regional service manager of JVC Industries, presented and discussed the latest JVC equipment, including the G-71 and CY8800 cameras October 26.

Chapter 34—Albuquerque, NM

Jon Wenger, director of engineering at Albuquerque Cable TV gave the group a tour of the facility including the head-in equipment and the micro-wave antenna that receives Telestar II October 9. The Competitive Edge Television production facility is in the same building with Albuquerque Cable TV and Dan Bibeau, chief engineer gave a tour of their facility.

Chapter 38—El Paso, TX

A slide program of Bosch-Fernseh BCN videotape was presented by Tony Magliocco October 11 in KVIA-TV Studios.

Chapter 41—Central Pennsylvania

Ed Mullin, president of Ampro Broadcasting, demonstrated an audiotape matrixing unit October 19 at WHP.

Chapter 43—Sacramento, CA

Art Erlick, a frequency and measurements specialist, and Richard Giroux, sales engineer, Tektronix, presented a demonstration and discussion of sideband and spectrum analyzer techniques and applica-

tions to broadcasting October 24 at KXTV.

Chapter 45—Charlotte, NC
Carl Martin, president of Audi-Cord Corporation, gave a talk on the NAB Cartridge Tape System October 9.

Chapter 46—Baltimore, MD
Bob Mroz and Dan Emrick, representing the FCC local area and field unit respectively presented the seminar portion with a tour of one of the FCC field check-out truck units October 18 at WBAL-TV.

Chapter 47—Los Angeles, CA
Tektronix presented a program on audio measurements using a low-frequency spectrum analyzer and described some of the ways a low frequency spectrum analyzer can make life easier around the plant October 11.

Chapter 49—Central Illinois
George Hall of Convocom presented their goals and objectives September 26. A tour of their facilities followed his presentation.

Chapter 52—Columbus, OH
Bill Orr, director of engineering WBNS-TV; Bob Dye, chief engineer WCMH-TV; and Dale Tish, acting chief engineer WOSU-TV, presented an informative discussion on the recent FCC inspections of their stations October 26.

Chapter 53—South Florida Area
This was a joint meeting of SBE, SMPTE and AES October 24. Ralph Goule, sales engineer for McCurdy Radio gave an interesting talk on the evolution of audio consoles October 24.

Chapter 54—Tidewater Area
Frank Rush demonstrated two of Ampex Corporation's TV cameras September 14 at WHRO.

Chapter 55—St. Louis, MO
Bob Weirather, manager of the FM radio transmitter section of Harris Corporation, presented a program on their CPM system for AM stereo September 28. Following the program, a discussion of the aims and directions proposed for the new chapter was given by Chairman Bill Martin. □

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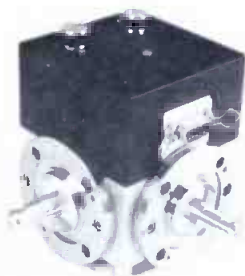
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from blue bananas to sag tails

Live mic causes embarrassment

Nearly 30 years ago while I was technical director for Chicago's WMBI and WMBI-FM, owned by the Moody Bible Institute, we ran a heavy schedule of city remotes, or "nemos" as we called them then. I had hired a part-time man to handle the extra jobs, which he did with expertise. For this article I will simply refer to him as Bob W. I always called Bob when we had a nemo to broadcast from the huge Moody Memorial Church.

Our control booth, behind glass, was placed high above the auditorium near the platform and pulpit at the front. Frankly, I saw this booth only once, but it was always a reliable operation under Bob's care. Well before air time, we would be fed random audio noises and at air time Bob always supplied what was on schedule, 60 seconds after we gave one short crank on the magne-to phone line.

It was the Christmas season, and the Moody Church always had its annual special musical program which was well publicized and broadcast by the institute stations. On this particular occasion, the guest music conductor was a professor from Wheaton College. The fact that he was not a large man and wore a prominent goatee is important to keep in mind.

The program was well under way with approximately 4000 people in the live audience as well as the radio audience. Bob was in the broadcast booth with booth announcer, Don T. Don, a veteran network announcer from the World War II years, was very professional with a deep, resonant basso voice. He was well liked for his gracious, and inoffensive personality.

During the musical program there were interludes, and at these times Don would motion for his mic to be opened so that he could ad lib some commentary for the radio audience. The provision was made for the church's PA system to pick up the commentaries as well.

When the professor stepped up to the rostrum to resume the program, Don would refer the audience to the platform, and so on. The goateed maestro raised the baton for the down beat, held it, then aborted the gesture so as to walk over and speak with the organist. Don motioned for his mic and filled in with appropriate words. Seeing that things were to resume below, he referred the audience, again. As the professor raised his arms to commence his musical conducting, he held, then aborted again, only to walk over and have a few words with the pianist. Back up in the booth Bob and Don were doing their thing to fill time and describe the scene below.

When it appeared that the program was getting back under way... Guess what? The goateed professor raised both arms for the down beat, and then decided he had to talk to someone else. Up in the booth, Bob was so sure Don wanted his mic on again, that he simply fell into the off-again, on-again, Flannagan thing. Only, Don had not motioned for his mic, nor expected it on. Instead, he uttered, "Well, go ahead, you old goat" directly into the mic. And 4000 people in the auditorium and a large radio audience all heard it.

They told me that the quiet, reverent-like atmosphere started with just audible snickers, until the assistant, presiding pastor could not contain himself. He doubled up on his chair and all you could see was his balded head top, scarlet and quivering. With that, the place was a shambles of laughter! Up in the booth both men knew what had happened, and you can well understand why Don had little use for his mic for the remainder of the program.

Talk about Monday morning memos. We had quite a meeting on the 10th floor at headquarters. With forced seriousness, the facts were ferreted out and understandings made clear about future operations, which included one set of unused key switch contacts, a relay and an ultra-visible booth on-the-air light.

In conclusion, I would like to say that Don went out to the professor's home to offer a humble apology. It was received most graciously; and in fact, the professor found the entire incident most humorous himself. Don has since passed on in a swimming accident, but those of us who knew him thought such a thing should have happened to anyone but him. Howard L. Enstrom, Tepco Corporation, Rapid City, South Dakota. □

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A return visit for the behind the scene tour

Remember the last time we visited a dark and deserted studio 8-H in Radio City—the time we spotted the British Guild of TV Cameramen's award label on a Vinten pedestal? It seems like only last month.

Well, we were back in 8-H and this time we spotted yet another sight. There, prowling around in the same locale that had been the originating point for broadcasts (radio and TV) featuring Frank Sinatra, Robert Montgomery, Hildegard, Bob Hope, Dean Martin and Chevy Chase, we found Bob Zweck, guiding Bill Rhodes around the props, cameras and other assorted gear.

Rhodes, Broadcast Engineering's new editorial director, was in town for the SMPTE Get-Together at the Americana Hotel and decided that a visit to NYC would not be complete without meeting and greeting his ASTVC correspondents at NBC. Some out-of-towners visiting for a convention might have prevailed upon Zweck for an introduction to the clandestine or even the dens of debauchery that big cities are rumored to be full of, but not our Bill. "Show me something interesting," suggested Rhodes.

This immediately started Zweck thinking that he had to play it cool. "It's rather late and I believe the planetarium is closed," he countered.

But Rhodes persisted, "No. I mean something really interesting. I would be most interested in things the average visitor doesn't get to see." And so they both wound up in studio 8-H, and from there to room 520, the TV network's very impres-

sive and very modern newsroom. Here, the night editor on duty very graciously explained the operation of the slave camera that is used for the News Update, seen several times a day on the NBC network. We learned how, after the commentator mics himself and the transmission engineer remotely lights the working area, the computer takes over and gets our newsmen on and off.

We then wandered down to the glass partition that divides the newsroom working area from the Nightly News staff area. There, in a corner of the room is a desk with a miniature flag of Ireland centered on it. This is where John Chancellor helps get the show on the road. When not at this desk, Chancellor can be found in his private office located just adjacent to this open working area.

The night editor interrupted to point out a special feed coming in on the monitor located overhead and to the right of the newsdesk. This, he explains, is from Mexico City via satellite and is all about the explosion in the oil fields. It is to be taped by NBC VTR for the upcoming Today show. In response to our query, he pointed out that the other three monitors carry one of the major net feeds.

At this point, Rhodes mentioned that he had a busy day coming up and then a 7 PM flight to visit with his family. Could he have a rain check for the rest of our tour? We got the message and promised Bill that anytime he comes back this way, that red carpet will be waiting.

ASTVC people

Buddy Fleck, one of the founders of ASTVC, and now secretary of the board, just returned from a great vacation to Hawaii. John Kenny, one of ASTVC's charter members at NBC was just elected vice president of NABET's local #11. Congratulations, John!

Just received a copy of the British Guild of TV Cameramen's Journal in which they published Mary Zoller's award-winning essay. We'll publish extracts from that in future issues. Mary is ASTVC's San Diego regional representative.

Kipp Rabbitt, our erstwhile regional representative working out of Dayton Communication in Ohio stopped in to tell us that he is now with the Amperex Corporation and will be moving to Long Island. Kipp proposed a plan whereby he could be of service to ASTVC in the Northeast Regional Area helping our various regional representatives in that area by setting up seminars.

Speaking of seminars, we are anxiously awaiting word from Tony St. John on the outcome of his Sony sponsored seminar at KRON-TV.

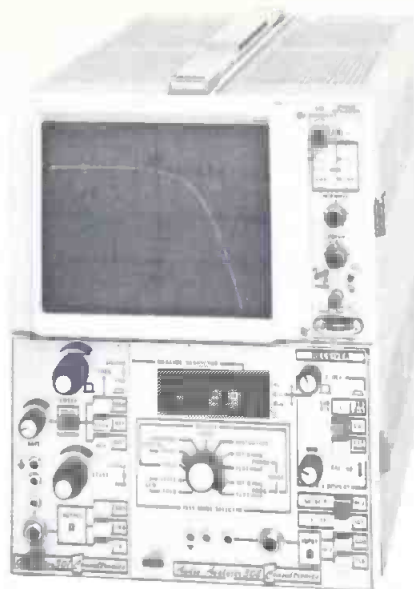
On a personal note to all readers of our column, the ASTVC, members and staff, wish all of you a wonderful holiday season and a healthy, happy and prosperous New Year! □

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Disc capacitor

Sprague Electric—Engineering bulletins 6101E and 6102C contain information on the revised line of standard disc capacitors. 6101E covers general applications, semi-stable and temperature-stable dielectric formulations, while 6102C includes listings in the temperature-compensating bodies.

Circle (64) on Reply Card

Guideline tips

Westinghouse—SCR guidelines for high temperature units are featured in Tech Tips 1-8. Designed for operation at junction temperatures above 125 C, the units are particularly useful for ac motor starting, dc motor control, ac controlled rectification and welding applications. The brochure discusses advantages of high temperature SCRs including improved system reliability, reduced cooling requirements and simplified designs.

Circle (65) on Reply Card

Modular power supplies

Sorensen—An 88-page catalog describes the company's full line of modular power supplies, power

assemblies and power instruments. The catalog provides information on features, operating specifications and dimensions for each power supply.

Circle (66) on Reply Card

Data conversion modules

Datal Systems—A 144-page catalog is available on data conversion modules and accessory circuits. The product areas include state-of-the-art devices, analog multiplexers, sample-holds, fast op amps, instrumentation amplifiers, V/F converters to data acquisition systems.

Circle (67) on Reply Card

Political guide

National Association of Broadcasters—The NAB has published a booklet to familiarize political candidates with federal regulations governing political broadcast advertising. A *Candidate's Guide to the Law of Political Broadcasting*, by Erwin Krasnow and John Quale, summarizes the laws and regulations concerning equal opportunities, reasonable access, rates that may be charged to candidates for broadcast time, the

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The Salvation Army believes that a stable, harmonious family life is the cement of society. It operates community centers for family worship, recreation, and social activities. And, offers practical programs — based on love of God and man — to help troubled family members.

Computer accessories

Minicomputer Accessories—A 48-page catalog has been tailored to the needs of Texas Instruments minicomputer users. The company assures the compatibility of all products with TI equipment and that every product is stringently tested and field-proven for optimum performance.

Circle (68) on Reply Card

Basic sensitive switches

Electronic Industries Association—Entitled Basic Sensitive Switches, RS-437-1 was written by the engineering department to promote interchangeability of basic sensitive switches, and to eliminate misunderstandings or confusion between manufacturers and buyers with respect to product performance values.

Circle (69) on Reply Card

Fairness Doctrine as it applies to political campaigns, the personal attack and political editorializing rules and the rules on sponsorship identification, logging of broadcasts and records which stations must maintain.

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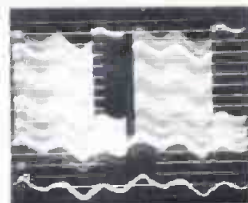
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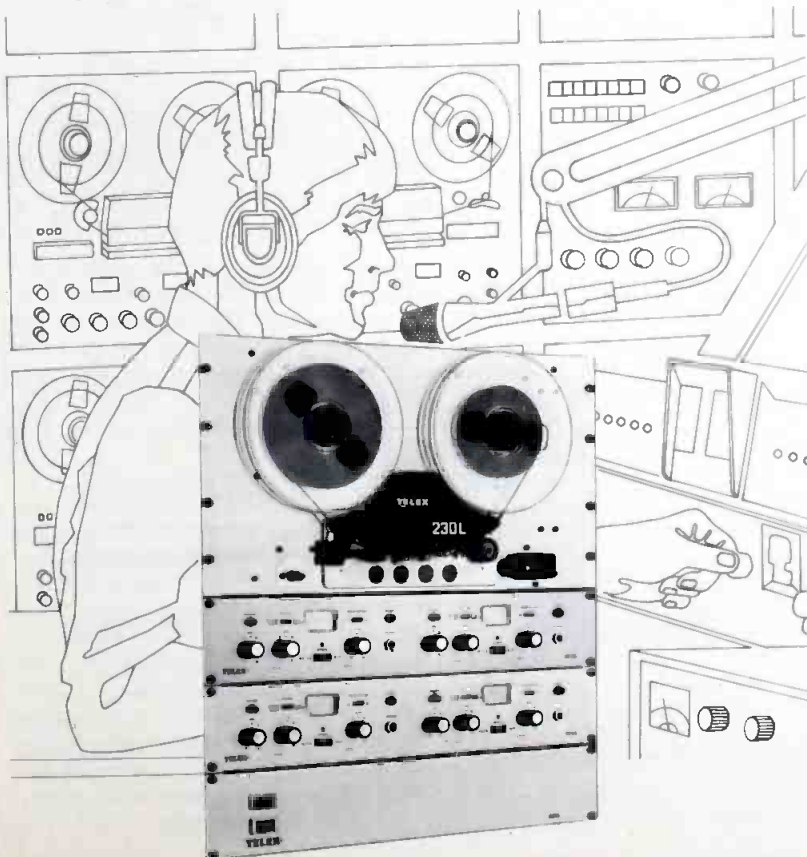


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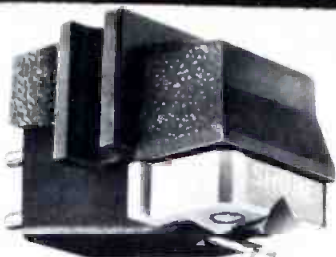


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December 1978 *Broadcast Engineering* 87



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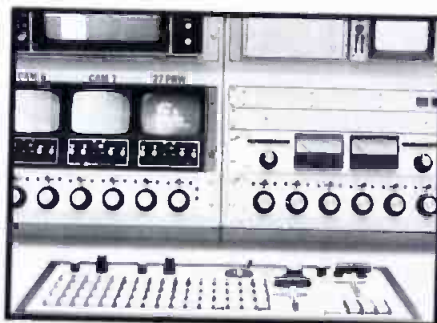
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Circle (55) on Reply Card

new products

Audio mixing system

An audio mixing system that can be controlled by video switchers has been introduced by Hallikainen and Friends.



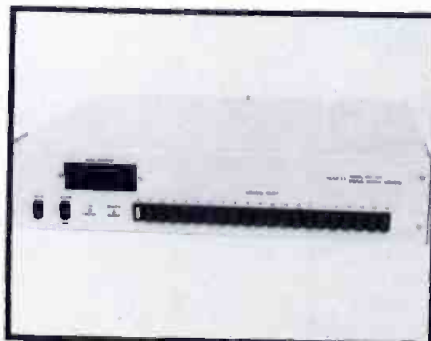
The Television Audio System, TVA series, is a modular approach to console design. The TVA 142 mixer module has six inputs. Each of these inputs may be either mic or line level. In the AFV mode, the video switcher activates a noiseless control sending audio to program or audition or both. A cue channel also is provided.

All outputs are line level for stand-alone mixer operation. Light-emitting diodes indicate the status of each channel and a manual override is easily accomplished with a lever switch above each channel gain control.

Circle (71) on Reply Card

Remote control system

The Marti RMC-20 is a solid-state digital remote control and telemetry system. It is designed to control and meter a remote transmitter from a control point, utilizing one or more available communications circuits.



The system consists of a RMC-20S digital remote control unit, a

RMC-20T digital remote unit, and a RY-5TM master relay control panel. This basic 5-channel system provides five raise commands, five lower commands and five metering channels.

Circle (72) on Reply Card

Frequency counter

Leader Instruments Corporation has introduced a 250 MHz general purpose frequency counter featuring an 8-digit fluorescent display.

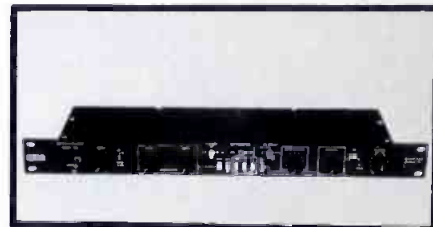
The model LDC-823 offers 20 mV sensitivity, pushbutton attenuation control and selectable 50 Ω or 1 m Ω input impedance.

Frequency measurements can be made with 0.1-, 1- or 10-second gate times from 10 Hz to 250 MHz. Period measurements from 1 mS to 100 mS can be made with resolutions of 0.1, 1 or 10 mS.

Circle (73) on Reply Card

Flanger

MicMix Audio Products has incorporated additional features into its Dynaflanger models.



One improvement now permits the control voltage (CV) tracking-reversal feature to be utilized in all modes. This feature allows an increase in control voltage to cause either a higher or a lower fundamental flanging frequency in the output.

Another feature is the addition of a front panel switch that allows the unit to operate in either the normal flange mode, the direct mode or the delay-only mode.

Circle (74) on Reply Card

TV tuning system

Fairchild Camera and Instrument Corporation announced a monolithic phase-locked loop tuning circuit designed for microprocessor-controlled AM/FM radios and TV

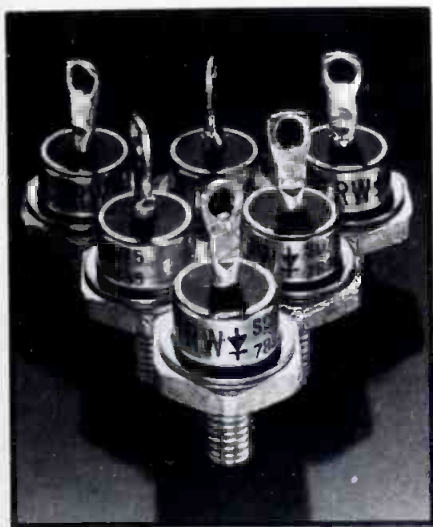
receivers as well as other communications systems.

The FEX2500 operates directly from 100 kHz to 4 MHz, and will operate up to 1 GHz with the addition of an ECL prescaler. The system provides fine tuning increments of 1 kHz for the AM band, 25 kHz for FM, and 57 kHz for the TV band.

Circle (75) on Reply Card

Diode for power supplies

TRW Power Semiconductors has introduced a 75 Amp. Schottky diode. Designed for operation at 150 C, it is made for high-power switching and linear power supplies.



The rectifier, designated SD-75, features a forward-voltage drop of less than 700mV at 75 Amps and a PRV rating of 45V. Its thermal impedance (0.8 C/W) allows the device to be operated at full rated load with a junction temperature of 150 C.

Circle (76) on Reply Card

Instrument enclosures

The Optima Division of Scientific Atlanta has expanded the Optima 17 enclosures line to accommodate the special needs of micro-processor and minicomputer-based instruments.

The line, with a depth of 22 inches, is a combination cabinet and chassis in one integrated unit, with the finished product enclosed in an

accessible instrument enclosure. They are available in standard lead time.

Circle (77) on Reply Card

Videocassettes

The AV Product Group of Maxell Corporation of America has announced a 3/4-inch videocassette.



Utilizing an Epitaxial-type magnetic oxide, a ferric-oxide particle combines with a cobalt particle in a single crystal for color balance and consistency.

Circle (78) on Reply Card

Electronic graphics system

Chyron Telesystems announced the latest of computer graphics systems, Chyron IV. Standard features include see-through characters, six font loading positions, multiple roll and crawl speeds, adjustable video window during roll, mini-computer programming and automatic centering.

Sixty-four colors are provided by the system in an electronic color-grid arrangement. Background colors can range in size from full screen height to as small as 4 TV lines. Colors may also be loaded into memory from Vididisc storage.

Circle (79) on Reply Card

Headsets

Setcom Corporation introduced a line of communication headsets for TV production. A self-contained amplifier uses a small portion of available microphone power to in-

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Circle (58) on Reply Card

New products

crease the output level of the speakers. Integrated with these features are preamplified microphones. The electronic circuitry of the amplifier permits use of many additional headsets in systems normally equipped to drive 15-20 conventional units.

Circle (80) on Reply Card

Fiber modules

A line of optical fiber audio/video modules has been introduced by the Electro-Optical Products Division of International Telephone and Telegraph Corporation.



These modules are recommended for wherever long-distance industrial-quality video transmission is required. One baseband video channel (10 Hz to 4.5 MHz) and two audio channels, frequency-multiplexed on subcarriers of 6.0 MHz and 8.5 MHz, can be transmitted over a single optical fiber.

Circle (81) on Reply Card

Hand tool

AMP Special Industries' coax economy stamped hand tool line has been expanded to include Belden 8281 cable, a 75-ohm video cable.

Designed to crimp UHF and BNC connectors on the Belden 8281 cable, the tool features a guide on the body for strip dimensions in all coax series.

Circle (82) on Reply Card

Image flipping lens

Buhl Optical has introduced image flipping lens designed for study carrel use.

The 3-inch, f:2.5 lens solves the problems created with a two-mirror rear projection system requiring slide orientation to be upside down and backwards.

Standard 35mm slides (horizontal only) can be loaded as for normal front projection, and still be used in a study carrel. The internal dove-type prism both inverts and reverts the projected image.

Circle (83) on Reply Card

Crystal oscillator

Wavetek Indiana introduces model 2102, a 5 MHz crystal oscillator.

It has an accuracy of 0.05 ppm after one hour warm-up. Each of its two RF outputs will drive one 50-ohm load or up to five TTL devices.

Applications include locking and calibrating signal generators and counters to a common reference frequency and as a calibration source for standard labs.

Circle (84) on Reply Card

Modular video camera

A lightweight modular video camera, designed for use with all existing videotape and videocassette systems now on the market, has been introduced by Akai America.

Model VC-8300 is a high resolution monochrome video camera that is compatible with both Beta and VHS formats as well as Akai's VT-300 and VT-350 portable videocassette systems.



The basic camera includes a 16mm lens, attached to the unit by a universal C-mount.

Other features include automatic light control to allow use of the camera in a variety of lighting conditions and a built-in record warning light to prevent operator error.

Circle (85) on Reply Card

RESISTIVE PAD MANUAL

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Continental Electronics

Circle (94) on Reply Card

Phase filter

Symetrix announced the phase filter, a studio quality signal processing device for recording or live performances.

The phasing effects created by the unit are the result of frequency spectrum notching. Eight 90-degree phase delays in the signal path create four notches related by constant frequency bandwidths.

The controls include an input level control with LED overload indicator, two variable low frequency oscillators (LFOs) with LED rate indicators, a manual/auto sweep selector switch for LFO 2, a blend control, and depth and resonance controls.

Circle (86) on Reply Card

Computer systems

Hewlett-Packard offers two computer systems which employ proprietary silicon-on-sapphire technology.

The standard HP 300 system includes an easy-to-use language, (either HP Business Basic or RPG II), a CRT display terminal with a typewriter-like keyboard, a built-in 1-million character flexible disc drive and a 12-million-character fixed disc.

The Series 33 basic configuration includes 20 megabytes of cartridge disc storage, a double-sized flexible disc with one megabyte capacity and a microprocessor-based console.

Circle (87) on Reply Card

Prom

A field programmable read only memory (PROM) that uses approximately 60% less power supply current than the high speed version is available from Signetics.

Access time for the commercial 8192-bit bipolar memory is 175 nanoseconds maximum. A military version is also available.

Maximum access time for the commercial part is 175 nanoseconds, and 225 nanoseconds for the military component. Input loading for the commercial part is 100 microamps maximum, and for the military device, 150 microamps.

Circle (88) on Reply Card

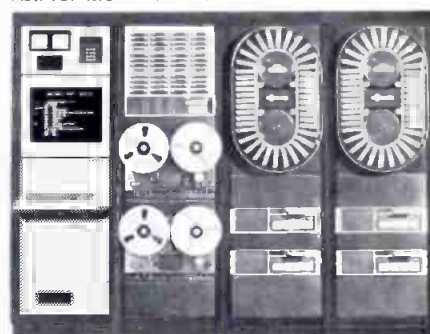
Alphanumeric printer

A miniature, panel-mounting alphanumeric printer using quiet, non-impact thermal printing has been introduced by Datel Systems.

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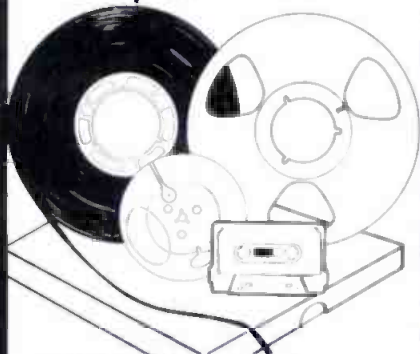
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New products

The APP-20 prints the full AD ASCII character set of upper and lower case letters, numerals, punctuation, etc. in 20 columns across 2 1/4-inch wide thermal paper.

A dual-voltage transformer offers switch-selected input power of 115 or 230 VAC $\pm 10\%$ at approximately 25 watts max. AC power frequency range is 47 to 440 Hz.

Circle (89) on Reply Card

Power system

Nova Electric Manufacturing Company has announced the 20KVA UPS (Uninterruptible Power System). The system features an efficiency in excess of 83% and an inverter with an efficiency of 90%.

Frequency and phase synchronization are standard features and a one-quarter cycle solid state transfer switch is available.



Some typical applications are in the areas of computer backup, process control, emergency lighting and communications.

Circle (90) on Reply Card

Communicating terminal

Electrolabs' ESAT 200B is a full feature, dual font, split-speed communicating terminal on a single board.

The unit features user alterable EPROMS to contain two fonts of up to 128 characters each. It also features split speed serial data transmission and reception, RS232C, 20 mA loop and TTL interface levels.

Other features include addressable, non-destructive cursor, page

transmit and 15 watts power consumption.

Circle (91) on Reply Card

Acquisition system

The Digitec Datalogger 3000 from United Systems is a data acquisition system with a built-in CRT display which prompts the user in programming.



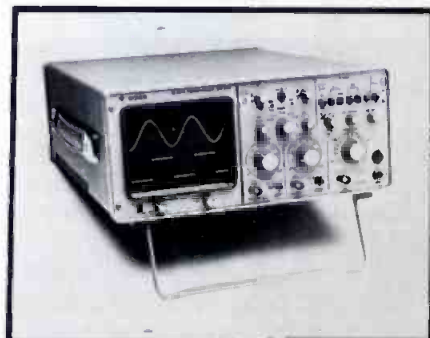
A mini-cassette loads the system program, provides memory back-up and records data. Serial input/output (RS-232-C and 20 mA current loop) permits direct control of the unit from a remote CRT, teletype or host computer.

Circle (92) on Reply Card

Oscilloscope

A compact, portable, 15 MHz dual-trace/X-Y oscilloscope, the OS255, has been added to the line of conventional and digital storage oscilloscopes offered by Gould.

The unit uses an 8x10 cm rectangular CRT to present clear single-trace, dual-trace or X-Y displays of signals within its frequency range.



Specifications include DC-15 MHz bandwidth, 2 mV/cm vertical sensitivity over the full bandwidth, and timebase speeds to 500 ns/cm.

Circle (93) on Reply Card

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WANTED: One 6 KW or less television transmitter. In good condition, tuned Ch. 3. XEFP TV3, Box 1875, Monterrey, N.L. Mexico. 12-78-11

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

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EQUIPMENT FOR SALE (CONT.)

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STUDIO MAINTENANCE ENGINEER with First Class FCC License. Three years minimum broadcast experience including digital technology. Send resume to Jim Doyas, KTVK-TV, P.O. Box 5068, Phoenix, AZ 85010, (602) 266-5691. 12-78-11

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KATV, LITTLE ROCK, ARKANSAS is accepting applications for an experienced FCC first class licensed TV studio maintenance and operating technicians. Call Ralph Smith or Rudy Garrett at (501) 372-7777 or send resume to KATV, P.O. Box 77, Little Rock, Arkansas 72203. Equal Opportunity Employer. 12-78-11

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HELP WANTED (CONT.)

ASSISTANT CHIEF ENGINEER: Responsible for operation of studio facilities with TK-46 and TK-28 cameras, ACR-25, AVR-2 and VPR-1 tape machines plus ENG/EFP equipment. Digital experience required. Send resume to: KOLO TV, Box 10,000, Reno, Nev. 89510, (702) 786-8880, E.O.E. 12-78-11

MICROWAVE/MAINTENANCE ENGINEER: Responsible for maintaining microwave and translator sites, assisting with studio and transmitter maintenance. Basic digital knowledge required. Send resume to KOLO-TV, Box 10,000, Reno, Nev. 89510, (702) 786-8880, E.O.E. 12-78-11

MASTER CONTROL OPERATOR: Responsible for set up and operation of all master control equipment for on air use, monitoring and control of remote control transmitter. Send resume to: KOLO-TV, Box 10,000, Reno, Nev. 89510, (702) 786-8880, E.O.E. 12-78-11

TV TECHNICAL HELP WANTED: Experienced Chief Engineer, for independent UHF Family Christian Television in South Florida. RF experience a must. Contact G. Kent Smith, WHFT, P.O. Box TV 45, Miami, Fla. 33169, (305) 962-1700. Equal Opportunity Employer. 12-78-11

KPAS FM 94 RADIO has an opening for a Chief Engineer. The applicant must be knowledgeable in FM audio and transmitter with a minimum of two years experience. Resume and salary requirements should be forwarded to KPAS FM 94 Radio, 3901 North Mesa, El Paso, Texas 79902. 12-78-11

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TV MAINTENANCE SUPERVISOR—Major West Coast Independent—degree preferred, five years TV maintenance or related experience required. Management or supervisory experience required. Send resume to Ray Swenson, Chief Engineer, KTVU, One Jack London Square, Oakland, CA 94607. 12-78-11

MAINTENANCE ENGINEER: WGBH-TV, one of the nation's leading public TV stations and national production agencies, has an opening for a Maintenance Engineer. A minimum of 5 years' experience covering all phases of installation and maintenance of state-of-the-art color TV equipment is required. This would include cameras, video switchers, video tape recorders, and video distribution systems. We offer an excellent benefit package and competitive salary. WGBH-TV is an equal opportunity employer and encourages applications from minority and female engineers. Send complete resume and salary history to WGBH-TV, Personnel Department-BE, 125 Western Ave., Boston, MA 02134. 12-78-11

AGGRESSIVE, GROWING corporation in Central California needs preventive maintenance engineer for AM/FM combo. Need on air experience and must have knowledge of AM & FM Transmitters. Salary commensurate with experience. An Equal Opportunity Employer. Write Dept. 437, Broadcast Engineering, P.O. Box 12901, Overland Park, KS 66212. 12-78-11

WE ARE LOOKING for a Chief Engineer experienced in Audio and FM Engineering and Transmitter and Antenna. Salary range will totally depend on the individual. For further information, please contact Garrett W. Haston, telephone (915) 533-8211, KPAS Radio Station, El Paso, Texas. 12-78-11

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MAINTENANCE AND OPERATIONS ENGINEER—For color production facility in major market. Responsible for maintenance and operation of television studio equipment including three 3/4" VCR's and two VPR-1's. Should have First Class license; one year's experience a definite plus. Salary open, good benefits. Call or write: Craig E. Blohm, Production Supervisor, CRC-TV, 6555 W. College Dr., Palos Heights, IL 60463, (312) 371-8700. 12-78-11

HELP WANTED (CONT.)

TV MAINTENANCE ENGINEER. Central California NBC affiliate needs an engineer with strong background in all areas of commercial TV engineering, especially maintenance and 2" reel-to-reel VTR machines. TCR-100 cartridge tape equipment and E.N.G. experience/knowledge highly desirable. 1st phone required. 40 hour week, annual salary range \$17-19,000 with excellent fringes. Send complete resume, or call Bob Hess, Chief Engineer, KMJ-TV, Channel 24, 1544 Van Ness Avenue, Fresno, California 93779. (209) 268-6666. An Affirmative Action-Equal Opportunity Employer. 11-78-21

HELP WANTED—MAINTENANCE ENGINEERS: Three to five years prior experience in maintaining studio equipment required. Applicants must have expertise in one or more of the following areas: Audio-Video-Microwave-Radar-ENG-Digital-Slant Track and quad VTRs. Station has modern facilities, good wage levels and extensive hardware with challenging activities. Contact: Chief Engineer, KCRG STATIONS, 2nd Avenue at 5th Street, SE, Cedar Rapids, Iowa 52401. (319) 398-8407. **EQUAL OPPORTUNITY EMPLOYER.** 12-78-21

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RCA Service Company has several opportunities for field engineers with at least 3 years experience in the maintenance and repair of RCA television tape and/or color studio equipment. Successful candidates should have a 1st Class RCC Radiotelephone license, plus a strong digital electronics background.

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RCA Service Company
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This position involves supervising the technical and engineering operations involved in the production of video-taped shows, from pre-production meetings through final taping. Requires an individual who is totally knowledgeable in state-of-the-art television techniques, equipment and engineering parameters as determined by the FCC. Prefer individual who possesses a technical degree plus a minimum of 3 years engineering supervision experience. If you have ever had the desire to become part of a winning team, please send resume and salary history to:

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Broadcast Engineering
P.O. Box 12901, Overland Park, KS 66212

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Major National CCTV Co., has openings for Part-Time VTR maintenance engineers. Must have Hands-On experience with 3/4-inch equipment & possess or have access to test equipment. **GOOD PAY & FRINGE BENEFITS!** Also interested in Microwave engineers. All replies held in confidence—Send resume to:

Bob Skidmore
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fact: this condenser microphone sets a new standard of technical excellence. & it sounds superb!

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Shure engineers sought — and found — ingenious new solutions to common

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As the following specifications indicate, the new SM81 offers unprecedented performance capability — making it a new standard in high-quality professional condenser microphones.



SM81 puts it all together!

- WIDE RANGE, 20 Hz to 20 kHz FLAT FREQUENCY RESPONSE.
- PRECISE CARDIOID polar pattern, uniform with frequency and symmetrical about axis, to provide maximum rejection and minimum coloration of off-axis sounds.
- EXCEPTIONALLY LOW (16 dBA) NOISE LEVEL.
- 120 dB DYNAMIC RANGE.
- ULTRA-LOW DISTORTION (right up to the clipping point!) over the entire audio spectrum for a wide range of load impedances. MAXIMUM SPL BEFORE CLIPPING: 135 dB; 145 dB with attenuator.
- WIDE RANGE SIMPLEX POWERING includes DIN 45 596 voltages of 12 and 48 Vdc.
- EXTREMELY LOW RF SUSCEPTIBILITY.
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Outstanding Ruggedness

Conventional condenser microphones have gained the reputation of being high quality, but often at the expense of mechanical and environmental ruggedness. This no longer need be the case. The SM81 transducer and electronics housing is of heavy-wall steel construction, and all internal components are rigidly supported. (Production line SM81's must be capable of withstanding at least six random drops from six feet onto a hardwood floor without significant performance degradation or structural damage.) It is reliable over a temperature range of -20° F to 165° F at relative humidities of 0 to 95%.

Send for a complete brochure on this remarkable new condenser microphone! (AL577)

SM81 Cardioid Condenser Microphone



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