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November, 1974/75 cents

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**TURNTABLE
PREAMPS**



**MIC & LINE
AMPLIFIERS**



AUDIO DISTRIBUTION AMPLIFIERS



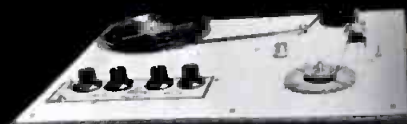
AUDIO CONSOLES & CONTROLLERS



**STUDIO MONITOR
AMPLIFIERS**



**REMOTE POWER
CONTROLLERS**



**AUTOMATIC TAPE CARTRIDGE
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MP-8E Mono \$86 SP-8E Stereo \$137

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Dual function and superb performance. Inputs for mic and line, ± 0.5 db response 10Hz-20KHz, 67db gain on mic channel(s) $+26$ db gain on line inputs. Balanced inputs & outputs, $+21$ dbm out max, 0.1% distortion. Internal power supply.

MLA-1E Mono \$98
MLA-2E Dual Mono/Stereo \$139

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DA-6R/E Rack mount. 1 in/6 out. \$149
DA-6BR/E Rack mount. 1 in/6 out. Individual level controls for each output. \$165
DA-6RS/E Rack mount. 1 in/6 out stereo or 2 in/12 out mono. \$229
DA-16BR/E Rack mount. 1 in/8 out stereo or 2 in/16 out mono. Individual output level controls, selectable metering & headphone monitoring. \$287
DA-2080/E Rack mount main frame with protected

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DA-2080/E Main Frame \$150
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SMA-500/E Rack mount (mono)
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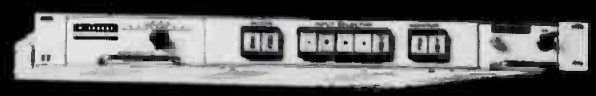
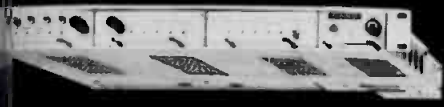
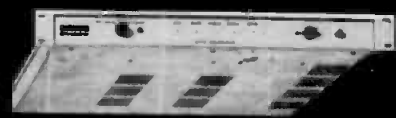
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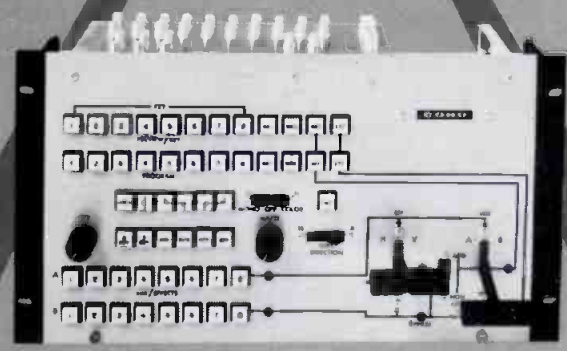
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For More Details Circle (2) on Reply Card

November, 1974

BROADCAST engineering®

The technical journal of the broadcast-communications industry

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About the Cover

The cover photo was taken at EXPO '74. It's the KREM LEM on the job. The story, KREM's unique coverage, begins on page 24. Photo courtesy of KREM-TV and Warren Pritchard.

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DIRECT CURRENT FROM D. C.

November, 1974

by Howard T. Head

Revisions of Part 74

As reported in last month's D.C., the Commission is proposing a complete revision of Part 74 of its Rules. These are the Rules which govern the broadcast auxiliary services, including remote pickup and ST stations. We'll summarize the more important changes for you:

...under the proposal, a single license would be issued for each remote pickup system specifying the maximum permitted number of mobile transmitters rather than a separate license for each transmitter as is now required.

...the use of type-accepted equipment would be required for all stations in this service. Under a "grandfathering" provision, licensees would be permitted to continue to use existing equipment, and a year "grace" period after the adoption of the new Rules would be provided during which non-type-accepted equipment could be specified. Type-accepted equipment would be required to include automatic modulation limiters. No application would be required when changing from one model of equipment to another so long as the new equipment is type accepted.

...Channels in the 450 MHz band would be split from the present channel width of 100 kHz to 50 kHz. Ten of these 50 kHz channels would be set aside for exclusive program use. Two of the 50 kHz channels would be further split into 10 kHz channels and set aside for non-program use. Tighter frequency tolerances would be specified to accommodate the channel splitting.

...maximum power limits of 100 Watts for ground stations and 15 Watts for airborne stations would be established. The higher powers would be authorized only on a showing for the need for additional power.

...logging requirements would be greatly eased from the present system which requires logs on each transmission to be maintained at both the base and mobile stations. Under the proposed new procedure which is essentially the same as that now in use by land mobile licensees, a single log would be maintained for the entire system at the base station with only a single entry required for each series of transmissions.

There are also a host of minor changes which may affect individual licensees in specific circumstances. We would like to urge all readers who use equipment of this type to obtain and read a copy of the Commission's proposal since the Commission is interested in everyone's comments. To get a copy, write the Commission at Federal Communications Commission, Washington, D.C. 20554, and ask for a copy of the Notice of Proposed Rule Making in Docket No. 20189.

(Continued on page 6)

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Instead of offering the familiar comparison of our equipment **versus** others' in this space, in all fairness we can only list some features of ours and let you try to find an equal... we cannot.

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Maker?

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Sparta
AC155B/
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Any
Other
Maker?

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For More Details Circle (3) on Reply Card

GAO Reports on Radio Spectrum Management

The United States General Accounting Office (GAO) has reported to the FCC and the White House Office of Telecommunications Policy (OTP) on the management and use of the radio frequency spectrum. The GAO is an arm of Congress charged with maintaining oversight of essentially all activities of the Federal Government.

The GAO report finds that over \$90,000,000,000 has been invested in the U.S. in electronic equipment which requires the use of the radio spectrum. Slightly more than half of this sum reflects equipment used by the Federal Government, with the remainder being used by private industry and by state and local governments.

Although the report refrains from making specific recommendations, it concludes that the rapidly increasing demand for additional uses of the spectrum is outstripping the ability of technology to provide additional spectrum space. The report finds indications that the practical limits of the usable spectrum are being reached. The result is intense congestion in some parts of the spectrum, although some parts are still lightly used. One suggested avenue of relief is making more extensive use of techniques which do not require the use of the spectrum.

The report notes the heavy demands of television broadcasting on spectrum use, and suggests the possibility of reducing the bandwidth of television broadcast channels from 6 MHz to 3MHz. It notes, however, that this would require complete replacement of the more than 100,000,000 television receivers now in use which, according to the report, represent a public investment in excess of \$16,000,000,000.

Short Circuits

The ATS-6 direct broadcasting satellite is now transmitting successfully from its position over the Galapagos Islands to specially equipped receiving locations in the Rocky Mountain area, Alaska, and the U.S. East Coast...Federal budget cuts are delaying the start of a second Spectrum Management Center in the San Francisco area; the first center, in Chicago, is now in successful operation...The microwave rules have been amended to permit digital modulation techniques at frequencies above 15 GHz...The Commission has instituted an inquiry into the use of low-power wireless microphones sharing frequencies with VHF television channels 7 through 13.

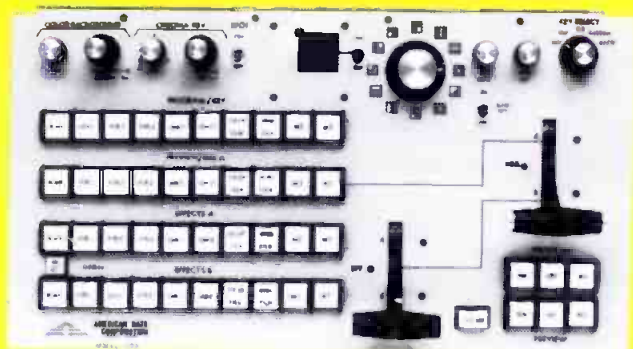
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The **MAXI** features 16 inputs and the **mini** has 10. All inputs may be composite or non-composite. Four buses are standard but when combined with an "OBQS" (one bus quad split) the capabilities of an 8 bus system is attained. The keyer is down-stream to enable effects enabling wipes (or Quads) to be done behind ALL keys including chroma keys. Other STANDARD features are; a program channel processing amplifier, an internal blackburst-color matte generator, a 12 pattern programmable special effects generator, a positioner and a spotlight, a cutbar, program and preview output switching, "split handles" for mix and effects, a 3-input keyer with a rate adjustable "blink" feature. All this plus more, much, much more! Ask any one of over 50 satisfied users of the ADC 556.

OPTIONS?

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For More Details Circle (4) on Reply Card

New Identity Needed for Radio

"Radio must develop its own identity, unique and totally separate from other forms of communication." This conclusion was reached after a four-hour, free-wheeling discussion by the Radio Information Office Committee of

the National Association of Broadcasters.

The committee, chaired by Robert Hilker, president, Suburban Radio Group, Belmont, N.C., praised the recent efforts of NAB on behalf of the entire radio industry, and termed the progress to date a "giant step forward". Among these efforts the committee specifically noted: the resounding defeat of Section 114 of the copyright bill;

the progress of AM-FM all-channel legislation; the progress of the license renewal bill, especially the efforts for a 5-year term; radio re-regulation achievements with the FCC; the positive crosspollination that has resulted from the visits of FCC personnel to radio stations and broadcasters to the FCC; work with the Federal Highway Administration to allow radio frequency information signs on highways and specifically, the successful effort to have FM frequencies included on these signs; and the RIO newsletters designed especially for radio broadcasters.

"These examples provide ample evidence that NAB does not regard radio as an electronic stepchild," the committee said.

The committee pointed out that local radio has a distinct and separate identity in every city in America, and this type of identity must be achieved on the national level as well.

"The problem is that the individual station spends time and effort promoting itself, but little time recognizing the total effectiveness of the radio industry. The result is a strong local identity, but little national identity. This is the job that needs to be done."

A number of specific recommendations were made by the committee. The Radio Information Office is to begin developing immediately a series of announcements which will be sent monthly to every member radio station. The announcements will be promotional in nature and will cover everything from the number of dollars spent yearly on transistor radio batteries (93 million) to the number of people who start their day with radio (57 percent).

A campaign is being developed which will allow all NAB radio stations to unite in supporting a single effort, and will amply demonstrate the effectiveness of radio ability to reach every American and will signal the beginning of the establishment of a unique and separate identity.

The committee also applauded the programming of this year's FCC Conferences and urged every radio broadcaster to attend. They were equally enthusiastic about plans for radio's participation in the 1978 Convention.

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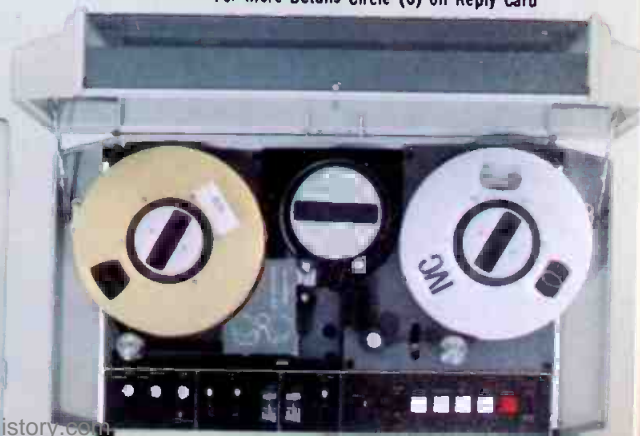
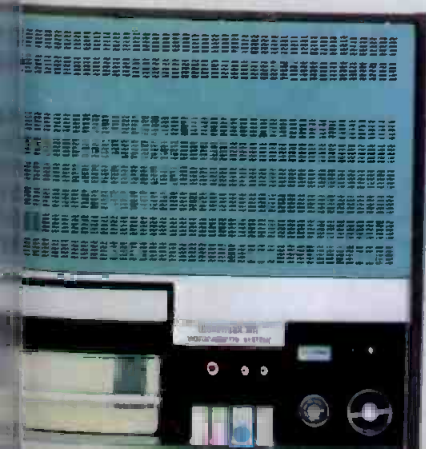
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 For More Details Circle (6) on Reply Card



NAB Conferences Take New Look At Industry

The 1974 Fall Conferences of the National Association of Broadcasters will have a brand new look this year. The six day-and-a-half meetings are designed to stimulate more **management** involvement and special sessions are scheduled to provide vital and useable information for radio and television **program directors, sales managers and chief engineers.**

In addition, the evening before each conference an informal and informative get-together will provide broadcasters an opportunity to ask questions of experts from the Radio Advertising Bureau, the Federal Communications Commission, Chuck Blore Creative Services, broadcast equipment manufacturers and top NAB personnel involved in legal, regulatory, management, public relations and engineering activities.

Here's the agenda:

- An FCC Commissioner will discuss Commission activities and then open the session for questions.

- A representative from Chuck Blore Creative Services will show radio broadcasters how imaginative and effective spots can be made at their stations. He'll demonstrate how creative thinking and production techniques can be combined to create highly effective commercials. Everyone at the meeting will be involved in producing, from scratch, a local audio spot.

- A day-long Engineering Conference will cover basic problems such as interconnection of program facilities...the future of quadra-sonic...advancements in audio/video switching techniques...FCC rules and regulations...tuning and maintaining transmitters...principles of microphone utilization.

- Representatives of the National Association of Television Program Executives will discuss new ideas in such areas as counter-programming and programs for children.

Management And Legal Affairs

There also will be three concurrent workshops on sales, management and legal affairs and television. The lineup:

Sales—Carleton Loucks, service president, Radio Advertising Bureau will show broadcasters how to increase January and February incomes by ten percent.

Management and Legal—A five-wheeling discussion to bring broadcasters up to date on current problems in both legal and management fields.

Television—Roy Danish, director, Television Information Office will give an NAB/TIO slide presentation on industry self-regulation, children's programs and commercials.

Broadcast experts will zero in on the status and prospects of direct-to-home TV via satellites and working by satellites. George Bartlett, NAB vice president in engineering will participate at the meeting. Other participants will include: A. James Ebel, president, KOA-TV, Lincoln, Neb., chairman, NBC Affiliates Satellite Committee (Denver, New York and Chicago); K. Jay Yager, general manager, WDSB-TV, New Orleans, La., chairman, NBC Affiliates Satellite Committee (Atlanta and Dallas); Jay E. Cramer, general manager, KRDO-TV, Colorado Springs, Colo., chairman, ABC Affiliates Committee (Denver and Las Vegas).

Other conference sessions will include:

- Luncheon speaker at the meeting will be Dr. Herb True, internationally-acclaimed research psychologist, humorist, consultant and lecturer.

- Broadcasters will join NAB President Vincent T. Wasilewski and his staff at the conference for an informal look at the area of concern the staff encounters in the proposed solutions.

- A quiz on the problems facing broadcasters with a lively discussion of the answers by President Wasilewski and the NAB staff.

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For More Details Circle (55) on Reply Card

Pay TV Special Committee

Six members of the National Association of Broadcasters' Special Committee on Pay Television will discuss at NAB's Fall Conference the dangers of pay cable systems and phoning programs from free TV stations.

The participants and the conference cities are:

Robert I. Elliott, special assistant to the president, CBS (New York, Oct. 22-23); Wilson C. Wearn, president, Multimedia Broadcasting (Atlanta, Oct. 28-29); George Johns, vice president, WZZM-TV, Grand Rapids, Mich. (Chicago, Oct. 31); Willard E. Walbridge, senior vice president in charge of corporate affairs, Capital Cities Communications (Dallas, Nov. 14-15); Dale G. Moore, president, Western Broadcasting, Missoula, Mont. (Denver, Nov. 18-19); Richard Capin, president, Stuart Broadcasting, Lincoln, Nebr. (Las Vegas, Nov. 20-21).

New Sales Office

Colane Sales Corporation of 1044 Southern Boulevard, Roslyn N.Y. 11566 has recently established a N.A. sales office for the purpose of marketing TV Translating equipments to the Broadcasting industry. Colane is presently establishing representatives in order to obtain full market coverage. Colane supplies complete TV Translator Systems, as well as low power TV transmitters for educational or low budget applications.

MCA And Philips Reach Agreement

V. Philips, Eindhoven, The Netherlands, and MCA Inc., Los Angeles, have reached a long-term agreement for the sale in the consumer market of a Philips/MCA optical video disc player and compatible discs. Each company has an optical system in active

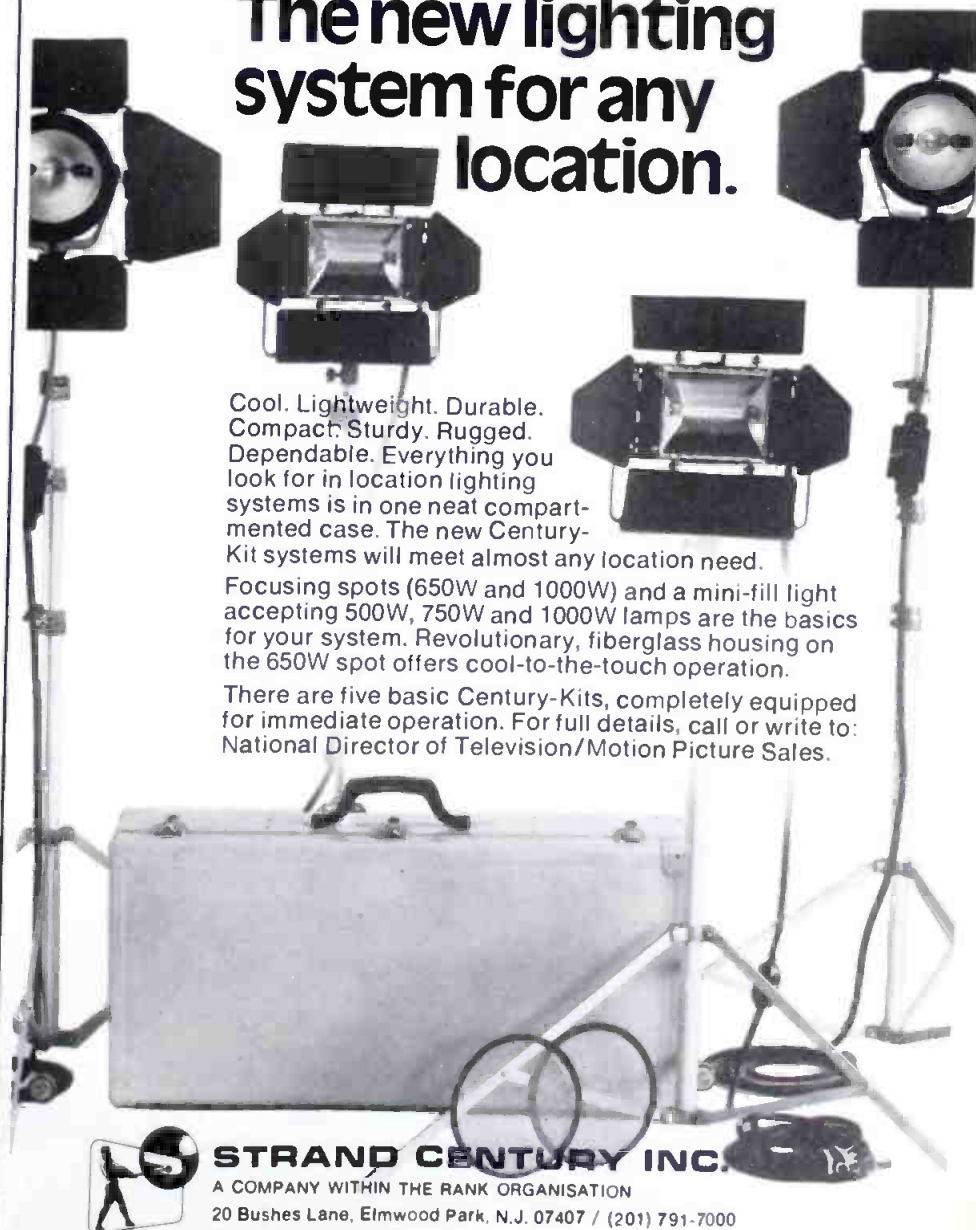
development for a number of years.

The companies will establish a licensing organization to negotiate with others for patents relating to the Philips/MCA video player under a liberal licensing policy enabling the entire industry to participate in the video player technologies of both companies.

The Philips/MCA video disc player will be manufactured and marketed by Philips through its worldwide marketing and distribution network and concurrently

MCA will manufacture and market video disc programs. MCA has a wide spectrum of entertainment and other material, including the vast Universal Pictures film library, one of the world's largest — and expects to produce a variety of new programming especially tailored to the unique characteristics of the optical video disc. It is expected that other suppliers of programming will also make their library material available.

CENTURY-KIT. The new lighting system for any location.



Cool. Lightweight. Durable. Compact. Sturdy. Rugged. Dependable. Everything you look for in location lighting systems is in one neat compartmented case. The new Century-Kit systems will meet almost any location need.

Focusing spots (650W and 1000W) and a mini-fill light accepting 500W, 750W and 1000W lamps are the basics for your system. Revolutionary, fiberglass housing on the 650W spot offers cool-to-the-touch operation.

There are five basic Century-Kits, completely equipped for immediate operation. For full details, call or write to: National Director of Television/Motion Picture Sales.



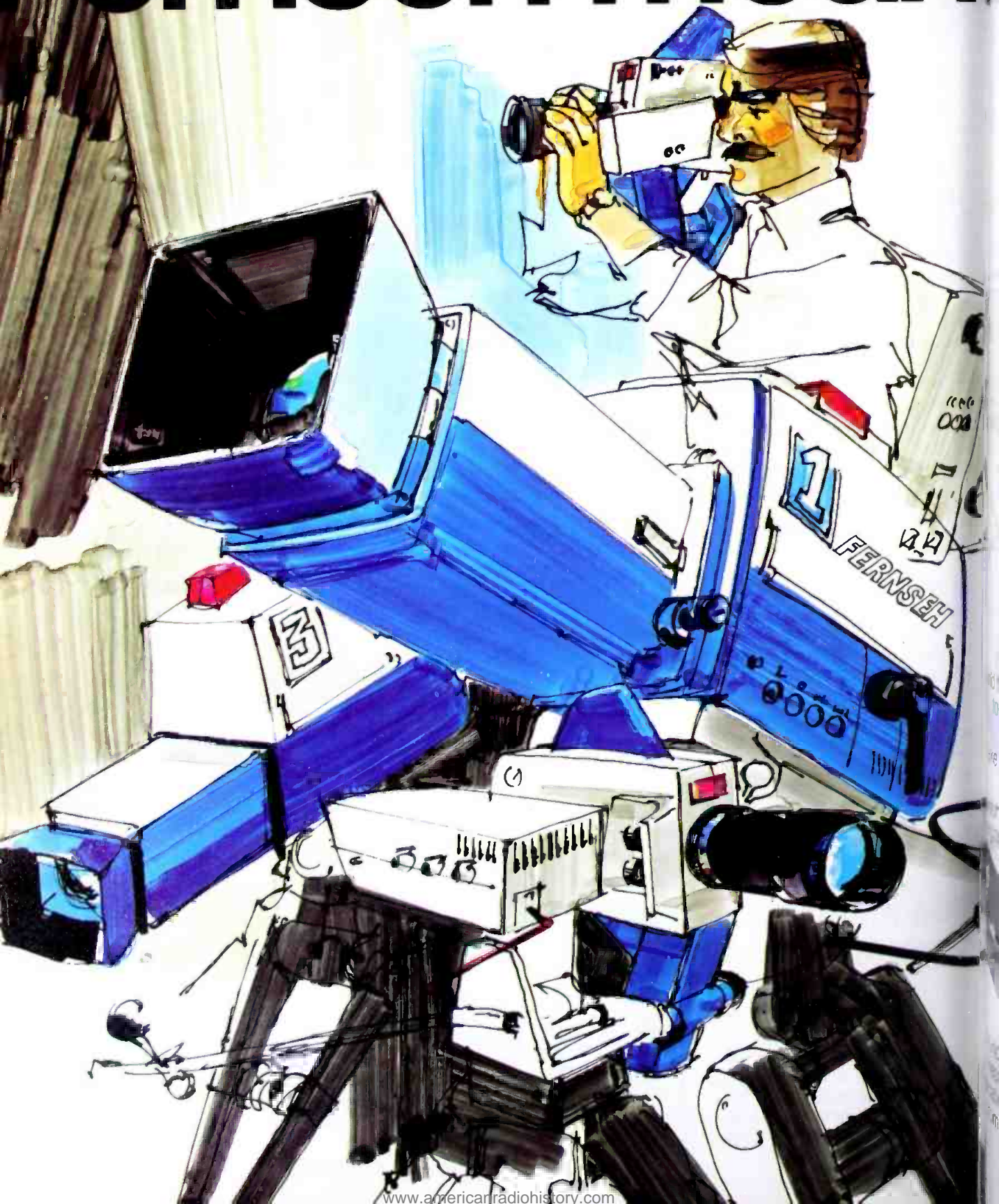
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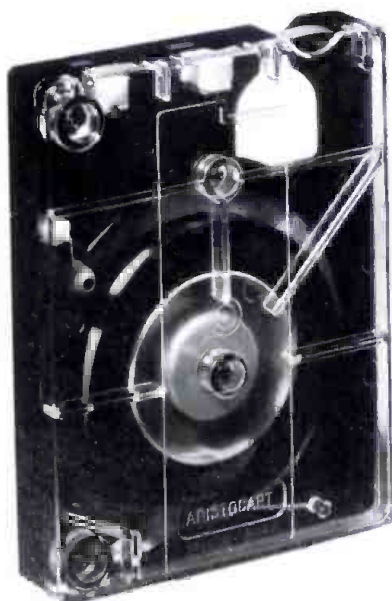
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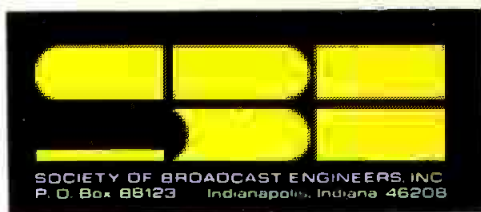
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SOCIETY OF BROADCAST ENGINEERS, INC.
P. O. Box 88123 Indianapolis, Indiana 46208

Morgan Moves Up At Susquehanna

Charles Morgan, Assistant Director of Engineering for the Susquehanna Broadcasting Corporation, Chief Engineer of WARM, a 5000-Watt, 24-hour station serving the Scranton/Wilkes-Barre, Pa. area, has been promoted by the corporation to the position of Director of Engineering, Radio Division. He is now located at the corporate headquarters at 140 East Market St., York, Pa. 17401, telephone (717) 845-5626. Morgan will direct the engineering of the company's radio stations.

SBE Fellows

In the short, the 10 year history of the Society of Broadcast Engineers, Inc., a number of members have been advanced to the grade of Fellow. The Fellow grade is conferred on those who have rendered conspicuous service or who have given signal service to the Society. A member cannot apply for the Fellow grade but must be nominated by other members and be approved by the SBE Board of Directors.

In each of the next several issues of **Broadcast Engineering**, as in previous issues, with the cooperation of the publisher, the qualifications and experience of one of the SBE Fellows will be presented. In this issue, we have selected Harold

E. Ennes, who is widely known as an author of technical and engineering publications in the broadcast field.



Harold E. Ennes first became interested in radio and electronics in Physics classes in Shortridge High School, Indianapolis, Indiana, where he graduated in 1929. After graduation he went to work for a local department store installing radios and antennas. He soon enrolled in the First National Television School in Kansas City and earned his 1st Class FCC Radio-Telephone license. This led him to a position on the technical staff of WKBF (now WIRE) in Indianapolis, in December 1936. He instructed in Radio-TV at Jordan

(Continued on page 17)

SPORTS Commentator Headset

Dynamic Boom Microphone; 400 OHMS, frequency range 50-15,000 Hz, sensitivity 2mV (loaded) for close speech.

Double Headphones; independently wired, 200 OHMS each, frequency range 50-15,000 Hz.

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THE ORIGINAL 1¼ INCH PLUMBICON*
THAT WAS IN THE CAMERA
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TEN YEARS AGO...**



**THIS IS THE 2/3 INCH VERSION
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IT WILL CHANGE THE ENTIRE COURSE
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(Continued from page 14)

College of Butler University and installed WAJC-FM at that school. Ennes joined Dage Television in 1954 as coordinator of color development and in preparation of instruction manuals for television equipment. He assisted in the installation of WTAE-TV, Pittsburgh in 1958 where he became maintenance supervisor and then assistant chief engineer for maintenance in 1972. He continued part-time technical writing and experimental electronics after his retirement in October, 1973.

Harold Ennes' first article was published in a trade magazine and was entitled "Space Charge Frequency Modulation". The article was the result of an experiment in obtaining FM by amplitude-modulating the suppressor grid of an electron-coupled oscillator. Ennes says, "I suppose my first interest in writing was...in 1936, when I realized a great deal needed to be written for the new guy on his first job. I found that the best way to educate myself was to "pretend" I had to instruct another newcomer in the field. Writing down all the problems and their varied solutions helped me, hence (I figured), would help others".

His first textbook was "Broadcast Operators Handbook" in 1947 and then in 1953 "Principles and Practices of Telecasting". Since then, there have been ten broadcast textbooks, six of which are new and current publications. The publisher of Ennes' books is the Howard W. Sams and Co., Inc., Indianapolis. Harold has always had the interest of the reader or student at the forefront. To quote him: "I have thoroughly enjoyed the many new contacts I have made as a result of such tutorial endeavors. In the highly specialized field of broadcasting, as in all technical fields, continuing education is not incidental to the job, but a necessary part of it. I feel highly honored if I have inspired just some of my readers to that same conviction. There is the old riddle: 'do I really inspire others to study, or do they study because they already realize the necessity'? I am glad to have filled in either way."

(Continued on page 61)

If broadcast journalism is distinguished primarily by its immediacy," why should your viewers have to wait until color film is processed before they see your news telecasts? Until now, they've had to wait because there was no TV camera tube made that was small enough for a really portable color camera capable of producing broadcast quality pictures in broadcast quality color. The new 2/3-inch Plumbicon camera tube is now available for a new generation of portable, hand-held color cameras which will provide the same startlingly realistic color and dynamic resolution that revolutionized color broadcasting ten years ago when its big brother was originally produced. With the 2/3-inch Plumbicon tube you'll get quality, and you'll get it without the delay and logistical complications of film.

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NAEB's president William G. Harley hopes the NAEB is on track with its new approach. Five years ago the convention was called the "little NAB". In fact, it rivaled the NAB in attendance and exhibitor numbers.



NAEB returns to Las Vegas

Going to Las Vegas could be a gamble. It's not the kind of convention location you'd pick for maximum attendance. But NAEB is betting its new organizational and convention approach will regain interest and exhibitors.

Communications engineers, anxious to know more about the latest in techniques and technology in their related field, will find a wide range of sessions and demonstrations waiting for them at the NAEB 50th Anniversary Convention in Las Vegas November 17-20, from satellites and vertical interval reference techniques, to new equipment, time compression transmission, and the need for better university curricula for communications engineering.

"The engineering program at the NAEB conventions has been getting bigger and better for the past 3 years," states F. Lee Morris of the

Mississippi Authority for ETV, who has been planning the upcoming program, "and this year promises to be the best ever for the large number of engineers, consultants and government officials who will be present."

A complete satellite technology demonstration, coupled with a general overview of applicable satellite technology presented by Philip A. Rubin, director of Engineering and Research for the Corporation for Public Broadcasting, will highlight the first day of the convention. Applications Technology Satellite 6, man's first widespread use of a satellite-based telecommunications system for educational purposes, will be the project examined. The ATS 6 is presently being used in Alaska, Appalachia, and the Rocky Mountain area, and there are plans for its use in India on a country-wide experimental basis. The Rocky Mountain Satellite Demonstration Project will have a mobile receiving unit on hand to pick up the daily instructional transmissions.

Satellite Tests

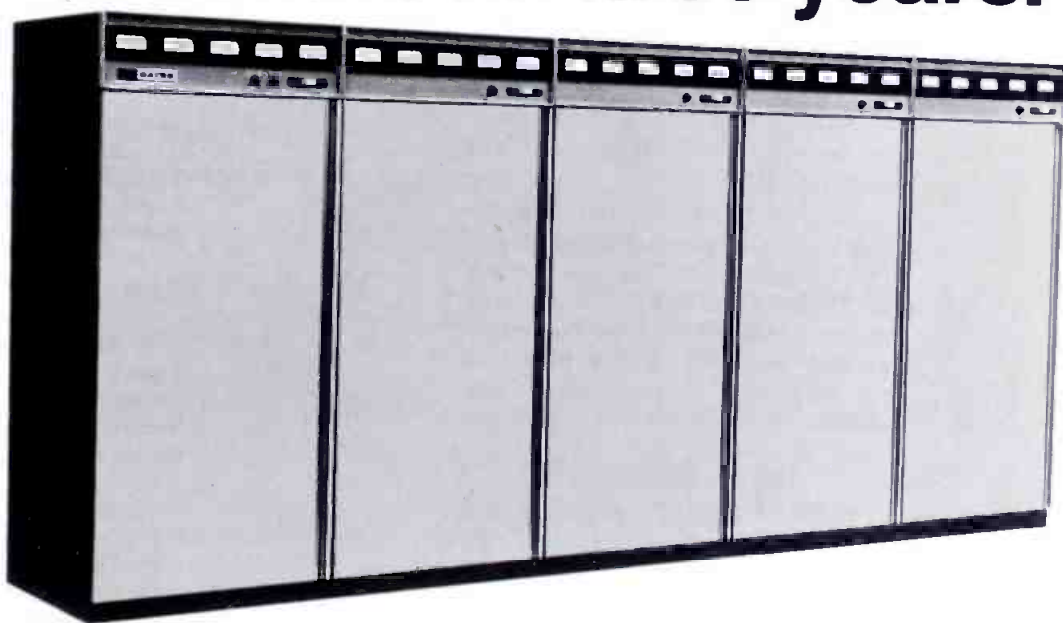
John Ball, Manager of Transmission for the Public Broadcasting Service, will report on the results of the PBS Mobile Satellite tests. Five years now, public and commercial television stations have been told that it would not be feasible for them to use satellites to achieve station interconnection. The cost would be prohibitive, it was said because signals could only be picked up by a rural receiver and then microwaved into populated urban areas. However, as Ball reports, the PBS Mobile Satellite tests found that it was indeed possible to receive the program signals within the city, thus making satellite interconnection economically possible.

A new VU meter developed by Wayne L. Hetrich, Senior Research Engineer for National Public Radio, will be seen and demonstrated for the first time nationally at the convention. The meter, functioning both as a board and as a transmission meter, is capable of showing

Design: IF Modulation!

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**Result: Harris/Gates
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ing, with precision, the actual program level instantaneously.

Time Compression Experiments

Another first will be a joint session with broadcast engineers and instructional television people to examine the technical and utilization aspects of VIDAC, the time compression experiments of the Georgia Network. Essentially, VIDAC time compression operates on a ratio of 400 to 1, allowing super rapid transmission of programs. Time is not all that is saved; VIDAC transmission leaves stations and schools with a drawer full of videotape, rather than a floor full. O. Max Wilson, Director of ITV for the Georgia Network, and Henry Diambra, Vice-President of Engineering, Westinghouse, will be making presentations at the joint session.

The list of topics and demonstrations goes on, including a "what-can-be-done" session to deal with the shortage of university programs specifically for communications engineers and a report of the PBS UHF Improvement Committee.

Add Harold Kassens

Harold Kassens, Assistant Chief, Broadcast Bureau, Federal Communications Commission, will discuss current developments at the FCC, and Tuesday afternoon will be joined by engineering officials of CPB, PBS, NPR, and engineering consultants and attorneys for a free-wheeling discussion on the current progress and future outlook of public broadcasting.

Other papers to be presented during the engineering sessions include discussions of the use of vertical interval reference (VIR) for transmitter control and studio production; comparisons among broadcast video tape recorders and reproducers; digital audio and video; computer managed graphics, and captioning for the hearing impaired.

Monday, November 18

Morning

10:30 - 12:00 - **Engineering**
Open for satellite demonstration equipment exhibit visits

Afternoon

- 2:00 - 5:00 - Chairman, Evert Anderson
Director of Engineering
KCET-TV
Los Angeles, CA
- 2:00 - 2:30 - **Satellites - An Overview**
Philip A. Rubin
Director of Engineering & Research
Corporation For Public Broadcasting
Washington, DC
- 2:30 - 3:00 - **Satellite Technology Demonstration - Technical Progress Report**
Dail Odgen
Director of Engineering
Satellite Technology Demonstration
Denver, CO
- 3:00 - 3:30 - **Results Of PBS Mobile Satellite Tests**
John E. D. Ball
Manager of Transmission
Public Broadcasting Service
Washington, DC
- 3:30 - 3:45 - **Break**
- 3:45 - 4:15 - **PBS Engineering Committee Progress Report**
Daniel R. Wells
Director of Engineering
Public Broadcasting Service
Washington, DC
- 4:15 - 4:45 - **The Use Of Vertical Interval Reference (VIR) For Transmitter Control**
John Kean
Vice President, Engineering
Connecticut Public Television
Hartford, CT
- 4:45 - 5:15 - **Vertical Interval Reference (VIR) For Studio Production**
Thomas B. Keller
Director of Engineering
WGBH-TV
Boston, MA

Tuesday, November 19

Morning

- 9:15 - 12:00 - Chairman, Philip A. Rubin
Director of Engineering & Research
Corporation For Public Broadcasting
Washington, DC
- 9:15 - 9:45 - **A Quantitative Comparison Of Broadcast**

Magnetic Tape Video Recorders & Reproducers

Arthur K. Peters, P.E.
Kessler, Peters & Wilhelm
Gainesville, FL

5 - 10:15 - **Update on D.A.T.E. - Digital Audio**
R. Evans, Wetmore
Assistant Manager of Transmission
Engineering
Public Broadcasting Service
Washington, DC

5 - 10:45 - **ACCU Meter - A Super Accurate VU Meter**
Wayne Hetrick
Senior Research Engineer
National Public Radio
Washington, DC

5 - 11:15 - **Caption For Hearing Impaired**
John Lentz
Senior Engineer
Public Broadcasting Service
Washington, DC

5 - **Tower Strobe Lights - A Case History**
John Wilner
Director of Engineering
New Jersey Public Broadcasting
Trenton, NJ

noon
5 - 5:30 - **Chairman, William J. Kessler, P.E.**
Kessler, Peters & Wilhelm
Gainesville, FL

1 - 3:00 - **Area Population Study**
Public Broadcasting Service
Washington, D.C.

0 - 3:30 - **Broadcast Engineering Technology -
Careers, Curriculum/Program**
Roy Harrison
Director, Broadcast Engineering Tech-
nology Program
Northern Virginia Community College &
Northern Virginia ETV Association
Annandale, VA

4:00 - **Current Developments At the FCC**
Harold Kassens
Assistant Chief, Broadcast Bureau
Federal Communications Commission
Washington, DC

- **Panel Discussion - Public Broadcasting -
Current Progress - Future Outlook**
Moderator, William J. Kessler, P.E.;
Kessler, Peters & Wilhelm, Harold Kas-

sens; Ass't. Chief, Broadcast Bureau;
FCC Philip Rubin, Director of Engineering
& Research, CPB George Geesey, Director
of Engineering, National Public Radio,
Daniel R. Wells, Director of Engineering,
PBS, Louis Schwartz, Attorney, Schwartz &
Woods, Washington, DC, F. Lee Morris,
Field Coordinator, NAEB

Wednesday, November 20

Morning

10:45 - 12:00 - **Joint Session - ITV - Engineering**
Chairman, Robert L. Klein
Director of Engineering
Kentucky ETV Network
Lexington, KY

Time Compression - VIDAC

The Georgia Network - Westinghouse
Project
Atlanta, GA

Utilization

O. Max Wilson
Director of ITV
Georgia Network
Atlanta, GA

Technical

Henry Diambra
Vice President, Engineering
Westinghouse
Silver Springs, MD

2:30 - 5:00 - **Chairman, N.W. Willett**
Director of Engineering
KLRN
University of Texas
Austin, TX

2:30 - 3:00 - **Computer Managed Graphics**
Joe Scheuer
Vice President, Operations
System Resources Company

3:00 - 3:30 - **Digital Video - Time Base Correction**
William B. Hendershot
Vice President, Engineering
Consolidated Video System
(National Science Emmy Award)
Santa Clara, CA

3:30 - 4:00 - **Low Cost Big Screen Projection**

4:00 - 5:00 - **Panel Discussion - Quality Audio - Where
Do We Go From Here?**
Moderator, Thomas B. Keller, Director of
Engineering,
WGBH-TV, Boston, MA
Everett Anderson,
Director of Engineering,
KCET-TV, Los Angeles, CA

Since NAB, somebody has ordered an AVR-2 every day

Seems everyone wants this new breed of VTR. 60 are already in service. One order alone will send 43 AVR-2s up to Canada for the '76 Olympics.

Why the popularity? Because AVR-2 is all things to all people.

It's the kind of VTR you want it to be: bare bones, fully equipped, studio, portable, mobile recorder. Two basic modules and an optional monitor bridge let you assemble any configuration.

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23

Expo '74 and the *KREM LEM*

By Warren F. Pritchard

KREM, AM-FM-TV, Spokane, Wash.

How do you provide effective television coverage of a World's Fair? That was the problem facing us in the fall of 1973 at KREM-TV, a KING Broadcasting Company station located in Spokane, Washington.

EXPO-74, Spokane's own Worlds Fair, was scheduled to get underway in the spring of 1974. We knew that it would provide KREM-TV with unique opportunities for special service programming and news coverage. After all, a Worlds Fair right in your own back yard presents a challenge that simply can't be overlooked.

While our desire to provide special coverage of EXPO-74 was readily apparent, the question of our capability to fulfill that desire had to be answered. In order to

determine the feasibility of such an ambitious undertaking, the scope of the project required defining. Input from all involved departments was needed in order to ascertain the limits of project acceptability.....

Defining The Limits

From Bob Lewis, operations manager: "Coverage must be available no less than eight hours per day, seven days per week for the entire opening month of the Fair. It must be live, on the spot, instantly airable."

From Dick Soss, production manager: "No degradation in quality can be acceptable...Must be compatible with studio production...Must permit a full range of capability from spot to full length programming...Production control must be maintainable from either main studio or EXPO site."

From Wes Lynch, news director:

"Complete mobility...Must have rapid accesability to any and a parts of the entire 100 acre site. Must have constant communications capability."

From Dean Woodring, general manager: "Put together a package that will do the job...Be sure that will fill our needs."

These guidelines were quite clear as to the type of coverage which would be acceptable. Also quite clear were the guidelines of the EXPO-74 TV coverage staff: "This is a peoples Fair...no bulky camera cables are to be draped throughout the site. No big vehicles blocking walkways. No power cables to trip over. EXPO visitors come first. We welcome TV coverage but it must be as invisible as possible."

Special Equipment

It was immediately apparent that to meet our goals an equipment package would have to be designed on a "one-of-a-kind" basis. Equipment costs and delivery time also made it quite clear that our timetable could be in real trouble right from the start. For such a special purpose unit, the feature of availability made rental or leasing of the necessary equipment very attractive. On this basis a thorough search was undertaken to locate the special equipment needed to fill out EXPO-74 project requirements.

We believe the success of the equipment search is proven in the performance of what was immediately dubbed the "KREM LEM". With apologies to the first moon rovers, it is a fact that the first sight of our special unit does bring to mind the unforgettable NASA LEM. However, in the case of the "KREM LEM" the initials should stand for "Least Effort Module". The "Least Effort" concept was a cornerstone in the project design. We knew that for successful oper



Fig. 1 The KREM LEM ready for action. Note that when the LEM is not in use, the microwave antenna is lowered.



On location near the U.S. pavillion, the KREM LEM is shown working on an interview at Expo '74.

the "LEM" must be capable of producing maximum results from the least effort expended.

With this thought in mind, Bob McBlay, engineering supervisor, developed a compact, self-contained, highly mobile unit capable of fulfilling our full coverage requirements. The unit included a backpack color camera, a four channel audio mixer, a two-way communications system and a set audio/video microwave. Every active component of the unit was judged against the three requisites of quality, reliability and power drain. The limited physical space available, coupled with the limitations of battery operation, dictated absolutely equipment redundancy.

Credit must be given to the equipment finally selected. The schedule was rigorous and did not provide any time for "tinkering" in order to maintain quality

control.

The entire assembly was mounted on a Cushman model GC 400 electric cart, which provided the necessary mobility plus the complete powering of all equipment. Very little modification to the basic model was required to meet our special needs. Verification that the charger unit was connected became a nightly close-down ritual since dead or run-down batteries could prove fatal to the project.

Video Pickup

Video pickup was provided by an Asaca 5000 backpack camera. This unit was chosen for its lightweight portability, color quality and reliability. Utilization of the camera head for either shoulder mount or on a tripod proved to be of great importance during the month-long coverage. Being able to trade off on modes of camera operation greatly decreased operator fatigue, which

proved to be important in maintaining crew enthusiasm during day long coverage.

A Shure four-channel audio mixer, ensured audio control with a built-in tone capability for rapid level set checks. Both conventional and wireless microphones provided versatility in talent location choices. This location freedom resulted in pickups from such unique locations as across the surging Spokane river in the spectacular falls area and while riding over the Fair in the sky ride.

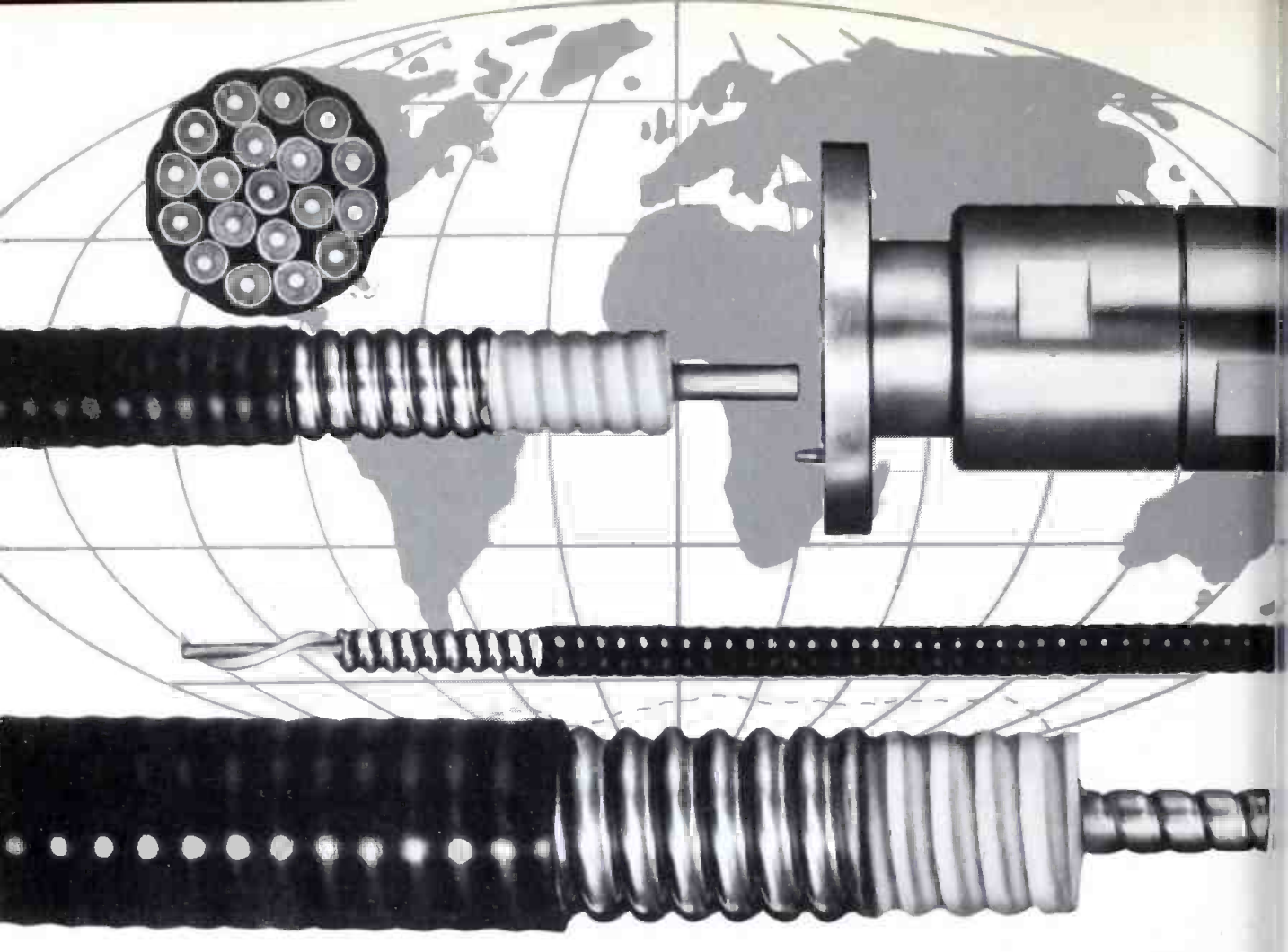
Two-way communications with the station was maintained through the use of a 45 Watt remote pickup unit licensed in the 450 MHz band. The studio end of the circuit featured control from either Master Control area or the Studio Production Control room. In this manner, simple air items could be handled as just another source to the master switcher, while production features could be routed to a directors tender loving care. This procedure permitted handling of the EXPO input with a minimum of disruption in our normal studio daily routine.

Back To The Studio

The microwave feedback to the KREM-TV studios was complex and required three hops. The first leg was provided as part of our "LEM" package. It consisted of an ICM-13A video/audio portable transmitter and fixed receiver operating at 13,187.5 MHz. The receiver unit was mounted atop the

Management Highlights

You've already seen in *Broadcast Engineering* how "ELECTRONIC JOURNALISM" works. You may not need to build a KREM LEM for your local coverage, but it should give you some helpful ideas about local news. And, if the need should arise, the KREM story stands as an example of what can be done. Keep in mind that this coverage included most of the prominent approaches to remotes now being used.

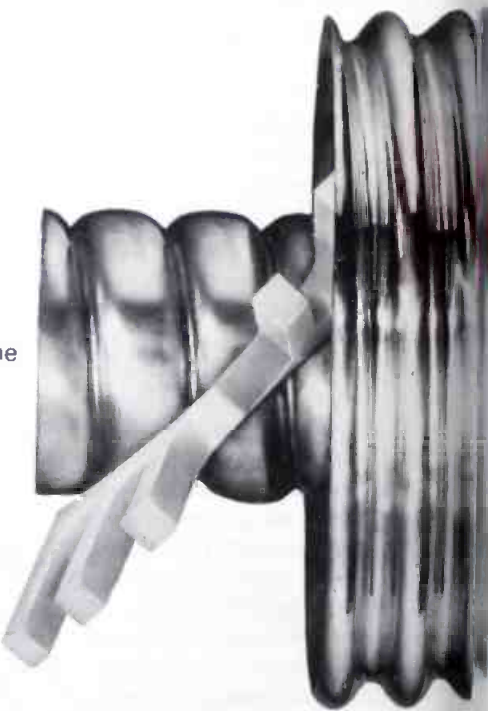


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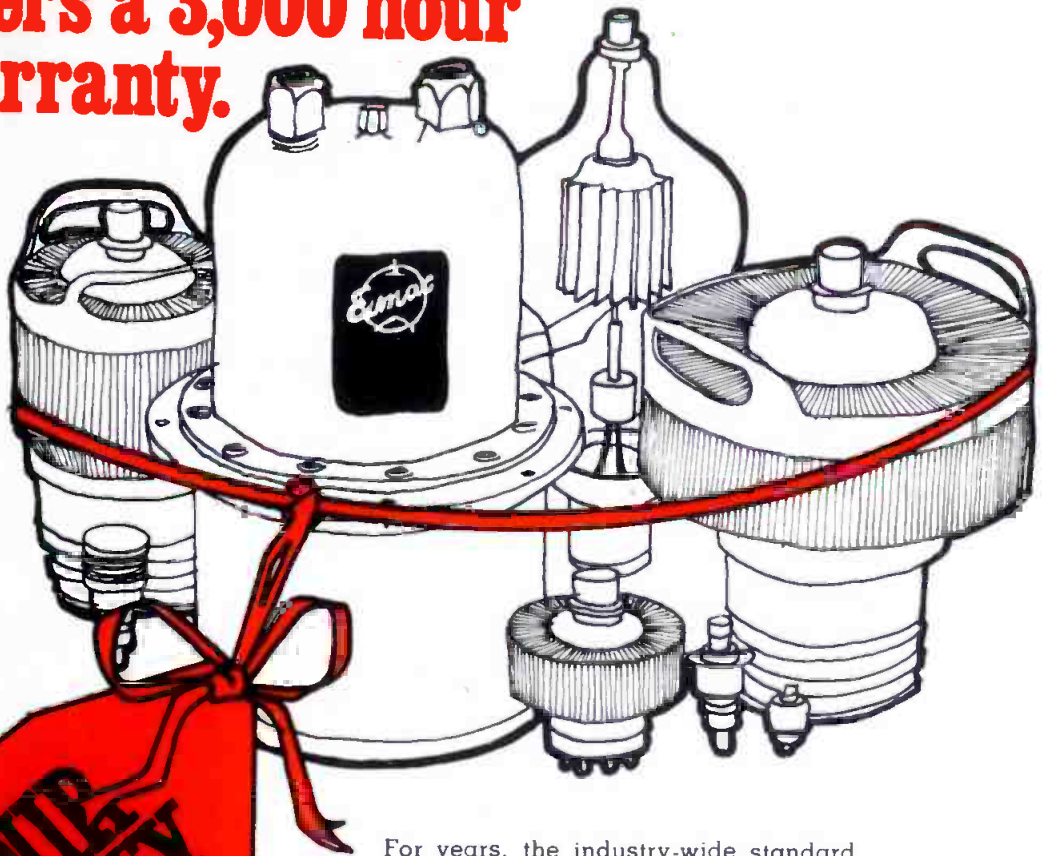
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BROADCAST ENGINEER

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Fig. 3 Here you see the cameraman using a tripod to steady the camera while the backpack control unit is placed in the LEM.

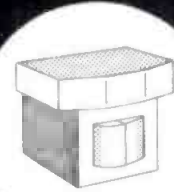
roof of the 15-story Old National Bank building located about three blocks from the EXPO site.

The feed was then routed to a commercial carrier, Western Telecommunications, for the final two hops to our studios south of the

city. Our operators became very adept at rapid microwave line up. Usually within five minutes after the "LEM" arrived at a new shooting location the unit would be fired up and providing pictures to the studio. This rapid location change

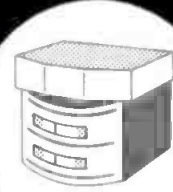
capability proved to be very important in our coverage of the many changing events taking place throughout the 100 acre site. The variable height microwave mast the "LEM" permitted raising of the transmitter dish high above the heads of the curious onlookers. This was a necessary feature since the arrival of the "LEM" quickly drew inquiring crowds wherever it appeared.

During the full opening month of May, the "KREM-LEM" roamed over the 100 acre EXPO-74 site bringing live, full color, on-the-spot coverage to the KREM-TV viewers in Washington, Oregon, Idaho, Montana and Canada. Continuing probing of exciting exhibits, daily seeking out of extraordinary activities, quick contacts with foreign dignitaries and visiting VIPs, on-the-site news programs and of course the warm contacts with Fair goers from all over the United States... all this, we feel, is how you covered Worlds Fair, and we at KREM-TV did it with a talented, creative crew and an extraordinary little vehicle called the "KREM-LEM".



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the FS-10 Frame Synchronizer

it's here
(since NAB, in March)

it's proven
(by critical network
evaluation in actual operation
-- all 4 networks)

**it's the most
revolutionary
broadcast
product
since the color
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In March, NEC introduced the frame synchronizer to U. S. broadcasters. Because the frame synchronizer is a completely new kind of product, it took a little time to find out what its real capabilities are. Since NAB, all four networks have had the unit in their studios for evaluation — the consensus of opinion is that the frame synchronizer is the most revolutionary broadcast product to come along in years.

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Bandwidth and remote pickups

by Pat Finnegan

FM is the popular method used for remote pickup service, especially those operating in the VHF range. There are many advantages in the use of FM, but unless the important factors contributing to these advantages are maintained, the results may be somewhat less than desired.

Confusion can develop in the engineer's mind when major maintenance is required, or when considering the purchase of a new commercial unit as a replacement. Why? Because there are many inter-related terms concerning the modulation process that can cause confusion, and these small transmitters operate somewhat dif-

ferently than regular FM broadcast transmitters. One important difference is the fact that most of these small units use a phase modulator to create FM. Another area for confusion includes the different technical standards in the FCC rules for remote pickup and other services.

Problems

Confusion can lead to both unsatisfactory results and out-of-channel emissions when attention is not given to some of the peculiarities of the systems and their adjustments. Many of the problems are caused by improper setting of the deviation, or the bandwidth characteristics of both the transmitter and receiver. Results can be poor audio response, distortion, channel "splatter", or low level recovered au-

and noise.

Some of the Terms

There are two ways to produce FM: modulate the frequency of carrier directly, or indirectly, modulating its phase. Phase and frequency are very closely related. In many commercial units, the signs of the modulators are such that they often behave more like their counterparts than the "pure theory" version.

In the "pure" FM system, audio signal is applied directly to the oscillator in a manner which will cause the RF carrier to swing above and below its normal resting frequency, and at the rate of audio signal frequency. The maximum distance (in frequency) above or below normal resting frequency the carrier will reach, is termed **deviation**. This deviation is determined solely by the **amplitude** of the audio signal.

In the "pure" FM system, audio signal may be applied to the RF stage (instead of the oscillator) in such a manner that the phase of the RF carrier will vary at the rate of the audio signal frequency. Varying the phase of a carrier will vary its frequency. How much the frequency will deviate depends on the speed or rate of phase change and on the maximum number of degrees changed. Since the audio signal determines the speed of change in phase, and the amplitude of the audio determines how



After adjustments and tuneup has been done on the bench, always make test transmissions with another unit. WIBC night operator Steve Vance is shown here checking with a mobile unit on the road.

es the phase will change, the
tion of the resulting FM is
ly dependent upon both the
ency and amplitude of the
signal.

le phase modulator method of
ucing FM is the most favored
remote pickup service (and other
es) because this method allows
irect crystal control of the
ator, and thus, greater sta-

nce the deviation of the FM
r created by the phase modu-
is dependent upon both the
ency and amplitude of the
signal, there is a natural rise
dB per octave at the upper
frequencies in the recovered
. The receiver must employ a
lementary de-emphasis curve
audio will sound very poor.

Bandwidth

bandwidth and deviation are not
the same thing! Bandwidth will
be greater than deviation of
carrier itself, as it will also
include all the sidebands. During
modulation process, many pairs
sidebands are created. These
occur at intervals both above and
below the carrier at distances re-
lated to the particular audio signal
frequency. How many pairs of side-
bands there are at any instant
depends upon the modulation
index. In FM, the modulation index
is equal to the total deviation of the

carrier divided by the audio fre-
quency.

The term **deviation** means the
instantaneous peak swing of the
carrier away from its resting posi-
tion and into either the upper or
lower sideband regions. **Total deviation**
is the distance of the swing on
both sides of the resting frequency.
For example, if the deviation is +5
kHz (or -5 kHz), total deviation is
10 kHz. The term **bandwidth**
means the total spectrum space
occupied by all the emissions
created by the modulation process
(including deviation).

The minimum bandwidth re-
quired to perform an adequate
service, is given by the formula: $B_n = 2M + 2D \times K$. M is the highest
audio modulating frequency, D is
one half of the total deviation and
K is usually 1. Wideband tele-
phony, for example: (M = 3,000
Hz, D = 15,000 Hz, K = 1). Then:
 $B_n = 2 \times 3,000 + 2 \times 15,000 \times 1$
 $= 36,000$ Hz. Adding the FCC
designator F3, this becomes 36F3.
Narrowband telephony deviates only
5,000 Hz and is designated 16F3.

Occupied bandwidth uses the
same formula as above, but the
figures entered in the formula for
M and D are those which actually
occur in a particular transmitter.
Also added to the results obtained
is the permitted (or what the
transmitter can attain) frequency
tolerance of the service in hertz.

For VHF remote pickup service, the
permitted tolerance is 0.005 per-
cent, although most present day
commercial units can maintain
0.0005 percent.

Remote pickup service is general-
ly permitted in wideband FM, al-
though there may be a few cases
where a narrower bandwidth will
be required. In the VHF range, the
channel width is 60 kHz for most
channels. All the emissions caused
by the modulation process must fit
within this channel and the carrier
resting frequency at the center of
the channel. Also, a guard band
must be allowed at each channel
edge to prevent spilling over into
adjacent channels and causing in-
terference.

Maintenance

Maintaining a high level of
modulation, and at the same time
staying within the channel, calls for
accurate setting of the deviation
and the speech clippers. Setting the
deviation control can sometimes
cause the carrier resting frequency
to change to a different spot, so it
is always advisable to make a fre-
quency check after resetting devia-
tion. (It can also work the other
way.)

A monitor especially designed for
measuring deviation should be
used, although there are more
cumbersome methods. An oscillo-
scope will prove useful in setting
the speech clippers and in observ-
ing the audio out of the modulation
monitor or the receiver.

For the preliminary deviation, a 1
kHz tone from a signal generator
may be used. Feed this to the
microphone jack at a level and
impedance comparable to that of
the microphone. Attach the scope
probe to an audio stage after the
clippers. Adjust the audio levels
and the clipper to a point where the
signal is on the verge of clipping.
Then adjust the deviation control
for the amount of deviation desired
as measured on the modulation
monitor. Move the scope probe to
the detector output of the monitor
and observe for clipping or dis-
torted waveform. For that amount
of deviation, the modulator may be
overdriven and it will show up here.
If this is the case, back off the
deviation, even though that is not
as much as desired.

A regular mobile receiver may be

Management Highlights

The Commission has proposed a rulemaking that would result in a
comprehensive revision of the regulations governing the licensing and
operations of Remote Pickup Broadcast Stations.

The proposal is in partial response to a petition filed by the
National Association of Broadcasters (NAB) in 1971, for changes in
the rules (RM-1735) and partly a result of the ongoing Broadcast
re-regulation Study initiated by the FCC in 1972.

The proposal would affect virtually every rule in Subpart D of Part
of the Commission's rules and regulations. In some cases, the
Commission said, only minor editorial changes would be made, but
such important areas as licensing, permitted uses, equipment and
frequency availabilities, "very significant changes are proposed."

Among the major areas under consideration are: channel splitting
of the 450 MHz band and the earmarking of certain frequencies for
transmission of program material only and the establishment of a
limited number of narrow-band channels for operational communica-
tions only; the provision for licensing station groups as a system
authorized pursuant to a single license; the requirement that type
accepted equipment be used; the revision of logging requirements,
and the specification of additional frequencies for use by low power
broadcast auxiliary stations.

used to pick up the signal. Attach the scope to the receiver out. Or this may be a voltmeter and a distortion meter. Without changing anything except the audio frequency, you can make an audio system response run, and you can check overall distortion. How accurate these measurements will be depends a lot upon the impedance match to the generator and the voltmeter to the receiver. It will give you a reasonably good idea of what the system can do.

These systems are designed for voice, so take off the tone and connect the mike. Use the microphone that is normally used with that transmitter. Signal peaks caused by voice can be 4 to 5 times the average level of the sine wave, so talk into the mike at normal voice levels and again set the levels and speech clipper. Set the deviation on the voice peaks.

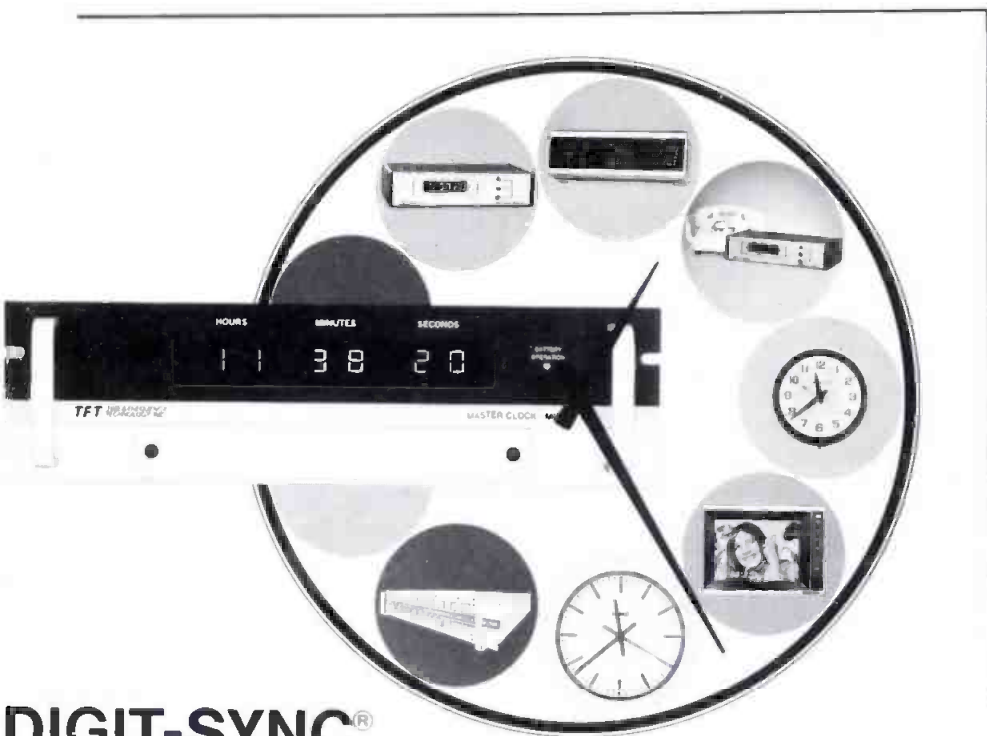
Bandwidth of all the RF circuits in both the transmitter and receiver are important. These must be tuned

broad enough for the channel width expected, but not so broad that it is difficult to make power in the transmitter or reduce the receiver sensitivity. In the receiver, tuned circuits also contribute adjacent channel rejection. All these should be tuned so that unmodulated carrier "goes right down the center of the road", leaving equal space on either side of the swing and sidebands. Sloping the response curves of these tuned circuits will effect the covered audio response curve and output levels.

Aside from transmitter limitations, the bandpass filters in the receiver will basically determine the practical bandwidth of the system. These filters are intended for rejection of adjacent channel interference. Many receivers today use the non-tunable crystal filter. The curve of this filter has a gentle flat top and fairly steep skirts that can reject signals out of its passband by 90 to 100 dB. The narrowband filter will pass ± 6.5 kHz (at its 6 dB points) and at ± 26 kHz the signal level is down 90 dB. A wideband filter will pass ± 15 kHz and at ± 32 kHz, the response is down at least 100 dB.

A wideband transmitter can be received on a narrowband receiver but the recovered audio will be lower than normal and the response curve will be poor. Much depends upon the actual swing of the carrier in that transmission and how wide the skirts of the filters are. In many voice transmissions such as a news report, the actual swing may only be 7 to 10 kHz. The recovered audio is usable for this purpose. However, the better system would not mix the two types.

Thus, deviation and bandwidth are important features of the remote pickup system. When proper consideration of these features is made, the chances of a good transmission will be enhanced. But other elements enter the picture: the microphone and the operator. Different types of microphones have different characteristics and output levels that can undergo other adjustments that have been made. And when an operator speaks in loud and distorted — tell him to speak softer, back off from the mike, or both!



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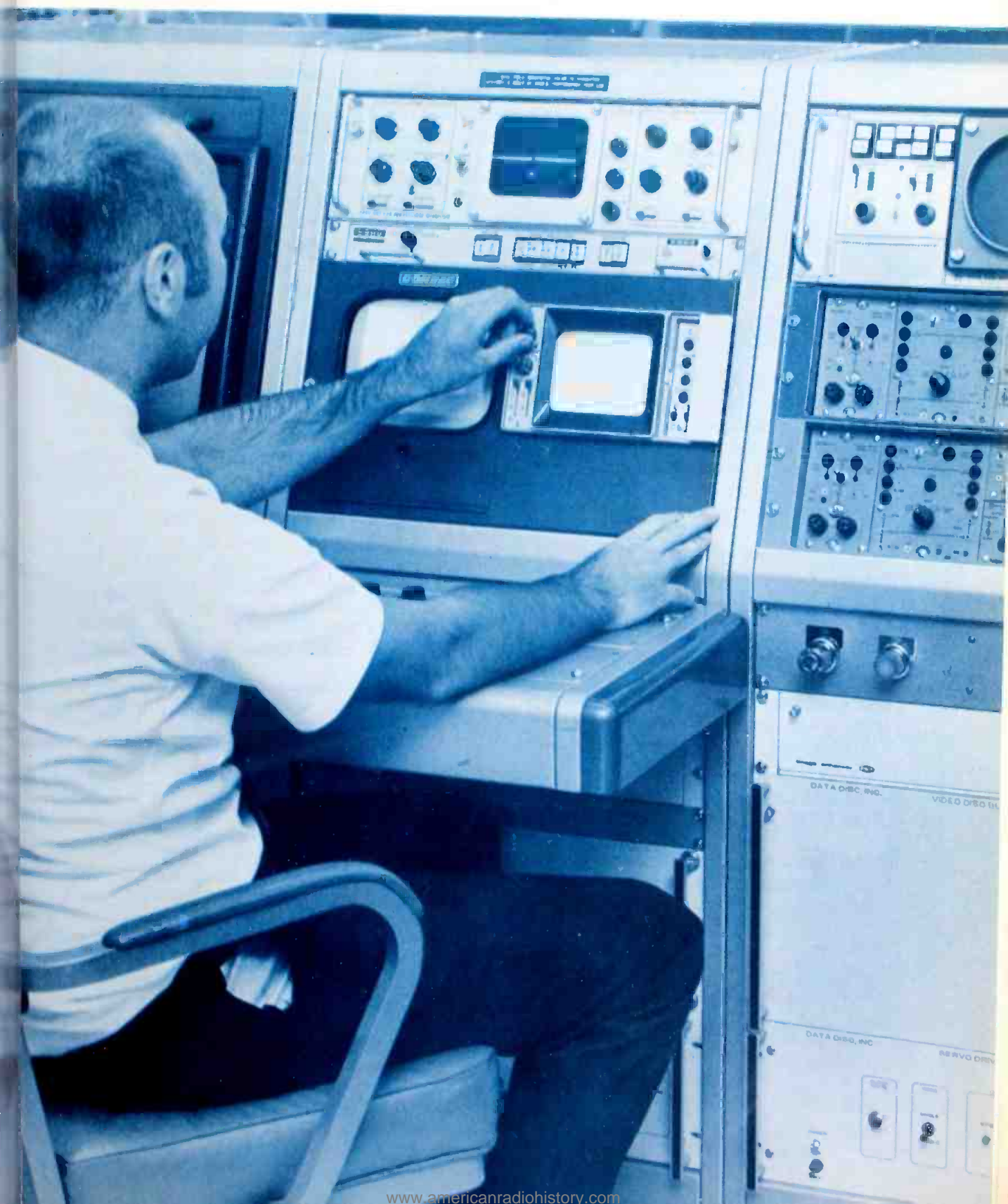
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CABLE engineering

In this issue...

The Installer and Company Image



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The installer and company image

By Kenneth Wayne

The cable television installer creates the image of the cable company. This is true if there is one installer, ten installers, fifty, or even more. It holds true if the installer is owner-operator, technician, bookkeeper, and answering service of a small town CATV system, or if the installer is an employee for the largest of MSO's. The reason being that for most subscribers, the installer is the only face to face contact they will ever have with the cable company.

The CATV industry may be unique, but it is not alone in its entry to households, offices, hospitals, military bases or any other place where cable TV or FM service makes itself known. For before the cable was requested, services such as power, gas, water and telephone, probably made entry into the premises.

The one thing common to all these services is the fact that one or more individuals made the installation or checked the service to be sure of proper operation. Usually this involves a face-to-face confrontation. Often, this is the only time



"THOSE ARE TO IMPRESS VISITORS. HERE ARE THE ACTUAL STATION CONTROLS."

customer will ever notice the physical function, appearance or personality of the company. It is the most important meeting between company and customer that will affect any future relations that the customer will have with your company. First impressions are lasting impressions and the installer is the one who sets the

Whether the installer is the owner of his cable system or has fellow employees, he is the first link to the success of the company. What he says and does forms the basic attitude toward the company. The customer will believe what the installer says and will not see his work as being symbolic of the company performs. The installer should be pleasant, professional, informed, and among other things, tidy.

The Golden Rule

An old axiom, of "you don't do it in your house so don't do it in the office," doesn't hold water. At work or office, we may plop our feet on a desk or table. We may, in that thought, grab the kitchen chair and climb on it. We may "quackie" step ladder to change light bulbs, hang a painting, or kill a spider. You do it in line boots or slippers. Your wife or mother does it in slippers. Your shoes or bare feet. The installer should never do it!

Suppose that old chair was an antique. Suppose that it had a broken leg. Or suppose that the chair came from the re-departed relative. We visualize the effects upon the customer and the company. The chair could have a enormous replacement value. The sentimental value could lead to hysterics, or the installer could cause himself injury. You could possibly lose a customer due to the old chair. Sounds just a bit silly, doesn't it? Well, it isn't. Lack of common sense or the disrespect for private property cause enormous problems. A good point, I vividly recall, is the installer who worked for a company several years. The man pulled the driveway and his first job was not to put on the parking brake. He then entered the house and proceeded to do a reconnoitering a cigarette, (the job

would only take a moment), he placed it on the TV while he started to connect the matching transformer. About this time, he heard a yell from outside and glanced out the window to see his van rolling down the drive. Fortunately, a teenage neighbor stopped the truck and no damage was done.

While the installer counted his blessings and thanked the alert youth, the cigarette slowly left its mark on the finish of the TV. When he re-entered the house, he never noticed the mud he picked up from running through the flower bed to chase his truck until he saw it on the carpet.

A comedy of errors? Not really. It could have all been avoided. It could have cost more than just free service for a couple of months and the cost of a carpet cleaner. The consequences are left to the imagination....

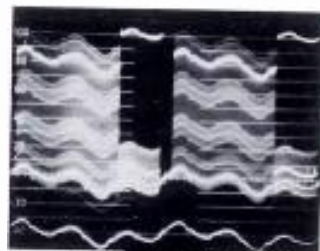
Been Treed Lately?

Another incident happened when an installer was up a pole that serviced four adjoining lots. One of the residents let his dog out and the pet discovered the man coming down the pole. The dog decided the stranger should not have been in the yard and figured he ought to keep the installer up there. Well, the installer was perplexed. He had to come down but the dog had him treed. What else to do but empty his tool pouch of all ammunition. Nuts, splitters, transformers, fittings, span clamps, and wrenches finally chased the dog off. The installer got off the pole and used his safety belt to ward off a new attack by the dog. The owner finally came out to retrieve the dog to the house and then jumped the poor installer while he was picking up all the paraphernalia he had thrown at the dog. They argued for a while until the master went into the house and called the system manager.

Things smoothed over for a few days until another neighbor, while mowing his lawn, discovered that his machine that worked well cutting grass wouldn't work at all after cutting into a span clamp.

Poor installer! He alienated the dog and two households just trying to do his job. He used a few four letter words in his argument with

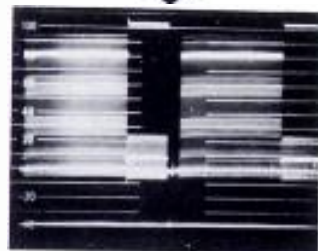
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the dog's owner when just one would have done the trick. Just one loud **Help!** It cost the system a new lawnmower and at least fifty percent of the potential revenue from that one tap. Accidents, of course, can happen. We wish they wouldn't, but they do.

Drilling For Less

I recall an incident of an installer drilling down through a floor so the service drop could be brought up through the crawl space. Not thinking, the installer placed his drill bit in the proper location and proceeded to drill through the floor. The bit caught a thread and before the hole was completed, the beautiful white carpet had a wall to wall run. That error caused the TV cable system's insurance company to replace the carpet. Common sense could have prevented that loss and the inconvenience.

I have installed cable in houses that made me wonder how they were still standing. I have connected homes to cable when I held my breath because of the stench till I thought I would pass out. Some homes look like a recycling center

inside and out. It is ironic that they pay the same monthly rate of the people across the community in the fancy townhouse on the hill. But even their property, whatever the value, should be respected.

Good Advice

Management tells the employee that the customer is always right. To pacify subscribers, it is occasionally necessary to go to great lengths to let them think they are right even if they are wrong. An installer has to be a diplomat. One thing the installer cannot be is a representative for a TV retail store or repair shop (unless the cable company and the TV store are jointly owned, as is still the case in many small communities).

Quite often, services are installed and the set either will not work or just barely does. The questions come up as to where to take it for repair, what is the best set to buy, and who is the best repairman? It is not the installer's job to advertise for television repair shops or dealers. To do so may (and justly) get their competition quite upset. Some people will wonder what is wrong

with an installer giving free ad (free advertising) to cable subscribers. Nothing, if there is only one out in town. But if there are two? Then you have just lost the second business and he will tell his customers (probably) that off the air reception is as good or better than cable. He wants to sell antennas not cable and he is mad at anyway.

It's possible also, that your friend is not the best technician in town and does a terrible job of repairing the customer's set. Then too, when you say the brand of TV that you recommend is better than another. Everyone is entitled to his own opinion and it has always seemed to me that if you buy a Rolls Royce and it develops problems, then you should obviously get repaired by a Rolls Royce dealer. The same holds true of a Chevy or Zenith or Radio or a Yamagatchie. It may cost a little more to take the merchandise to the factory dealer, but most of them are factory trained or at least are up on the latest repair methods of their franchised equipment.

Your pal may be pretty good, when his competition finds you're plugging for him, you may see an ad in the morning paper reading...."Second TV Cable Head Up Kit. All parts and instructions only \$5.99. Works for any TV FM Stereo." Slowly the income from the second outlet in your cabled areas decrease.

A Handy Card

I have found that the TV dealer and repair men advertise for cable companies by virtue of having their stores serviced by cable. A good gesture towards them, when customers when installed, receive a card listing the channels received and on the other side a list in alphabetical order all the stores that sell or repair televisions. When the customer asks where to take the set or what kind to purchase, a smile and a card will usually do the trick.

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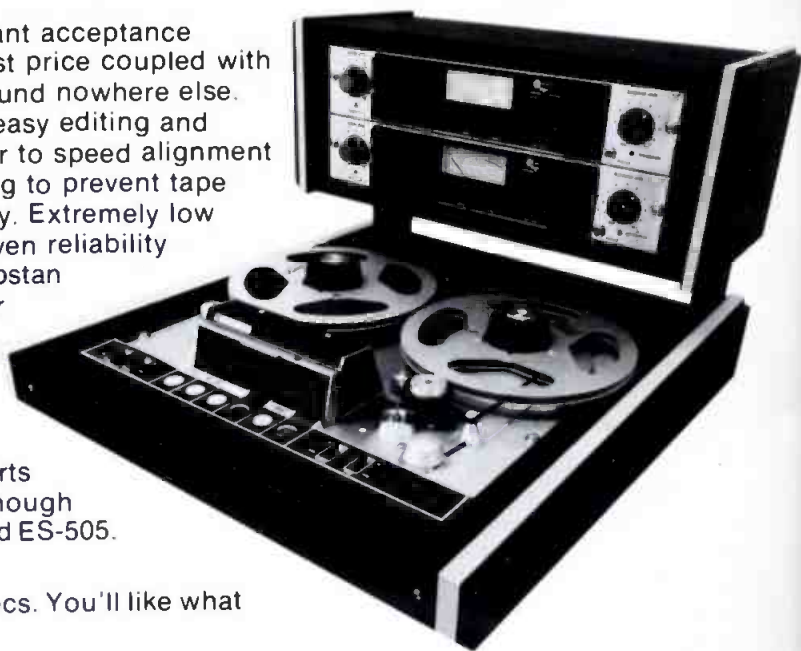
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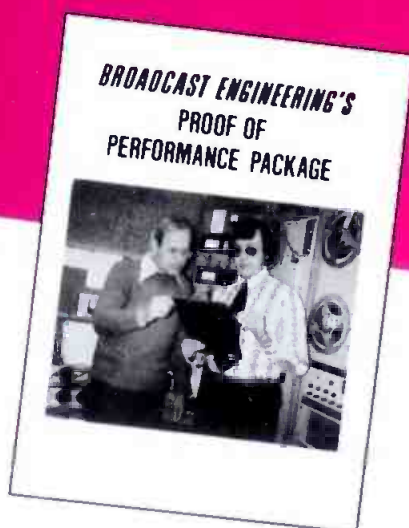
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Sportscaster Sally Reynolds interviews basketball players before the game.



Lincoln Christian College goes remote

By C. Dave Copeland

Certainly there ought to be more than one way to run a remote. The most typical being via Telco. At WLCC, the alternatives were considered, and this article describes the approach we took.

Being new at the game of remotes, we went to one of our engineer friends, Marv Beasley. Marv explained the available equipment advantages and we decided to go with an RF Communications 25 Watt transceiver. You will note that

I said transceiver, meaning not having to pay a phone bill for the cue or use the "cut the air signal twice if you got me ok" bit.

How much power? You can always use one black box designed for the purpose, or put together the information from half a dozen charts. Fortunately, our local dealer had a black box and we could jockey back and forth with antenna height and power. There is also the entire list of variables which can be worked with (receive sensitivity, transmit power, cable losses, antenna gains, frequency range characteristics, and antenna heights) and the box was handy. We ended up on 170.15 MHz (being workable, available, and not so populated in our area), and a base antenna of two vertical mounted yagis atop our 148 foot tower, with a rotator. Don't forget some lightning protection about 3 feet above the antenna.

Vertical polarization was chosen for purposes of mobile and portable work. We get ten miles with the 1.5 Watt unit in the car with a magnet mount vertical on top. The car battery is handy for serving those rechargeables, which fade out with about fifteen minutes of continuous transmitting. They are better for

short segments.

At this point, I should mention that Lincoln Christian College in the middle of some very country, thus a good range with power is possible. It even turns out that we have more range than estimated, largely because of conservative figures used to protect against some ugly unknown which frequently pops up after the whole thing has been installed.

If this is your first time around with license applications, one unit, you might try what we did. The communications firm gave us some help for a fee. That helped in having to run them through at least because of a small error and loss of valuable time.

These base units aren't designed for continuous duty, referring to the heat transfer capability of the final stage fins and the power supply. A couple of small fin pipes were mounted on the bottom back of the power supply. It is set on top of the transceiver with a small biscuit fan blowing through everything. We ended up with a small unit, so not much circulation is required for continuous operation at full power. It might have been more convenient for us to have purchased a 100 Watt unit

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Back at the station, Ron Henwood uses the extension mike to coordinate while running the board.



Randy Whitehead is shown here using the 1.5 Watt unit for an on the spot report of a railroad accident.

Management Highlights

As Dave suggests, you don't always need to be tied to a Telco line to go remote. And by taking this alternative, remotes that once were impossible can now be commonplace.

If community service is part of your plan, here's a way to improve it. If special ad tie-in remotes are important, this approach is a natural. The key is flexibility.

turned it down to whatever power we needed, eliminating the fan. Both units are about the same size and have that nice rugged construction which relieves any engineer's mind when equipment goes out with operators.

Everything that you buy has to be installed at your place, so you will be relieved to know that these units are just about idiot proof. I have personally proven that the final won't blow without an antenna connected. The men at the communications lab have never had to replace a final, and that is most comforting.

Our unit has a high/low power switch, allowing a setting at 3 Watts (adjustable to your needs)

and needing no fan. Most of our uses of the unit around town are at the low level.

Due to the base antenna gain and height, you may experience interference on distant remotes when the base sends info back to his man. A high/low power switch in the base unit would solve this problem by using a low talkback power. Almost all of our problems have been eliminated by letting the other fellows know when we have a distant remote.

Another handy feature is the multi-channel capability of these units. WLCC doesn't have a second channel, but there are times when the hand unit could be used for readying at another location while



The RF 1500 transceiver and power supply are shown here in an equipment rack in WLCC's engineering room.

working the other frequency. A police scanner can be used for receiver on a wireless mike basis for games, parades, etc., and then returned to the news room for normal duty.

One thing which we have taken advantage of is the pag tones for both directions. The method is to keep the receive quiet except for when your people with the proper tone burst. A good money saving tip is the use of sub-audible tones transmitted by the sportscaster to step into spot. The result is freeing a man from hard listening and allowing some production or other work to get done.

Ralph Antonacci of WTAX

duced this to me, on their phone
 es. This requires a unit with a
 ouble modulator board, for the
 iver frequencies. It also gives a
 gantly improved audio and has a
 god sound for general audio
 applications. Our use in civic events
 has been a relief for the "over
 meetingized" citizen who must
 catch certain parts of the meeting.
 You might be curious about the
 radio inputs for the mobile units.
 We have a base extension mike for
 the operator to keep in touch and
 feed back area scores and other
 information during spots. Also, we
 used the mike from the second RF
 unit and paralleled it at the
 first unit's location for test uses.
 Sometimes you need it to coordi-
 nate feeds when the control room is
 busy.

Remote operations always add
 flexibility and variation for programming
 station personnel, not to men-
 tion that very valuable audience
 response. Like many other tools, we
 can't wonder "how did we ever get
 along without all of this flexibility?"
 Made from planned trips, when
 something big comes along, you can
 simply throw a unit into the car
 and flip on a magnetic car top
 antenna, plug into the cigarette
 lighter socket and...go...go...go.

Suggested Managers Notes

These units were bought strictly
 on the basis that they would pay
 for themselves over a period of time
 and reduce operating costs during
 the same period. Plus, we can now
 do so many other programs live
 which would previously have been
 prohibited because of line costs and
 advance notice requirements, as
 well as some impossible locations.
 Being an investment, you may
 immediately back off and say that
 this is a bad year, must tighten up.
 But look at these facts and think
 ahead for more profits in the
 future. The units will pay for
 themselves, especially when you
 consider possible increases in line
 costs. In the mean time, you have
 added a versatile sales tool for the
 firm. Live coverage simply can't be
 had when there is something
 important going on. We had a
 tornado hit and did some live
 coverage on the streets at the tail
 end of it. That really got audience
 response!

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and aural carrier independently or aural intercarrier. These monitors provide continuous monitoring with inhibited off-frequency alarm drivers, switch settable to either ± 500 or 1000 Hertz. It requires three successive errors to produce an alarm. This means no false alarms for you.

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bookreview

Practical Solid-State Circuit Design, First Edition by Jerome E. Oleksy, was published for the design technician, or experimenter who is interested in constructing "tailor-made" circuits for a number of applications.

The author presents an introductory course that emphasizes the experimental method and includes many equations and tables that will be valuable to the experimenter. Beginning with a discussion of power supplies, the book proceeds with clear instructions for designing transistor amplifiers, FET and OP Amp circuits, audio power amplifiers, and regulator circuits.

Each chapter contains short examples and questions to help the reader gauge his understanding of the material. Whenever design calculations are required, the book includes solved problems showing how the solutions are obtained. The author devotes chapters to a discussion of interated circuit Amps—what they are and how they can be applied to practical circuits.

Whether you actually build circuits or simply want a better understanding of how they provide valuable insights and an increased understanding of solid-state principles.

The book is available through Howard W. Sams Co., Inc., Indianapolis, Indiana.

How to Use Integrated-Circuit Logic Elements Second Edition, by Jack W. Streater, is designed to help the engineer or technician who has not previously used or designed digital logic circuits meet the challenge of digital integrated circuits in electronics.

Completely illustrated, the book covers binary, BCD, decimal number systems and Boolean algebra with applications to simple switching circuits. Also discussed are gates and gate combinations, bistable elements and their uses, the logic families (RTL, DTL, TTL, ECL, CTL or CML, MOS and diode logics) and also discussed and compared.

A entire chapter is devoted to off-the-shelf logic elements—breadboard, testing, troubleshooting and locating sources of data on integrated circuits. The final chapter includes experiments to aid in understanding the operation of logic circuits. A glossary of digital terms has been included as an appendix.

Engineers, technicians, hobbyists and experimenters will profit from this new book.

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Accessory items for these antennas include medium to high power quadrature diplexers with over 30 DB isolation. Electrical deciders are also available, together with coaxial transmission line and supporting towers.

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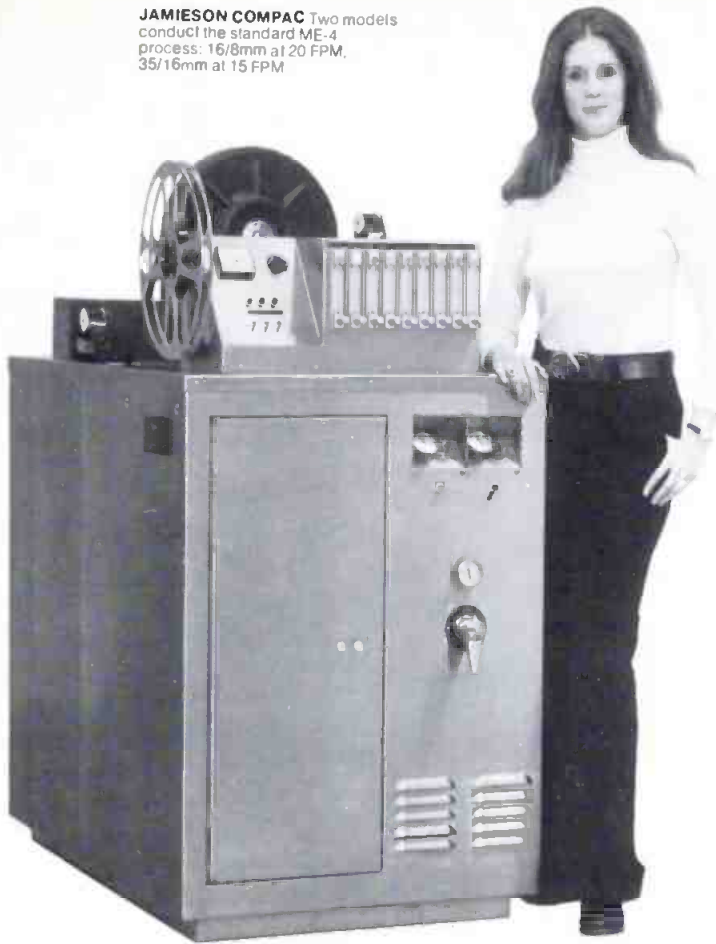
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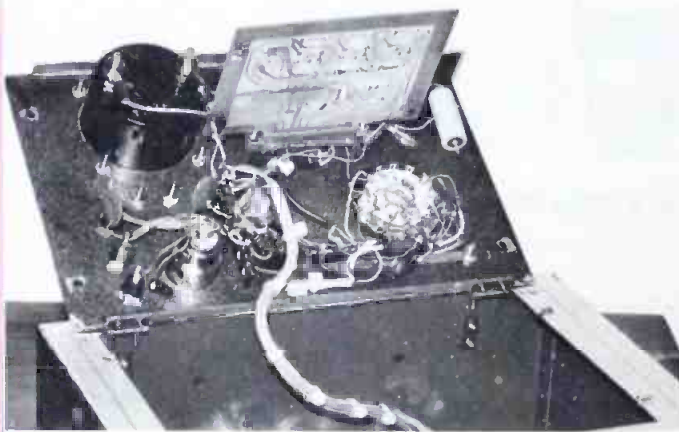
For More Details Circle (25) on Reply Card



The completed version of the KSL audio level meter

Building an audio level meter

Fig. 1 These two photos show component location and both sides of the audio level meter PC board layout.



By Dave Finley

Chief Engineer, KSL, Salt Lake City, Utah

One question that continues to pop up around a broadcast station is whether or not an instrument has the correct input and output levels. We all have standard peak and RMS voltmeters and oscilloscopes that aid us when troubleshooting a piece of gear on the bench. But, when it comes to the levels in dBm at a particular jack at the patch panel out of the console mic preamp coming from the network line,

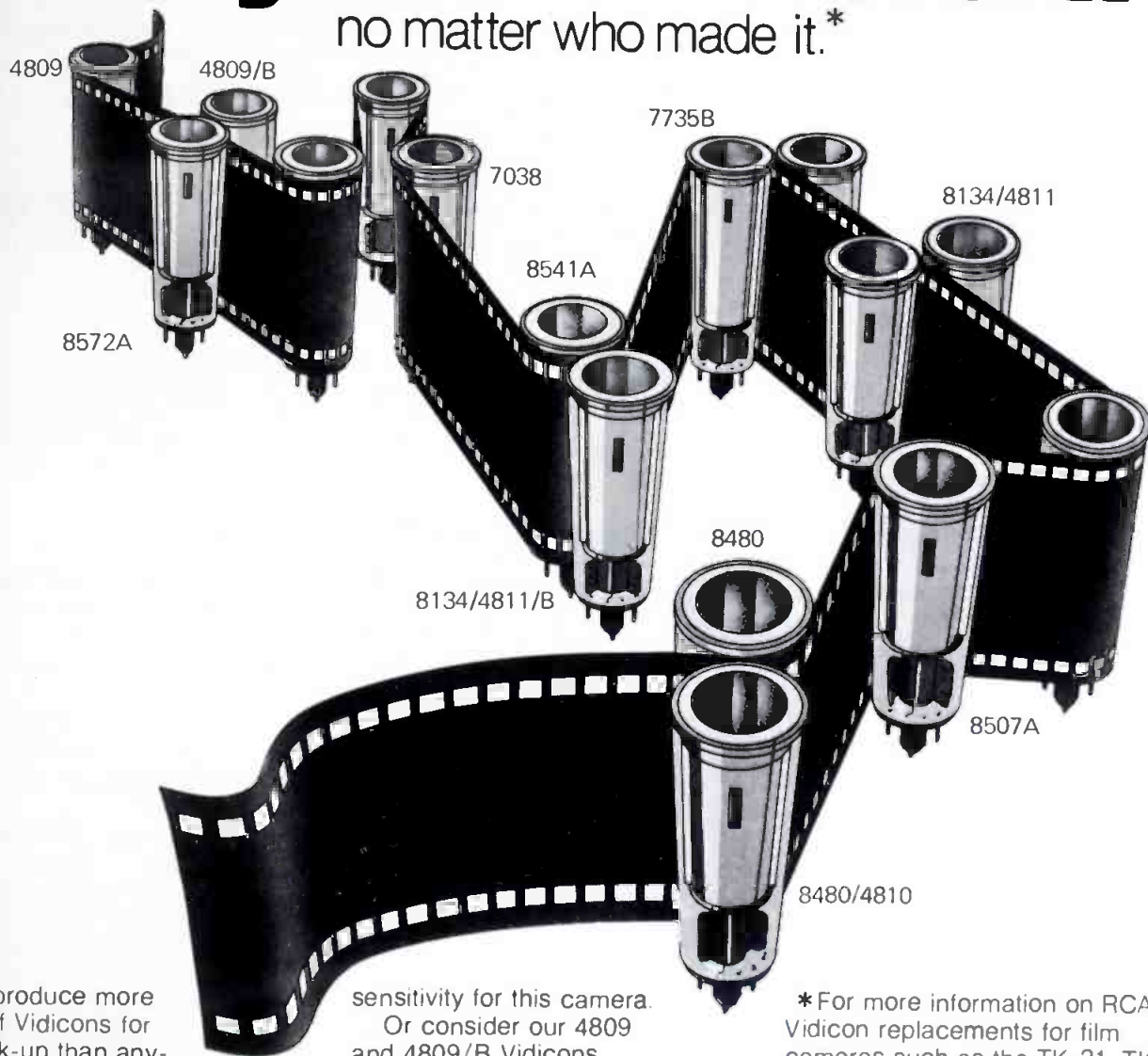
The radio engineering staff at KSL felt a need for an accurate, easy-to-read instrument that would allow us to check levels in dBm on any audio signal in the station. We decided that our design should meet the following specifications:

- Accurately indicate audio level from -60 dBm to +30 dBm;
- Allow you to monitor, through a speaker or earphone, the actual

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RCA Electro
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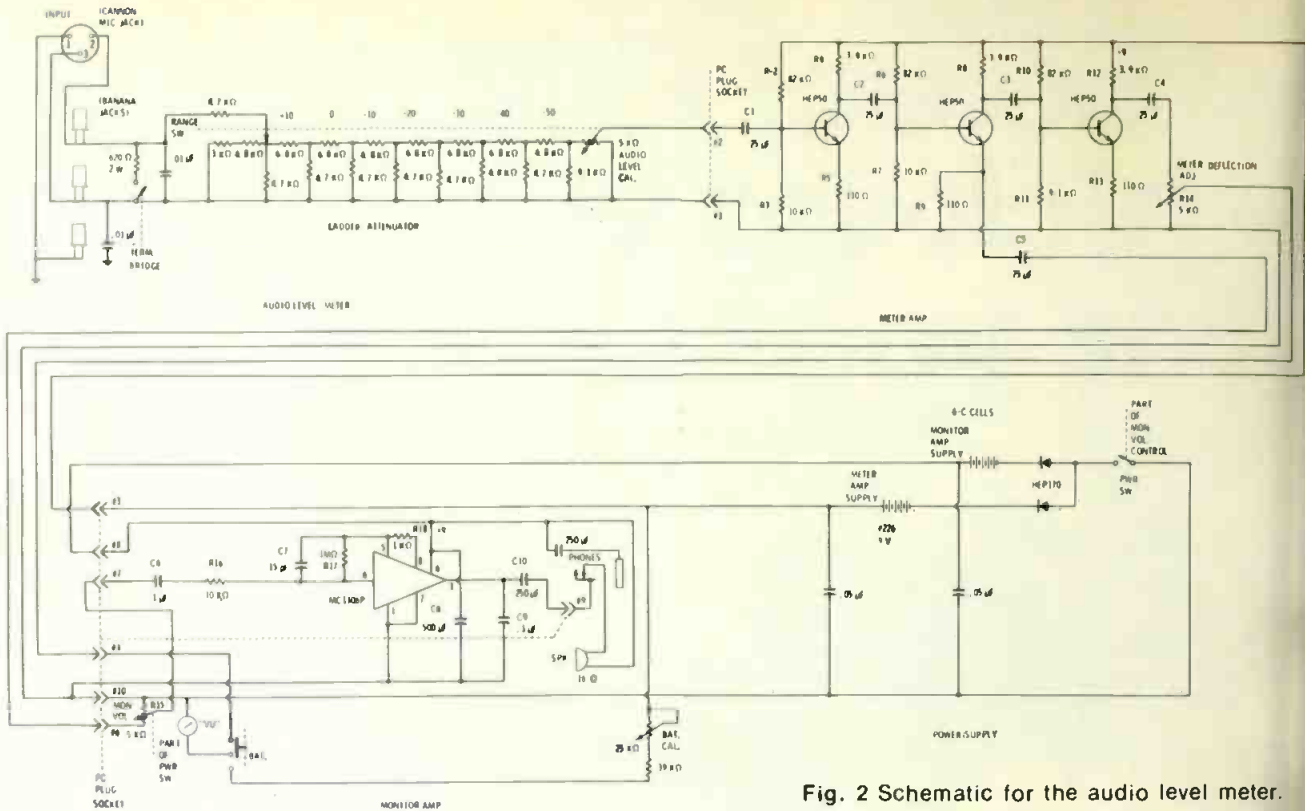


Fig. 2 Schematic for the audio level meter.

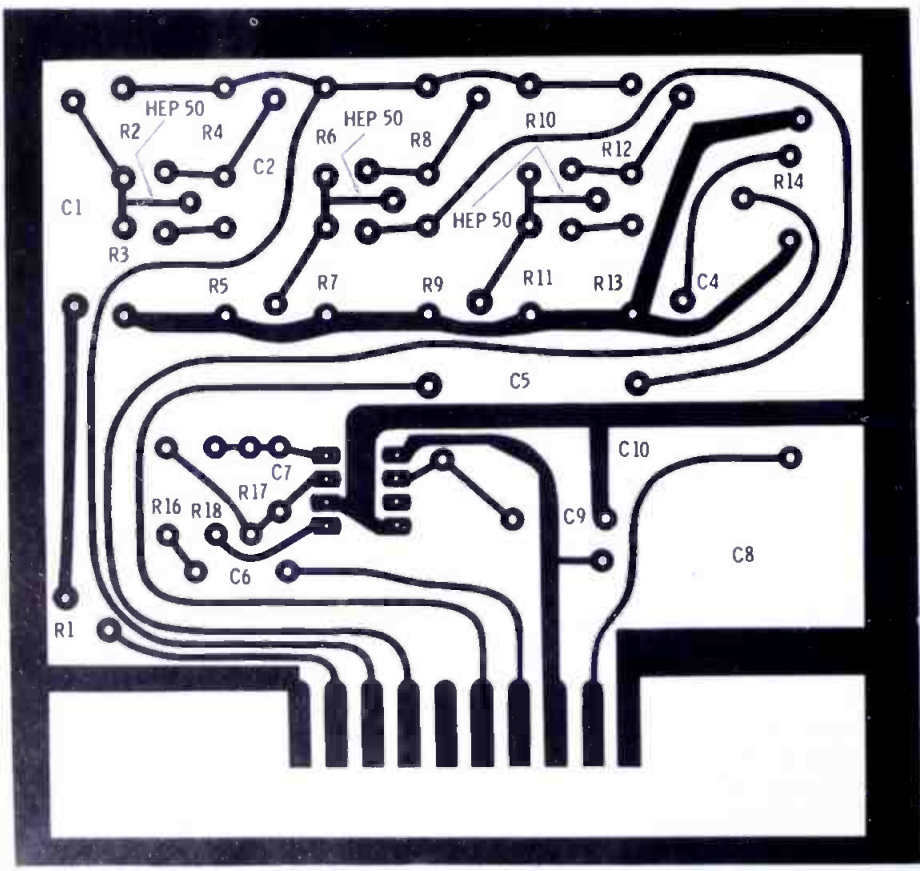


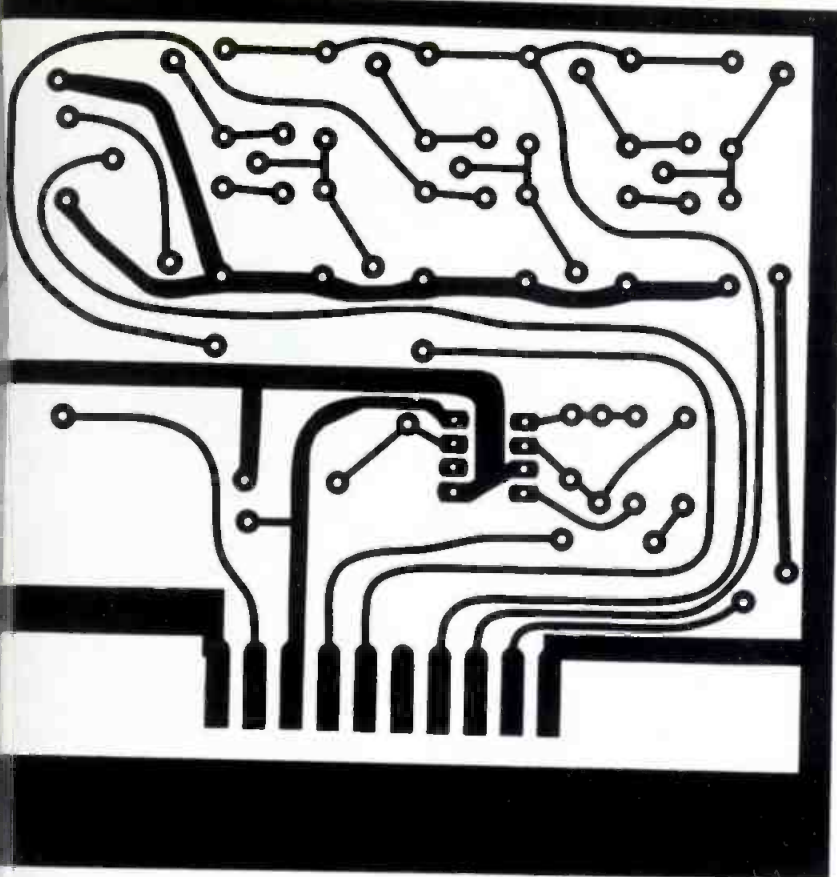
Fig. 3 This drawing shows the component side of the PC board.

source you're checking;

- Overload protected n.e circuit;
- Completely portable operation;
- Check microphones directly;
- Shut off automatically when is closed;
- Separate meter amplifier & monitor amplifier battery supply for increased accuracy when meter amp is used;
- Meter amplifier "battery check" circuit; and
- Provide bridging or 600 Ω terminating input.

After giving some thought to different types of designs, we finally selected a three-transistor meter amplifier circuit and a 1/2 W integrated circuit monitor amplifier circuit. These two amplifiers provide reliable, accurate service with low battery drain. We have made the audio level meter to be extremely useful and versatile. Its portability and monitor capabilities allow the engineer the pleasure of crawling through the most cluttered and cobweb-laden attic or closet space to check the console output line pad that was installed two-and-one-half decades ago by Marco brother-in-law.

We have found the meter to be particularly handy in locating



Here is the foil side drawing of the PC board.

problem when, say, a low level audio source originates in the news area, goes through five patch panels, four splitting pads, three amplifiers, two switching relays, and a partridge in a pear tree before **NOT** arriving in AM master control where it should be.

If your station, like KSL, does a fair amount of live studio or telephone call-in type programs, then you have undoubtedly heard the board announcer or moderator yell, five minutes before air time, "engineer!". This sobering outburst of anguish probably means trouble with the impending live program. As Murphy's Law stipulates, this will most likely happen when the Governor, the Mayor, the City Council, and the Board of Directors of your station's corporate structure are the guests on the program. At this point, the duty engineer has two options:

1. Walk across the street to a neighboring station and check out the employment situation, or
2. With audio level meter in



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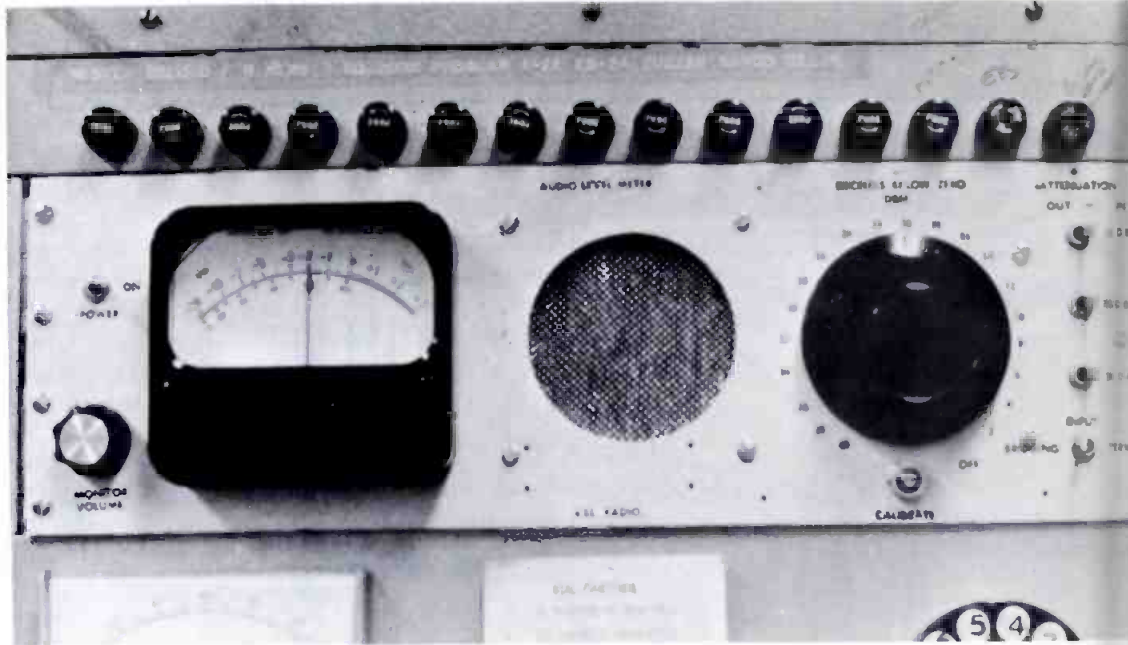


Fig. 5 The meter can be laid out on a different chassis and rack mounted, as shown here.

hand, calmly announce that this is just a regularly scheduled test of the "Head Engineering Licensing Program" (that's Help! for short).

The studio microphones can be checked directly for problems and if found to be okay, the level meter can then conveniently check across mic switch contacts for the proper audio level, across the preamp input or output, and right down the line to the console mixing bus until the problem is found. Being able to hear the quality of the signal that is being checked gives you a good idea of how much hum and noise there is, as well as revealing any "muddy" or "thin" audio.

Theory of Operation

The audio level meter is a precision measuring device capable of determining audio levels in dBm at most any point in a radio or TV system. The instrument is designed to either offer a bridging input impedance (greater than 5,000 Ohms) or a 600 Ohm terminating impedance. This allows you to "look" at a level without appreciably disturbing its value or act as a normal 600 Ohm load and show a "terminated" audio level.

KSL's audio level meter uses a "floating" amplifier arrangement so that both balanced or unbalanced lines can be checked without the

need for an input transformer. If an input transformer is desired, a good choice of impedance values would be 5k for both primary and secondary. The frequency response of the level meter then corresponds to that of the transformer's frequency curve.

The level meter design is straightforward and uses commonly available parts. The input of the level meter is routed through a stepped ladder attenuator which gives a 90 dB range to the meter in 10 dB steps. We have found that this is sufficient for most all audio level checks around a broadcast facility. This allows the engineer to measure and hear an audio signal anywhere from mic level to higher power line amplifier output level. The output of the ladder attenuator is dropped across R1 (calibration trim pot). This adjustment is provided to set the meter to zero dBm as compared to a known standard (e.g., calibrated audio generator).

The meter amplifier is comprised of three common emitter stages with its output dropped across R14 (meter deflection adjustment). The wiper of R14 goes through the battery check switch to a standard VU meter.

One of the features we felt was needed in a level meter of this type was the ability to protect the meter

when, say, we inadvertently, Friday the 13th, feed in +20 dBm while the level meter is set for 0 dBm. This is accomplished by u levels just below saturation in last transistor stage. To adjust meter protection circuit, a tone fed into the level meter input the range attenuator switch in appropriate position. With an oscilloscope hooked across the meter leads (R14 turned up about halfway), slowly increase the signal until the last transistor begins to clip. R14 can then be adjusted to read +3 VU. signal input increase over this will result in the last transistor saturating and no damage to the meter. Once the meter deflection adjustment (R14) has been set, the calibration pot can be adjusted for the correct dBm correlation.

The battery calibrate potentiometer is adjusted so that with "battery check" button depressed eight Volts will indicate zero. Eight Volts is the minimum the meter amp will accurately audio levels on the VU meter. Therefore, any "battery check" reading in the "red" (zero V above) will operate the meter satisfactorily. KSL's audio level meter does not have a "battery check" position for the mo

lifier supply, though one could
 sy be added if desired.

The monitor amplifier is a
 corola MC1306P 1/2 Watt IC
 associated external com-
 nents. The IC mounts in a socket
 e printed circuit board in case
 hip should ever fail, though
 uely. If it is decided to install
 arphone jack, the jack should
 insulated from the chassis by
 as of two extruded fiber
 bers.

Or monitor volume control
 also operates the power on/off
 h. The switch is a pull-on/
 huff type which enables us to
 ut a spring and sponge plastic
 h lid of the level meter to push
 switch off when the lid is shut.
 d helps reduce the chance of
 eigh the unit on and running the
 eies down.

At CSL we have constructed both
 otatable and a rack-mounted
 (D1 AC) version of the audio
 meter. The input to the rack-
 ed unit appears at a jack on
 ain patch panel (which is next
 h meter) for ease in checking
 of any patchable input or
 p. The faceplate of the rack-
 ed level meter is hinged at
 ad has a magnetic latch on
 ight for easy accessibility.

we have included a PC layout of
 eter and monitor amps that is
 atisfactory in operation. If
 ruction of the audio level
 is done by some other means,
 mportant to remember the
 or adequate wire size for the
 out common (16 gauge or
 el. Using small wire will create
 d oscillator with a howl that
 el bring help through the
 st fog.

h audio level meter can be a
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 y, and just about any audio
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 t that the time and money
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 lering the time and frustration
 es when working with audio
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FCC TYPE APPROVAL NUMBER 3-218

TRUE DIGITAL SYSTEM

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- A true digital antenna monitor specifically designed for broadcast directional antenna systems.
- Complies with FCC monitor and remote reading specifications. DAM-1 has received FCC Type Approved Number 3-218.

TWO WIRE TRANSMISSION REMOTE CONTROL UNITS DAML-1/DAMR-1



The DAML-1 and DAMR-1 provide for long distance remote control and readout of the DAM-1. Digital data is transmitted in both directions by integral FSK modems at 300 BPS.

HARDWIRE REMOTE CONTROL UNIT DAMH-1



The DAMH-1 provides for remote control and readout of the DAM-1 at distances to 1,000 feet.

TWELVE TOWER EXTENSION UNIT DAMX-1

The DAMX-1 permits the DAM-1 to be used for directional antenna systems with up to 12 towers.



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The TCT-1 and TCT-2 are precision toroidal current transformers to provide RF sampling voltages for the DAM-1 or other metering applications.

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"Hands on" Helical Editing

By Bill Meyer

Until recently, film reigned supreme in the area of low-cost programme distribution. This supremacy has been challenged by the various low-cost helical videotape formats. Due to the reusability of the tape medium, and the greater speed with which programme material may be generated, it is very rapidly gaining a strong foothold. In cases where extremely high resolution on a large screen is mandatory, film still has an advantage, however, on television screens, videotape gives a greater apparent resolution, and distribution costs are reduced.

As a result of the exposure to highly sophisticated productions which the public has received at the hands of the television networks, they have become somewhat immune to visual presentations, and highly discriminating of the appearance of these programmes. In order to secure their attention to

the material at hand, it is therefore necessary to achieve a similar level of sophistication, (even in non-broadcast applications). Helical scan recorders do not lend themselves to manually controlled editing. It is very difficult to achieve an aesthetically successful edit by manual means, due to the delay normally encountered in the control function of the recorder.

Because of the tape formats employed, physical splicing of helical tapes is not feasible, and precision in editing may therefore be achieved only through the use of an editing control system. Manufacturers have recognized the problem, and many such control systems have been introduced in the last few years. The difficulty lies in choosing the one which best suits the widest range of applications.

An editing control system may best be thought of as a pair of electronic hands. It is only there to

do what you yourself could do, with your reflexes sufficiently quick, and your sense of timing sufficiently accurate. To continue the analogy, these electronic hands should be designed that their operation requires no more thought than that of your own hands. This last is extremely important if attention is not to be diverted from the aesthetic requirements of the editing process.

Many of the manufacturers of these editing systems seem to have been so caught up in the technicalities of their designs that they have overlooked the human engineering element. This results in language problems that may render it necessary to include a translator in the system, in the form of an operator. The ideal editing control system should be operable by production personnel, (or else the process can become unnecessarily difficult.)

Management Highlights

The EA-5 is a film (natural) approach to video editing. It'll be on exhibit at the NAEB convention, and when you see the system in operation, it will remind you of film editing. That is, the creative person looking at the video can stop the video tape and move it by hand as many or as few frames as he wants. There just is no guesswork!

To make the point clear as to how this system differs from that presently in use, let's listen to two men who have just seen a demonstration of the EA-5. The first one says, "But you're backing up by hand. Suppose I want to go back 15 frames?" Says the other man, "Just how do you know you want to go back 15 frames? Why not 10 or 12?" In fact, it's guessing. With the EA-5, there is no guessing.

At first glance, it may seem like we're going backwards in editing development. Not really so. The hands on editing not only is precise, but it also allows the helical owner to pay a price he can afford for an editing system that allows maximum freedom for the creative editor.



Fig. 1 The TRI EA-5 editing control system for helical VTR's.

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Because with the 3M TBC you can get a clean, rock-solid signal out of virtually any VTR.

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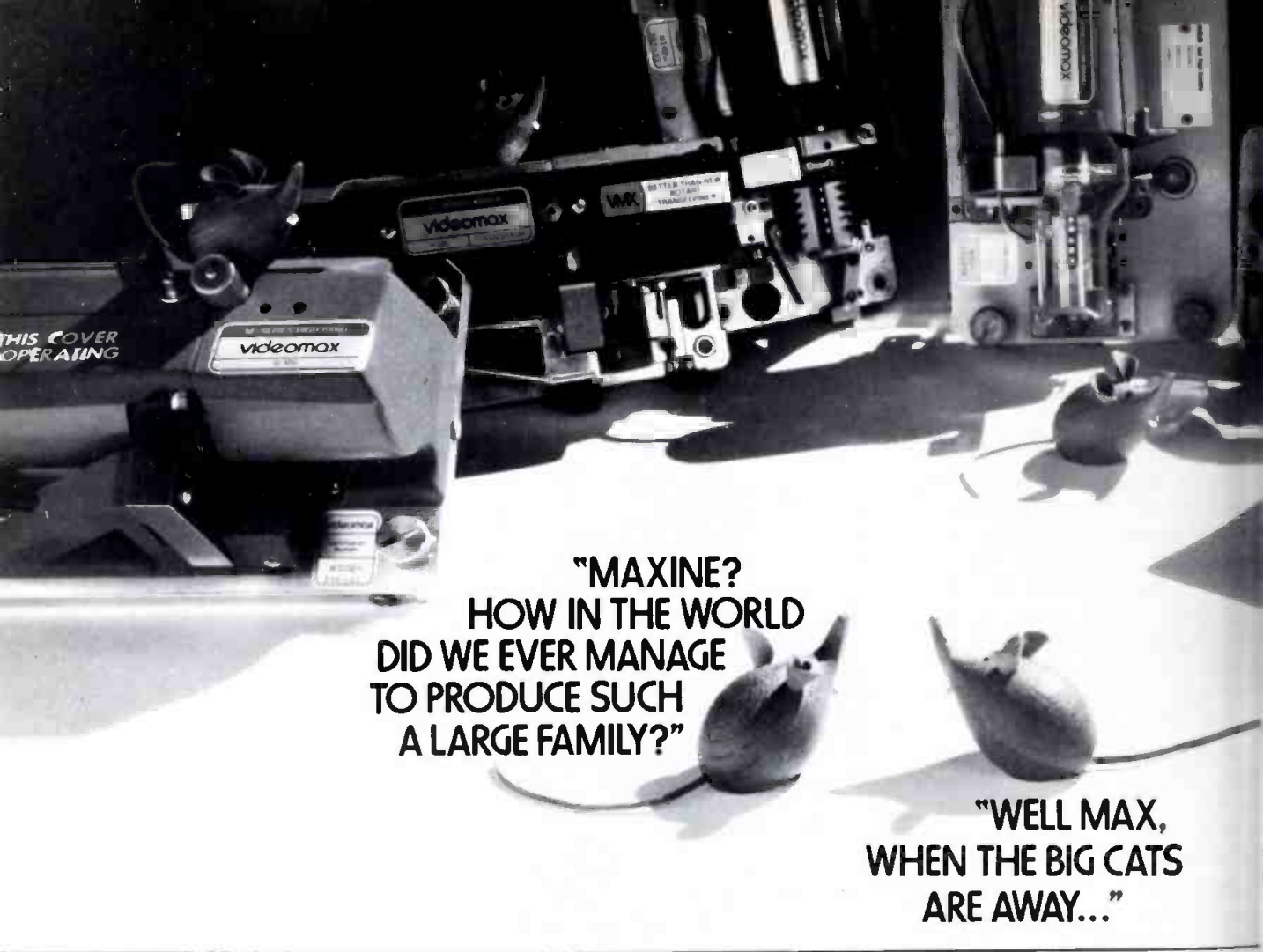
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THE 3M TBC

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**"MAXINE?
HOW IN THE WORLD
DID WE EVER MANAGE
TO PRODUCE SUCH
A LARGE FAMILY?"**

**"WELL MAX,
WHEN THE BIG CATS
ARE AWAY..."**

Unlike most other pieces of equipment, an editing control system should probably be selected by production personnel. This will bring on outcries from most of the engineers in our midst, and I might be branded as a traitor, but it is nonetheless true. Only the people who place demands on the equipment can determine properly whether it can meet the aesthetic needs of their application.

Most production personnel will be familiar with film editing methods, and almost certainly wish that editing videotape were as simple and accurate. In order for this to be so, it must be possible to view the tape one frame at a time, and to accomplish the edits with one-frame accuracy. This is the area in which helical formats have an advantage over quadruplex — they are capable of displaying a still-

frame. To do this with quadruplex tape is impossible, and if such accuracy is necessary, it must be gained through the use of time codes and slow-motion disc recorders. This is obviously both time-consuming and expensive. It is also far less simple than editing film.

In a recent article in "Educational & Industrial Television" Richard S. Marcus reviewed various methods employed by editing control systems on the market today. In this article, which is one of the most comprehensive magazine treatments of the subject to date, Mr. Marcus describes three basic methods of addressing tape locations. The first of these is the manual method familiar to all of us, using the tape counter in the recorder, and manually initiating the edit point. This is the most inaccurate of all possible methods. The second depends on rolling back tapes back a predetermined amount of time in a "reverse play" mode. They are then rolled forward,

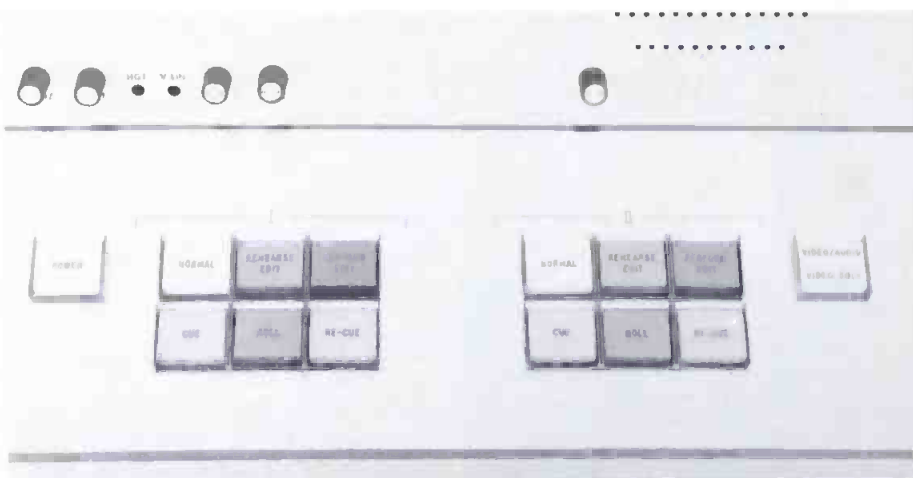
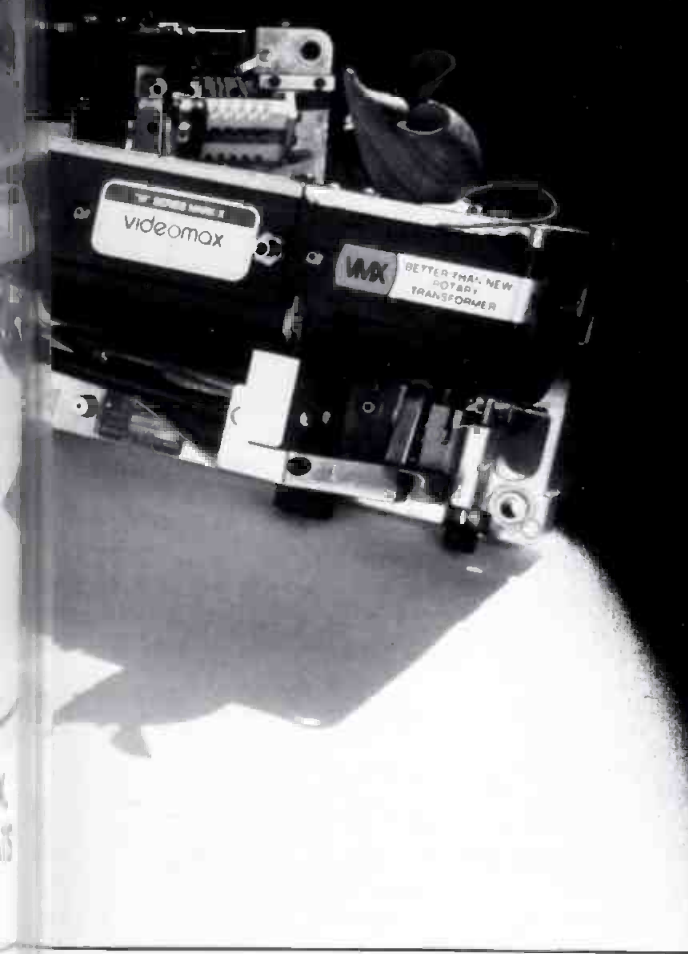


Fig. 2 Closeup of the front panel controls of the EA-5.



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credit is begun automatically by the same mechanism which timed the rollback. This method is far more accurate, but is subject to small variations in timing accuracy depending on the difference in the amount of tape on the two reels, as well as the difference in tape thickness between the two recordings. The final, and most accurate method, is time-code editing. This method has several advantages in hardware cost, complexity, and requires considerable training on the part of the operator.

Mr. Marcus has gone to great lengths to stress the importance of creative freedom in an editing system, and that is good. However, the article leaves the reader with the impression that the sort of sophistication achieved with broadcast editing equipment cannot be duplicated with less expensive equipment, and this is not altogether true. There is, in fact, a fourth type of editing system which has become recently available.

ditional, a California-based company, has developed an editing control system which is unique among low-cost systems, in that it achieves the same sort of accuracy as time-code systems, and does it at very low cost. In order to edit with single-frame accuracy, it is necessary to employ a closed-loop system. In other words, edit points must be identified as geographic

locations on the tape. This is the advantage that time-code systems have over most others. TRI set for themselves the goal of achieving time-code accuracy, without time-code expense and complexity. This goal has been realized by counting control-track pulses.

Unlike quadruplex recorders, which employ a complex control track, helical-scan recorders use a

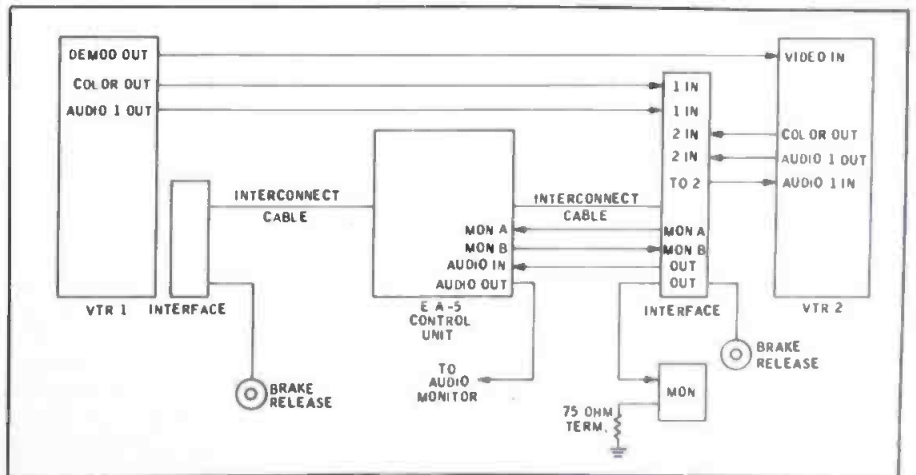


Fig. 3 Tape to tape Interconnect of the EA-5.

simple control track consisting of pulses at either field or frame rate. This lends itself quite readily to counting, and therefore enables very simple closed-loop control. It is not necessary to manually enter a time-code address, and the control system counts these control track pulses as you might count either sprocket holes or frames lines on film.

The TRI model EA-5 Editing Control System also meets the other basic considerations involved in the simplification of the editing process. It has dual controls, with a novel system of indicators to guide the operator. Additionally, it adds to the recorders a still-frame mode, which makes location of edit points extremely simple, whether they are to be identified on the basis of either video or audio content. A foot pedal is also incorporated as a release for the parking brakes on the recorder, and by releasing the brakes, it is possible to adjust tape position manually, viewing the individual frames, just as you would do with film on a Movieola.® The monitor output of the editor normally displays the video and audio outputs of the editing recorder, however, releasing the brakes of the playback recorder simultaneously switches the monitor display to the outputs of the playback machine, thus giving the effect of a dual Movieola,® and allowing direct comparison of the video content of the two points selected. This is of particular benefit, since it is quite easy otherwise to forget where you are in the editing process.

The control system has an edit preview function which allows evaluation of the continuity surrounding the edit point.

As an engineer for a mobile teleproduction company, I had the task of selecting an editing control system to meet rather unusual and stringent requirements. Our mobile van is equipped with very sophisticated production equipment, and our recorders are helical-scan. We offer a production service which caters to widely divergent needs,

from industrial training programmes to broadcast commercials. Our primary attraction for a client is economic, but to sell broadcast material, our quality must be impeccable. The use of helical recorders offered the largest single savings in hardware cost that was open to us, and it imposed very heavy demands on the rest of the system. In order to combat this problem, we knew that the recorders had to be the only elements of the system open to criticism, and this meant finding an editing control system which would offer extreme flexibility, without incurring extreme cost.

Since we also offer our facility to clients who will crew it themselves, the editing system we would select also had to be simple to operate. In short, we were in need of a system with maximum flexibility and sophistication, at minimum cost. Time-code systems were ruled out at the start, as we also offer editing services to customers who would not have time code generators, and the necessity of recording a time-code track before editing could begin would eliminate part of our cost advantage.

In the interests of system simplicity, we opted in favor of operating on only one helical format. Videocassettes were ruled out both by their inherent qualitative limitations, and by the difficulty of editing when it is impossible to handle the tape reels. Likewise, the EIAJ half-inch format was ruled out on the basis of quality. Economy, quality, and local market acceptance finally made us decide on the IVC format. These same considerations caused us to select the TRI editing control system. Any doubts we may have had about the wisdom of that choice have long since been eliminated by the impression it has made on our clients. The EA-5 meets all of the criteria we had determined, and has proved to be highly reliable. It has supplied us with what we feel to be the ultimate in creative freedom.

Unlike many of the other systems

on the market today, the operation of the TRI EA-5 has not previously been described in any major trade journals. So we have written this article in the interest of helping others to evaluate the applicability of this system to their own editing requirements.

Summary

There are many different techniques within reach of the EA-5 editing control system. Within the space of this article it has been possible to present only a few. Undoubtedly the end user will wish to develop techniques best suited to his particular application. He is limited only by his ingenuity and not the hardware.

To operators in systems which employ both three-quarter inch cassettes and one-inch open reel formats, it should be pointed out that editing on the one-inch format is far simpler than on cassette. Even when material has been mastered on cassette, it is still necessary to view the material prior to editing, and a transfer to one-inch, if done while viewing, does not entail an extra step. The degradation implied by an extra generation is negligible, since the capability of the one-inch format is beyond that of cassettes. The finished product may then be transferred to any desired format for distribution.

Biographical Note

Mr. Meyer is engineering supervisor for Lorry Productions, Inc., a mobile teleproduction company based in Toronto, Canada. He has extensive experience in the field of helical recorders, both in closed circuit and broadcast applications. His previous experience includes work as a field service engineer for the Canadian office of International Video Corporation. He was also involved in some of the earlier work in the use of helical recorders as primary broadcast tools.

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Simplifying digital math

By Harold Ennes

In this third part of our series, we continue with binary multiplication and how to multiply zeros and ones. From there we move into decimal to binary, octal-code binary, and basic Boolean algebra.

This Part will show you how to easily convert decimal (base 10) numbers to binary digits, and how you can avoid long strings of zeros and ones by conversion.

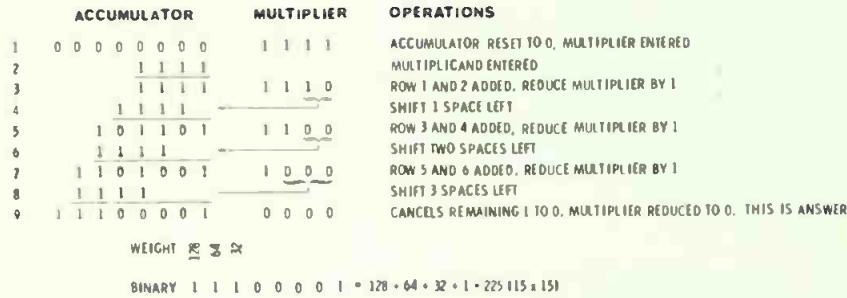


TABLE 7
THE OCTAL SYSTEM

OCTAL WEIGHT	8 ³	8 ²	8 ¹	8 ⁰	.	8 ⁻¹
DECIMAL	512	64	8	1	.	0.125

POINT

Figure 7

POWERS OF 2	2 ¹¹	2 ¹⁰	2 ⁹	2 ⁸	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	.	2 ⁻¹	2 ⁻²
DECIMAL VALUE	2048	1024	512	256	128	64	32	16	8	4	2	1	.	0.5	0.25
BINARY FOR 1124.75	0	1	0	0	0	1	1	0	0	1	0	0	.	1	1

STEP	NOTES	OPERATION
1	1124.75 NUMBER TO BE CONVERTED	
2	- 1024.00 LARGEST WHOLE POWER OF 2 THAT CAN BE SUBTRACTED	PLACE A 1 UNDER 1024
3	100.75 REMAINDER	
4	- 64.00 LARGEST WHOLE POWER OF 2 THAT CAN BE SUBTRACTED	PLACE A 1 UNDER 64
5	36.75 REMAINDER	
6	- 32.00 LARGEST WHOLE POWER OF 2 THAT CAN BE SUBTRACTED	PLACE A 1 UNDER 32
7	4.75 REMAINDER	
8	- 4.00 LARGEST WHOLE POWER OF 2 THAT CAN BE SUBTRACTED	PLACE A 1 UNDER 4
9	0.75 REMAINDER	
10	- 0.50 LARGEST WHOLE POWER OF 2 THAT CAN BE SUBTRACTED	PLACE A 1 UNDER 0.5
11	0.25 REMAINDER	
12	- 0.25 LARGEST WHOLE POWER OF 2 THAT CAN BE SUBTRACTED	PLACE A 1 UNDER 0.25
13	0.00 REMAINDER	

STEPS IN CONVERTING DECIMAL 1124.75 TO BINARY EQUIVALENT

Figure 8

	POINT															
(A) POSITIONAL WEIGHTS FOR OCTAL CODE	4	2	1	4	2	1	.	4	2	1						
(B) BINARY GROUPS OF 3	1 0 0			0 1 0			.	0 1 0								
(C) CORRESPONDING OCTAL NUMBER	4			2			.	2								
(D) POSITIONAL WEIGHTS FOR PURE BINARY	32	16	8	4	2	1	.5	.25								
(E) PURE BINARY NUMBER	1 0 0			0 1 0			.	0 0 1								
(F) CORRESPONDING DECIMAL NUMBER	3 4			.	2 5											

CONVERSION OF BINARY TO OCTAL AND OCTAL TO DECIMAL
NOTE THAT BINARY 100010.01 = 42.2 OCTAL AND 34.25 DECIMAL

Figure 9

Solutions To Part II Exercises

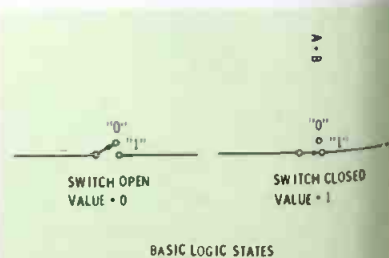
$$\begin{array}{r}
 1. \quad 1001 \text{ (decimal 9)} \\
 \times 0100 \text{ (decimal 4)} \\
 \hline
 0000 \\
 1001 \\
 0000 \\
 \hline
 100100 \text{ (decimal 36)}
 \end{array}$$

$$\begin{array}{r}
 2. \quad 1110 \text{ (14)} \\
 \times 0101 \text{ (5)} \\
 \hline
 1110 \\
 1110 \\
 \hline
 1000110 \text{ (70)}
 \end{array}$$

3. See Fig. 7 for solution to 1111 1111.

$$\begin{array}{r}
 4. \quad 101111.10 \text{ (47.5)} \\
 - 001101.01 \text{ (13.25)} \\
 \hline
 100010.01 = (34.25)
 \end{array}$$

Note that the 0-1 of the first (far right) digit gives a difference of and a borrow of 1. This convert the second digit (top row) to 0, an 0-0=0. The remainder is self explanatory. Review Part I and Table 6 if necessary.

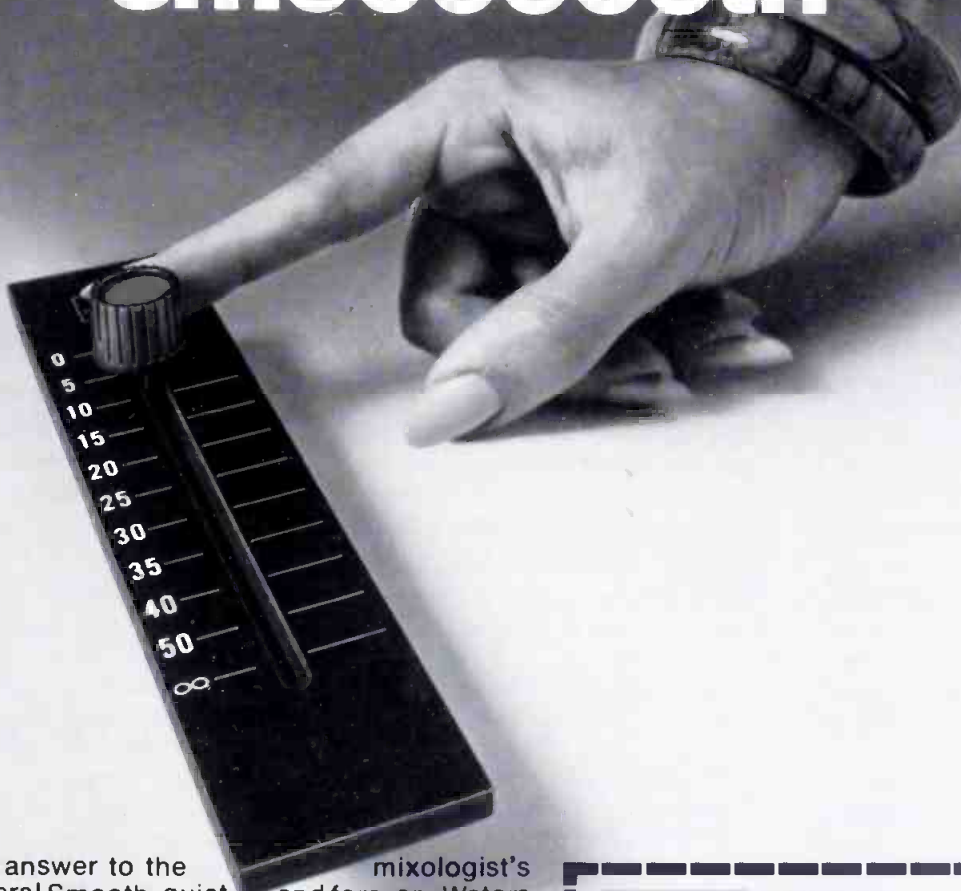


BASIC LOGIC STATES

Figure 10

Waters Attenuators

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Decimal To Binary

You have discovered from previous study how easy it is to convert binary numbers to decimal numbers. You must also be able to convert decimal numbers to binary numbers.

In Figure 8, you can see that binary 10001100100.11 is equal to $1024 + 64 + 32 + 4 + 0.5 + 0.25 = 1124.75$. Now let's see how the 1124.75 is converted to the binary notation.

Step 1 (Figure 8) records the number to be converted. Step 2 is to write down the largest whole power of 2 (in decimal form) that can be subtracted from the number in step 1. This is 1024 so you place a 1 under the decimal value of 1024 in the bottom row of Figure 8. Step 3 is to find the remainder, and step 4 is to find the largest whole power of 2 that can be subtracted from the 100.75 of step 3. So you place a 1 under 64, and so on, through all remaining steps. Then you write a 0 under all values not used in the above procedure. Thus you find that the decimal $1124.75 = 10001100100.11$. When you memorize the powers of 2 and their

decimal equivalents, and get a lot of practice (which is required in any math), you will be able to write a binary notation of a decimal number without actually drawing up a table.

As you know by now, a binary notation can become very long in representing decimal values. We are now in a position where we can study various number conversion techniques that simplify binary numbers.

Pure Binary And BCD

Thus far we have been concerned with the pure binary code which uses the exact positional weight (as in Figure 8) of each digit as the weight value.

The binary coded decimal (BCD) code employs four binary bits per character and the weight scheme of 8-4-2-1. You already know that 4 bits can represent a pure binary number from 0 to 15. For BCD, only the ten decimal symbols 0 to 9 are normally employed. To express decimal numbers greater than 9, a separate bit group is used for each digit.

For example, 92 in pure binary form = 1011100. The 92 in BCD

$$\begin{array}{r} \underline{1001} \\ 9 \end{array} \quad \begin{array}{r} \underline{0010} \\ 2 \end{array}$$

Note that the first group is decimal 9, and the second group a decimal 2 = 92 in BCD. Each group simply represents a number from 0 to 9. Thus for 920, pure binary = 1110011000. In BCD it

$$\begin{array}{r} \underline{1001} \\ 9 \end{array} \quad \begin{array}{r} \underline{0010} \\ 2 \end{array} \quad \begin{array}{r} \underline{0000} \\ 0 \end{array} = 920 \text{ BCD}$$

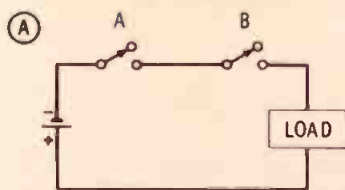
In one way, this greatly simplifies conversion of decimal numbers to binary notation. Examples:

$$\begin{array}{l} 75 = 0111 \ 0101 \\ 755 = 0111 \ 0101 \ 0101 \\ 8755 = 1000 \ 0111 \ 0101 \ 0101 \end{array}$$

Still it will be observed that there are many bits to represent equivalent decimal numbers.

Octal-Coded Binary

The octal system is a common numbering system within the digital area which greatly simplifies the handling of long strings of 0's and 1's required in pure binary to represent an equivalent decimal number.



BASIC FUNCTION

TRUTH TABLE (AND)

CONDITION	A	B	AB
1	0	0	0
2	1	0	0
3	0	1	0
4	1	1	1



OUTPUT READS A AND B

DIAGRAM SYMBOL

FUNDAMENTALS OF AN "AND" CIRCUIT

Figure 11

You'll recall in Part 2 that we were pointing out that a one-space shift in the binary system is simply a power of 2 change rather than the power of 10 change you're used to in the decimal system. The example was in multiplying 12 times 13. The answer, of course, is 156. In binary form, that would be 1100 times 1101, and that would equal 10011100. Below you see the conversion to a decimal value. (This was referred to in Part 2 as Figure 4.)

Weight	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2	2 ⁰
Value	128	64	32	16	8	4	2	1
Binary:	1	0	0	1	1	1	0	0
=	128		+	16	+8	+4		

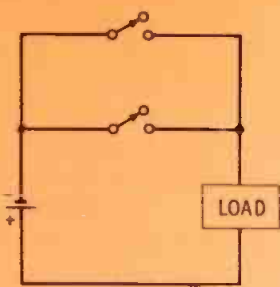
= 156 (answer)

CONVERSION OF BINARY 10011100 to decimal value.

ACCUMULATOR MULTIPLIER

1.	000	13
2.	<u>012</u>	
3.	012	12
4.	<u>012</u>	
5.	024	11
6.	<u>012</u>	
7.	036	10
8.	<u>120</u>	
9.	156	0 (answer)

12 X 13 IN "OLD FASHION" (BASE 10) CALCULATOR STYLE TEXT FOR PROCEDURE.

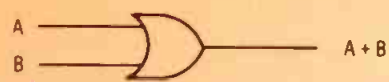


(A) BASIC FUNCTION

TRUTH TABLE (OR)

CONDITION	A	B	A + B
1	0	0	0
2	1	0	1
3	0	1	1
4	1	1	1

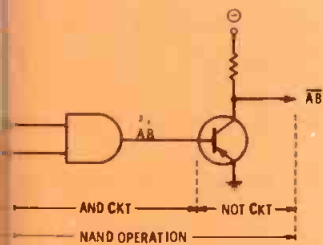
(B) FUNDAMENTALS OF AN OR CIRCUIT



OUTPUT READS A OR B

(C) DIAGRAM SYMBOL

Figure 12



TRUTH TABLE (NAND)

A	B	AB	\overline{AB}
0	0	0	1
1	0	0	1
0	1	0	1
1	1	1	0

(B) TRUTH TABLE FOR (A)



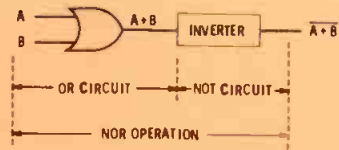
OUTPUT LOW ONLY WHEN BOTH INPUTS HIGH (EQUIVALENT OF FIG 13A)



OUTPUT HIGH ONLY WHEN BOTH INPUTS LOW

FUNDAMENTALS OF A "NAND" CIRCUIT

Figure 13



TRUTH TABLE (NOR)

A	B	A + B	$\overline{A + B}$
0	0	0	1
1	0	1	0
0	1	1	0
1	1	1	0

(B) TRUTH TABLE FOR (A)

(A) DIAGRAM



OUTPUT LOW WITH EITHER INPUT HIGH



OUTPUT HIGH WITH EITHER INPUT LOW

FUNDAMENTALS OF A NOR CIRCUIT

Figure 14

position weighting is based on powers of 8. The octal system converts readily to binary form, and *versus*, because the base of the binary system (8) is an integral power of 2 ($8 = 2^3$).

Since the octal system has 2^3 as its primary base, we can arrange a long string of zeroes and ones in groups of 3-bits; this converts the binary to a trivalent octal. Let's see how to do this is.

Figure 9, the pure binary word 1010.01 has been arranged in groups of 3-bits each under the corresponding positional weights for octal coding. Beginning at the binary point, mark off the digits into groups of 3 digits to the left and to the right of the point. Add a 0 where needed to complete a group of three.

When converting from octal to binary form, it is most convenient to use the octal-to-binary conversion as an intermediate step. This is shown in rows C-D-E of Figure 9. When the binary is converted to octal form in the normal manner shown by rows E-F. Note carefully in row A that the octal weight

4-2-1 applies to all blocks of three, even those to the right of the decimal point. Thus pure binary $100010.01 = 42.2$ octal = 34.25 decimal.

With some practice, all steps of decimal-to-octal and octal-to-decimal using pure binary as an intermediary can be done mentally.

For example, what is the decimal equivalent of octal 26.1? Just visualize as follows:

$$\begin{array}{r} \text{Octal} \quad 2 \quad 6 \quad 1 \\ \quad \quad \downarrow \quad \downarrow \quad \downarrow \\ \text{Binary} \quad 010 \quad 110 \quad 001 = \\ \text{pure binary } 101110.001 \end{array}$$

Then from binary to decimal by powers of 2 weight and summation: $010110.001 = 16 + 4 + 2 + 0.125 = 22.125$ decimal.

Another example, what is the octal equivalent of decimal 568? Using the procedure of Figure 8, decimal $568 = 1000111000$ in binary form. Then converting this to octal:

$$\begin{array}{r} \text{Binary:} \quad 001 \quad 000 \quad 111 \quad 000 \\ \quad \quad \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ \text{Octal:} \quad 1 \quad 0 \quad 7 \quad 0 = \\ \text{octal value of } 1070 \end{array}$$

Keep Your Perspective

The binary system, keyed to the decimal and octal systems, is used in all digital devices and the great majority of computers. Therefore, we have stressed the correlation of the binary notation with decimal and octal values. However, the octal (base 8) system can be represented as increasing powers of 8 just as the decimal system (Table 1) is expressed in increasing powers of 10, and the binary system (Table 2) in increasing powers of 2. This is illustrated in Table 7. While increasing powers of 8 are not easily handled, it is pertinent to keep the proper perspective in all number systems.

For example, octal 26.1 is equal to $(2 \times 8^1) + (6 \times 8^0) + (1 \times 8^{-1})$. This is $(2 \times 8) + (6 \times 1) + (1 \times 0.125) = 16 + 6 + 0.125 = 22.125$ decimal.

Basic Boolean Algebra

All logic schematics are simply functional flow-charts; you must be able to recognize the meaning of each "block" from its symbol. Boolean algebra is concerned with

elements that have only two possible stable states and no unstable states. It well represents switching circuits because a switch can be in only one of two possible stable states; "closed" or "open" as in Figure 10. The 0 can represent an open switch, and 1 can represent a closed switch.

0 = open circuit or non-conducting path

1 = closed circuit or conducting path

In Figure 11A, observe a simple circuit with two switches in series. Both switches must be closed to complete the circuit. If A or B is open, the state is 0, if both closed, the state is 1. If we draw up a truth table for this circuit as in Figure 11B, we list all the possible states of the switches under A and B, and derive the function AB in the last column. IMPORTANT NOTE: AB is read "A and B". It does not mean the product $A \times B$ as in con-

ventional algebra.

From Figure 11B, condition 1 is with A and B open (0 state) so function AB is also 0. Conditions 2 and 3 have only one switch closed (state 1) at a time, so the function of A and B is still 0. Condition 4 is with both A and B closed (1 state) and therefore function $AB = 1$. You must recognize this as an AND (coincidence) circuit since both A and B must be in the 1 state for a current to exist in the load. Figure 11C is the diagram symbol for the AND circuit.

Follow the same type of reasoning for Figure 12. The expression $A + B$ is read "A OR B", NOT "A plus B." It is an OR circuit since if either A OR B is closed (1), current flows in the load and the output $(A + B) = 1$.

If 0 is an open circuit and 1 is a closed circuit, what happens when a signal resulting from a given state goes through a phase reversal? Just what you would expect from basic electronics. In Figure 13 we have an AND circuit feeding the base of a transistor. The AND circuit output is A AND B (AB), so if both inputs are 1's, the base is in a 1 state (condition 4 of the truth table Figure 11B). This signal is inverted at the collector, so the output is now a 0 state, or NOT AB (signified by a line over AB, or \overline{AB}). The entire circuit is now termed a NAND.

This simply means we have an inverted AND, or NOT AND, operation. This is to say an AND circuit with phase reversal. Since the inputs must be high (1) for the output to go low (0), the symbol of Figure 13C is used. The small circle on the output indicates the output is 0 (low) only when both inputs are high (1). When the circles are on the input as in Figure 13D, the output is high (1) only when both inputs are low or 0.

Figure 14 shows the same kind of logic applied to an OR circuit. When the phase is reversed, the state becomes NOT A OR B (designated $A + B$) and is termed a NOR circuit. Figure 14C is the symbol for a NOR circuit when the output is high with either A or B high (1). Figure 14D is the NOR symbol when the output is low (0)

with either A or B in the high state. Memorize logic symbols and their functions. Practice problems in Part V of this series will give additional experience in logic analysis.

In this very brief study of Boolean algebra, we have hardly skimmed the surface of its entire application. Since this series is concerned primarily with binary mathematics (upon which all logic circuits operates) the serious student will undertake further study of Boolean algebra on his own. Go to a good technical library and examine the books available on the subject, and pick the one of most value to you. Purchase this book from the publisher or a bookstore and assign yourself regular study hours.

Exercises for Part III

- Write in BCD: (a) 825
(b) 786
(c) 22
(d) 10
- Convert following base 10 numbers to octal form:
(a) 16
(b) 11
- Convert binary 1111111.11 to octal equivalent.
- Convert octal 56.1 to decimal form.
- Convert decimal 653.1875 to binary form.

Author's Note

Re/DIGITAL MATH, Part I June issue, page 26 column A, 6 from bottom should read: $1100101 = 64 + 32 + 4 + 1 =$

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Chapters In The Making

Chapter 1: Binghamton, N.Y.
Chairman: W. J. Sitzman, Jr.,
Binghamton, N. Y. 14887

On Tuesday, September 10th, a social dinner preceded the meeting at Owego Treadway Inn, Owego, N.Y. Edward Mullin, Director of Engineering at Ampro Corporation, Willow Grove, Pa. spoke on New Developments in Bridge Tape Equipment Design. Mullin covered the features of improved stereo phase tracking, reduced maintenance requirements, automation of the digital cue tone synthesizer, fool proof method of cue detection, and advantages in use of constant-current bias recording.

Chapter 9: Phoenix, Ariz.
Chairman: Leo Anglin
Phoenix, Ariz. 85001

The July meeting was held on the set at KOOL-TV studios where Earl Blaffey, KTVK, chapter program chairman, presented Bill Montgomery of Tektronix who spoke on Vertical Interval Reference Signals. Chairman Leon Anglin announced that the annual Christmas Party will be held on Friday, December 13th at Singing Canary, 921 West Camelback, Phoenix, Arizona. Cost will be about \$10 per person.

Preliminary planning for a Mini-Convention to follow the Arizona State Broadcasters Convention, December 15th and 16th, was also previewed. For further information on this is available from Chairman Anglin.

On September 19th the chapter met at KTVK-TV where Telemation's engineer provided a program on the video area of broadcasting. For further information on this meeting will be covered in the next issue.

Chapter 15: New York, N. Y.
Chairman: John M. Lyons
Yonkers, N. Y. 11377

On September 12th, members and guests of the chapter met at Kluge Presentation Theater, WNEW-TV, 205 East 67th St., 3rd Floor, to hear Robert McAll of Vital Industries, Yonkers, N.Y. talk on a variety of topics including Production Switching, Video Tape, TV Measurements, Plant Sync Systems, Automation, Long Line Circuits, and What's Wrong in TV Transmitters.

The Mini-Convention, which was held by the chapter on October 24th and 25th at the Tarrytown, N.Y. Hilton Hotel, grew to surprising proportions,

and will be covered in detail in the next issue.

Chapter 16: Seattle, Wash.
Chairman: Harry Lewis
Seattle, Wash. 98125

The September 18th meeting was held in 2 locations; first, the social hour and lunch took place at the Black Angus Restaurant. Afterwards, members and guests proceeded to the KAYE-Smith-Van Ackern Stage Production Studios where Dick Reilly of International Video Corporation demonstrated their new IVC 9000 VTR and IVC color cameras.

Chapter 20: Pittsburgh, Pa.
Chairman: Henry R. Kaiser
Pittsburgh, Pa. 15212

On September 19th, a luncheon meeting took place at Buddies, Upstairs. The meeting related mainly to the Mini-Convention which is scheduled for November 1st at the Pittsburgh Marriott. Exhibits will be included.

Chapter 21: Spokane, Wash.
Chairman: T. O. Jorgenson
Spokane, Wash. 99201

All chapter meetings have been held at the Castle Restaurant. However, according to Chairman

Jorgenson, a new location will now be required due to a change in business hours at the Castle. Anyone interested in the new meeting location may contact Jorgenson at (509) 328-9084.

The most recent meetings covered the following topics: Spokane Cable System Proposals, Dual Transmitter Output Switching, KSPS Station Improvements, Ghosting of Signals in Northern Idaho Due to Lakes and Mountains, use of Attenuator Pads Between Microwave Transmitter and Receiver in Tests, New KSPS Dual Transmitter and RF Combining Network, Slow Scan TV Cameras for Reading of Meters on Remote-Controlled Transmitter, CEI Color Camera for KSPS, Educational TV, Antenna Base Current Meters for AM Broadcasting, TV Antenna Diplexers, High Efficiency AM Transmitter, TV Angle of Tilt vs ERP, and Errors in Antenna Base Current Ammeter and Simple Test Method.

Chapter 22: Central New York
Chairman: Mort Miller
Syracuse, N. Y. 13214

The Amperex Division of North American Philips presented the technical session at the September 19th meeting at WHEN-TV, Syracuse. Bob Raboin, Supervisor of End User Sales, and Pete Bernstein, Manager of Com-

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mercial Engineering, presented a videotape showing how the Plumbicon is made and demonstrated the correct setup for a Plumbicon camera. Included in this meeting was a review of the plans for the Mini-vention, October 11th at the Owego Treadway.

**Chapter 26: Chicago, Ill.
Chairman: Bradley Anderson
Chicago, Ill. 60680**

On August 29th Chapter Vice Chairman Robert Churchill presided at a meeting at which plans for future sessions were reviewed. Meeting lo-

cation was at the CBS Conference Room. The technical session featured Consulting Engineer Robert Jones who compared broadcasting in the United States with that in the Republic of Haiti. His program included slides.

On September 24th, the meeting was held at Rank-Precision Industries, Inc, Des Plaines, where D. Alan Crist, Harry Paget and Dick Dettmann presented a technical discussion of lenses — how to clean and service them. An extended question and answer session followed. Refreshments were provided by Rank-

Precision.

It was announced that the vember meeting will be at the W Studios and a tour of the transr at the Sears building will be incl Information on SBE Chicago me is available by calling (313) 332-0

**Chapter 28: Milwaukee, Wis.
Chairman: Ed Wille
Milwaukee, Wisc.**

The first meeting following summer recess, held on September 24th, at Radio City Auditor WTMJ, Inc., featured nation known John W. Wentworth, Man Broadcast Technical Training, Broadcast Systems. He spok Digital Techniques for the Br caster. His program included fundamentals of digital logic an use in cameras and video t machines, the inverter, the gate, the OR gate and various c nations of them.

Nominations for 1974-75 off were presented by the committe

**Chapter 32: Southern Ariz.
Chairman: Y. J. "Bart" Paine
Tucson, Ariz. 85717**

At the August 16th meet Chairman Paine conducted business session and then turne technical program, held at KOLI over to the Ampex Corp., repres by Frank Santucci of Redwood and Don Bowdish, Ampex Products Manager. They desc the technical features of the 800

On September 19th, the me was held at Lee Furr's Reco Studios, where Robert Manah Amperex provided a progr Plumbicons which included a tape. A question and answer s followed.

**Albuquerque, New Mex.
Chairman: Guy Smith
Albuquerque, New Mex.**

On June 13th, the meeting h Mountain Bell Auditorium fer Tinzie Pino, Mountain Bel Marketing Representative, Ms. Blackburn, ISC Marketing, and Jackson, Engineering, who pre a program on facilities availa broadcasters and future pla Mountain Bell.

The meeting held August 2 the Quality Inn, Albuquerque cluded an interesting presentat Howard Burgess, a pioneer Mexico broadcaster, on the earl of broadcasting and on researc currently conducting in Bio-elec

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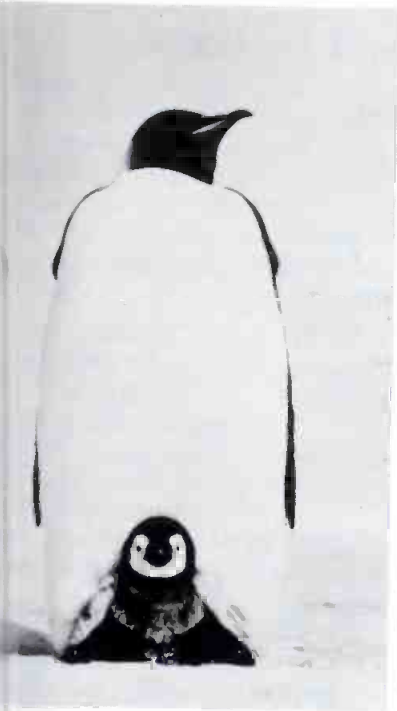
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Quincy, Ill.
Chairman: Lynd Carter (protem)
Hazelwood, Mo. 63042

The first two meetings of this provisional chapter averaged in attendance 32 prospective members, which leaves little doubt about the interest of broadcast engineers on forming a local chapter.

Report on the 3rd meeting, required before a charter is received, will be available shortly. Persons interested in future meeting dates and other information may contact provisional Chairman Lynd Carter at Tektronix, Hazelwood, Mo. 731-4696.

Broadcast Engineering magazine provides this means whereby the members of the Society of Broadcast Engineers can report on SBE chapter meetings, announce future events, and have articles, papers, and other technical and nontechnical items published.

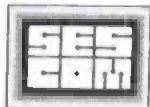
Chapter chairmen should see that information on meetings and other news is sent promptly, as soon as it is available, to the SBE Editor, Joe Risse, P.O. Box 131, Dunmore, Pa. 18512.

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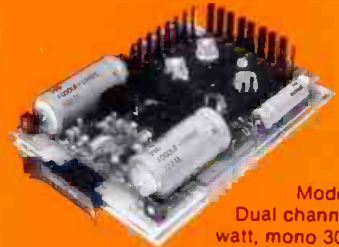
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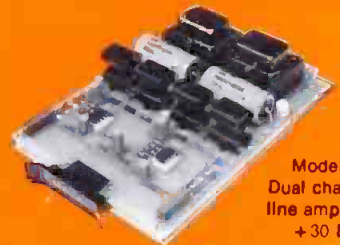
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Station to Station

Eliminating cue track noise

The influx of syndicated video tape programs to KOMO-TV brought unwanted and unexpected problems. A raucous assortment of noise recorded on the cue track interfered with our "in house" system of tone coding the tapes for smoother on-the-air switching.

Actually, the noise is digital data used in the various types of computer editing systems at the time of assembly of the program. It is so fierce that the operators turned the gain down and occasionally would miss their cues for inserted events. They finally resorted to erasing the entire cue track, a very expensive solution.

We moved in with the system shown in the diagram. It monitors the line continuously, and when a sound is heard for more than 1 second, it opens the circuit to MCR and keeps it open until the sound stops. As it will not tolerate more than one second of noise, it follows that any cue mark tones longer than that will be chopped.

The net result is a very quiet cue track with a path left open for all our tone codes. Incidentally, steep

sided single tone filters did not work; the hash went through them like Gang Busters.

Circuit Theory

The transformer listens on the line at 5K and does not load it unduly. Any audio is rectified by the diode bridge, filtered and the firing point of the NPN transistor is set by the 10 K pot. Once fired, the

transistor applies voltage to Time Delay Relay. Internal cuitry of the P.B. relay is om as not necessary. It is sufficient it works, and will not close un second after the transistor app the voltage.

Fred Fowle
Project Eng
KOMO
Seattle, Wa

Carousel SKIP Program Feature

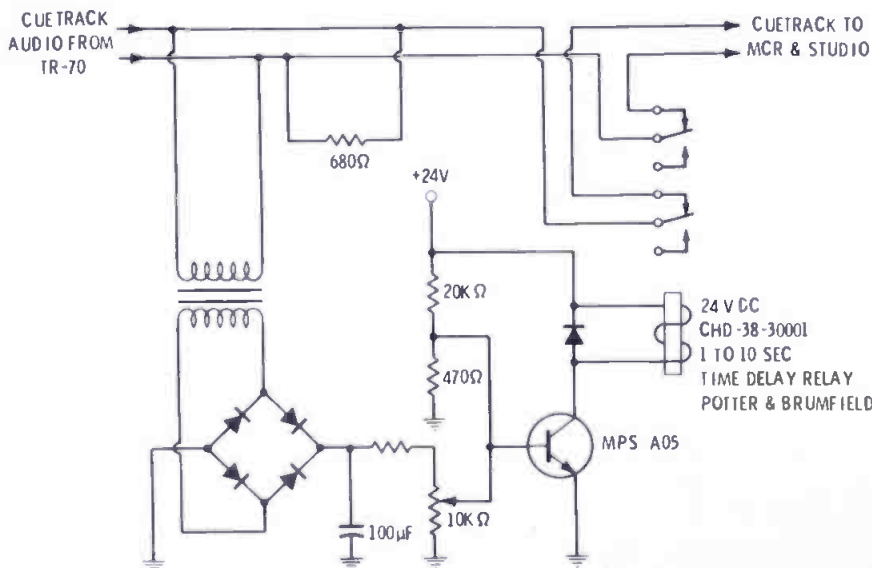
It is often desirable to temporarily change a fixed program automation format by simply deleting a scheduled event. Most newer control systems have some provision for this: they will SKIP a machine that is out of service, such as a rewinding rape, without a delay. Older systems can often be modified by routing start commands back to the control system as advance pulses.

We have found it convenient to use this SKIP feature to "program" our Carousels. They have been

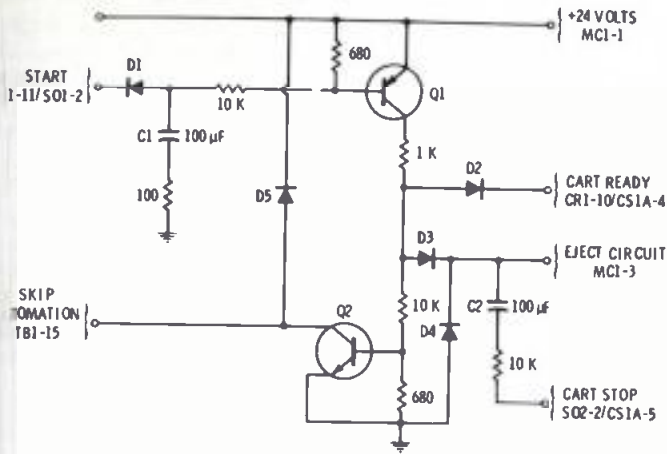
modified as described below so will not reject empty trays. W the automation calls on an er tray the modified Carousel: 1) ro a SKIP pulse to the control, vancing it without a delay; 2) e the empty tray as if it had play cart. In this way we can schedu heavy spot-load, and then in only the carts which are act needed.

The 250-series Carousel's er tray reject circuit is defeated by connecting the Cartridge Swi normally closed contacts, eithe the switch or at SO2-8. Trays eject only while the TRAY butt pushed or the Mechanical Co MC1 tray eject circuit is active ensure full ejection of the t increase C2 from 50 μ f to 10 and add 20 μ f from collecto emitter of Q2 on MC1. Ther plenty of room on the board.

The Advance Circuit show Figure 1 may be wired on a s Vector Board and mounted in the Carousel electronics chassi the transformer bolts. Compot are not critical. Re-route the of MC1 terminal 3 (from S and CS1A-5) and add the c jumpers as shown.



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The circuit operation is best described by listing the function of each part:

- lengthens start pulse
- prevents C1 from discharging through other circuits
- inverts start pulse
- defeats rest of circuit if cartridge is in place
- pulses MCI eject circuit if tray is empty, after start command
- passes cart stop pulse to eject circuit at end of regular play
- discharges C2 when cart starts
- causes automation to SKIP if tray is empty, after start command
- automation SKIPS if power is off.

This modification may be used on Random Select as well as Sequential Carousels. It will prevent continuous rotation of RS units should someone forget to insert a scheduled cart.

If the automation or RS unit needs +24V to SKIP, reconnect Q2 as an emitter follower and eliminate D5.

*John D. Strahler, CE
KTMS-AM, FM
Santa Barbara, Calif.*

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NEW PRODUCTS

Videotape Timer

A product worth noting, which was inadvertently left out of the Buyers' Guide edition, is the VAMCO Model BP-734b Videotape Timer. It is an all solid state, self-contained timer which is an exact replacement for the me-

chanical ones found on today's Videotape transports.

Timing is accomplished by optical encoding from the idler wheel (the only moving part of the unit) and counting the encoded pulses. LED readouts provide long life and easy

viewing of the resultant display.

The "Hold" button stops display action (while tape is in motion) timing ease and, upon release, return display to the real-time count. "Reset" is provided for zeroing the timer.

The Model BP-734b sells for \$54.95 complete with power supply and ready to install. Accessories available for remote displays, a controlling purposes.

For more information, refer to advertisement in this issue on page 69.

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Splice Finder

Designed by UMC Electronics to fill an unique equipment niche in the broadcast industry, the Sensi-splice finder is utilized exclusively by radio stations to locate the splices on broadcast audio tape cartridge. A location of the splice is important to the broadcaster as it can produce an audible "blip" during any material recorded on that cartridge.

The splice finder stops the tape within one inch after the splice, allowing use of the full time duration of the cartridge but without the potential blip. Previously, splices were visually located with a technician required to watch all footage until the splice appeared. This time-consuming chore has now been eliminated.

The splice finder mechanism (patent pending) is currently being tested in conjunction with other devices where its thickness sensing capability may be required, such as in paper, textile, and metal-work industries.

For More Details Circle (81) on Reply Card

Video Sound System Without Wires

Eddcor, manufacturers of professional wireless sound equipment, announces the availability of the PRV-1 wireless video sound system. PRV-1 eliminates all mic wiring, adding mobility and versatility to existing VTR, while maintaining quality sound reproduction and stability.

The PRV-1 consists of two solid state units: a miniature omnidirectional mic with a connecting transmitter and a receiver antenna unit. The lavallier mic clips to shirt, leaving hands free, permitting speakers or performers complete mobility on a stage, set or platform.

If you haven't seriously considered the new Setchell Carlson Dual-10 Monitor,



It's time to take a closer look.

At Its Price. At \$465* the Dual-10 is certainly worth taking seriously. In fact, the Dual-10 provides 13% more viewing area per monitor than higher priced Dual-9s.

At Its Modular Construction. The Dual-10 features Setchell Carlson's unique Unit-ized Plug-in Circuit Modules for instant on-the-spot servicing and the elimination of downtime. It's the next best thing to serviceless operation.

At Its Performance. Horizontal Resolution, 640 lines. Amplifier Bandwidth, 8MHz. And effective shielding to eliminate crosstalk. It's all in the specs. And it all requires only 8 1/4-inches of vertical rack space. For complete data and/or product demonstration, write to us today.

SC ELECTRONICS, INC.
A SUBSIDIARY OF AUDIOTRONICS CORPORATION

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For More Details Circle (43) on Reply Card

over a 200 foot transmitting
 ge from the receiver. The receiver
 sensitive and distortion free and is
 ily mounted on any VTR that has
 ultaneous audio and video inputs.
 he PRV-1 has an electronic
 nalism possibility, because it can
 used with a porta-pack video re-
 ling unit.

For More Details Circle (82) on Reply Card

Cross Pulse Generator

Video Aids Corporation of Colorado
 ready to introduce their model
 P-1 cross pulse generator that
 ures BNC loop-thru connect in any
 o line (unity gain) and operates
 rdnally with any monitor....and
 out any modifications.

The engineer can use the CPG-1 to
 nose video problems. Now you
 re-determine timing for gen-lock
 VTR lockup instantly. And, it can
 sed to check edits before dubbing
 distribution.

Applications include: Checks helical
 playback skew error allowing for
 rection while making duplicate
 s; checks helical switching head
 e and line-to-line jitter; checks
 a head tape playback errors;
 ks type of sync being used and
 es such as clipping, overshoot,
 gg, jitter, and improper equaliz-
 and serration pulses.

The CPG-1 is a valuable tool in
 uleshooting and adjusting many
 e of video equipment.

For More Details Circle (83) on Reply Card

Color Camera

Fernseh KCP-40 color camera
 ow operate on triaxial cable and
 een equipped with an adaptor
 hich enables direct replacement
 lti-wire cable up to one mile.
 adaptor contains video modu-
 e, intercom demodulators, as well
 ower converter.

The entire rackmounted CCU,
 ing the triaxial cable adaptor, is
 14 inches high.

use in sports coverage—
 y proven in men's and women's
 sional golf tournaments. The
 on of triaxial cable will save
 and money and provide better
 n coverage. It eliminates the
 for buried cable resulting in
 iate set-up and provides on-site
 as with high mobility to move
 the players. For many events,
 xtensive coverage is now
 ble with fewer cameras. Where
 d cable is required, the inex-
 ve triaxial cable may be left
 d.

For More Details Circle (84) on Reply Card

Location Lighting Kit

A new series of unusually compact
 and easily portable location lighting
 kits has been developed and is now
 being marketed by **Strand Century
 Inc.**, it is announced by Frank J.
 Deighan, president.

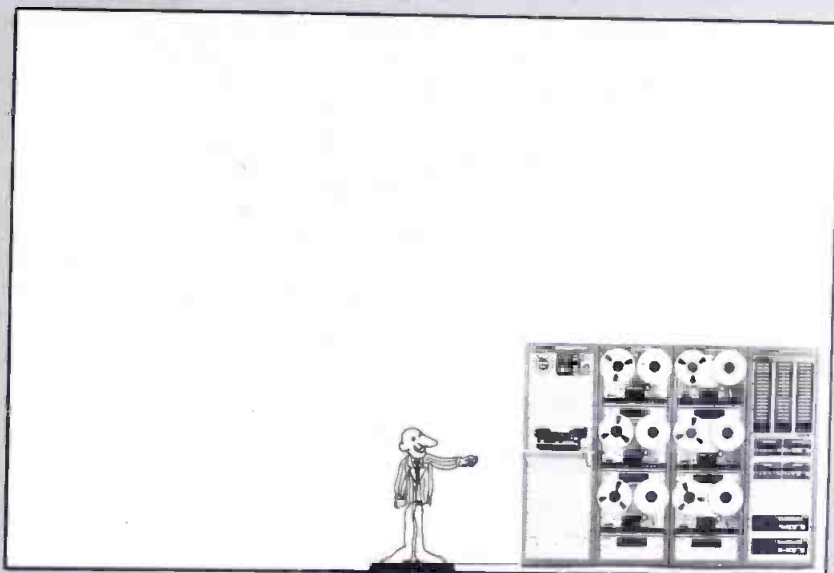
There are five basic packages
 offered for television, motion pictures
 and photography in this new Strand
 Century Porta-Kit series. Engineered
 for optimum performance even under
 extreme conditions, Porta-Kit is de-

signed to meet every location lighting
 need.

For the first time in any portable
 set-up, Porta-Kit includes lanebeam
 open-faced units by laniro, the Italian-
 made lights that are world-famous for
 extraordinary technical and optical
 excellence. Among them is the new
 650-Watt lanebeam spotlight with a
 fiberglass housing that offers im-
 portant advantages.

The rapid cooling properties of
 (Continued on page 70)

If you're
 serious about cost,
 be serious about quality.



At Schafer, we've built a 21 year reputation of providing reliable equipment with more fea-
 tures for every dollar. With today's inflation, that's more important to you than ever before.
 So if you're serious about cost . . . now and in the years to come . . . be serious about quality.

Be Serious about Schafer. The people who invented automation.

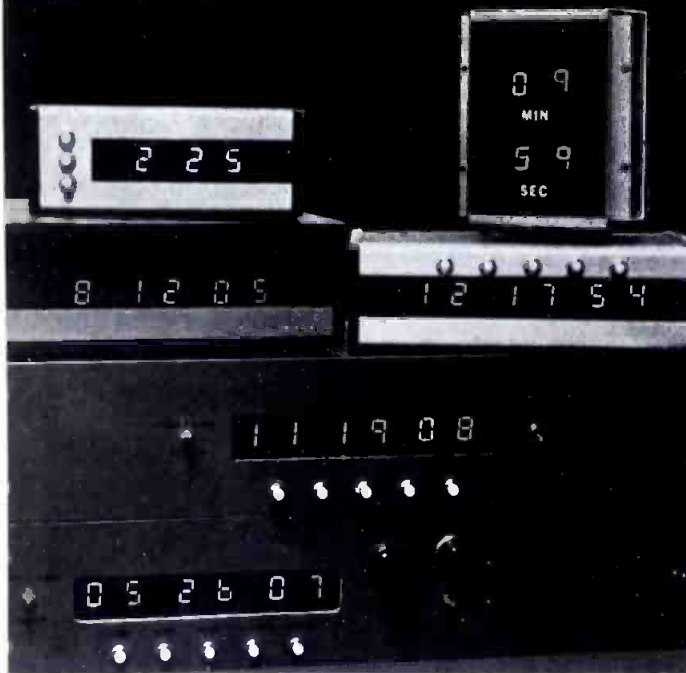
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 Goleta, California 93017

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 Station _____
 Address _____
 City _____
 State _____ Zip _____

For More Details Circle (42) on Reply Card

LOW COST DIGITAL CLOCKS, TIMERS AND COUNTERS



All ESE digitals are designed and constructed using the latest solid state electronic components and circuitry. This equipment is perhaps the most economical line of digital clocks, timers and counters available. Circuit efficiency and lasting quality are designed into every ESE digital product. Constructed with the built-in ruggedness necessary for studio use. No moving parts.

Special custom items, like the video tape/counter editor, a monitoring system with unique display configuration, 12 and 24 hour clocks or timers, 10 minute timers, 3 digit, 4 digit, 6 digit, record seconds in tenths, hundredths or thousandths . . . All available from ESE. Options include: Thumbwheel switch or patchboard programming, BCD outputs, relay closure outputs, and solid state buffered outputs. Many products available in kit form.

MOST EFFICIENT DIGITAL CLOCKS/TIMERS AVAILABLE ANYWHERE:

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- ES-300, 100 minute up/down counter: Displays up to 99:59 — Easy pushbutton: Reset — Count up — Count down — Advance seconds — Advance minutes — Stop. 168.00
- ES-400, 10 minute timer: Displays up to 9:59 — Pushbutton: Start — Stop — Reset 98.00
- ES-500, 12 hour clock/timer: 6 digit — Records hours, minutes, seconds. Start — Stop — Reset — Slow and Fast Advance buttons. Displays up to 12:59:59 150.00
- ES-510, 60 minute timer: Displays up to 59:59 — Pushbutton: Start — Stop — Reset, Only 3¾" deep for flush mounting into walls or std. alum. case 125.00



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NAB Convention Plans

The Convention Committee of the National Association of Broadcasters has met in Las Vegas and set a tentative agenda for NAB's annual assembly the April 6-9, 1975.

The committee determined that strong emphasis will be placed on workshop sessions and seven or eight will be held each morning from 9:00 to 10:30. Among topics being considered are radio sales, television sales, ratings, radio news, community affairs, farm programming, women in broadcasting, editorializing, race promotion, TV promotion, legal affairs and broadcast financial management.

An invitation to address the convention on Monday, April 7, will be extended to Richard E. Wiley, chairman of the Federal Communications Commission. The other commissioners will be invited to participate in a Wednesday morning joint session.

Wednesday's closing luncheon will feature entertainment rather than the traditional speaker.

Appointed to assist in planning the entertainment were Convention co-chairmen Charles R. Dickoff, president, WEAQ, Eau Claire, Wis. (vice chairman, NAB's Radio Board), and Walter E. Bartlett, senior vice president-television, AVCO Broadcasting Co. (vice chairman of the Television Board); Robert Bennett, vice president-general manager, WCVB-TV, Needham, Mass.; Dick Painter, general manager, WYSM, Mankato, Minn., and Daniel T. Pecaro, executive vice president, WGN Continental Broadcasting Co., Chicago.

Wynn Nathan of Time-Life and Howard Lloyd of Worldvision were present to discuss the needs of film exhibitors. The committee determined that if association members desire, they will be accommodated in the Las Vegas Hilton Hotel near the Convention Center.

There also will be a session on television programming. Bartlett, Pecaro and Bennett will serve as subcommittee to advise on this segment.

The committee also discussed programming for radio, television and joint sessions and authorized the NAB staff to develop the various sessions.

Co-chairmen Dickoff and Bartlett said "the committee was impressed with the excellent facilities of the Convention Center in terms of the exhibit space, meeting rooms and also the large number of hotel rooms close to the Center." They said they are "looking forward to the convention being the best in NAB history."

They also said the committee "was pleased that discussions with film exhibitors resulted in a poll that will benefit the exhibitors and NAB members."

The committee also heard a report that tentative commitments for exhibit space in Las Vegas already totals the record 69,000 square feet used at last year's Houston convention. It determined that convention registration and exhibit fees will remain unchanged and authorized a reception on Sunday evening (April 6) at the NAB Board of Directors and principal executives of exhibiting equipment companies, and determined that shuttle buses will run between hotels and the Convention Center.

PEOPLE IN THE NEWS

Allen Russell has been named to succeed Henry H. Schirmer as Chairman of the Board of Robert Bosch Corporation. Schirmer and Foster Perry, a long standing member of the Board and past Chairman, retired at the end of June....Dr. Herbert A. Schulke, Jr., of Washington, D.C., has been named General Manager of the Institute of Electrical and Electronics Engineers (IEEE)....Clay T. Whitehead, Director of the Office of Communications Policy since its creation in 1970, left his post on September 15, 1974 to return to private life. After his departure, OTP Deputy Director John M. Eger had by law, assumed the position of Acting Director of OTP.

Stephen A. Grayson has been named marketing and sales manager for IGM/NTI, Inc., Bellingham, Washington....Jay M. Moody has joined Dictaphone Corporation in Rye, New York as Vice President, Communications....Telemation Productions, Inc., Chicago producer of television software for TV industry and education, has appointed Robert Flager as General Manager....Gerald G. Heitel has been named vice president, marketing, at International Video Corporation, Sunnyvale, California. International Video Corp., Sunnyvale, also named Bert H. Dann as vice president and technical advisor to the president.

Jack B. Hanks has been promoted to marketing operations manager of 3M Company's Magnetic Audio/Video Products division....The appointment of John M. Boatman as Manager, Field Sales, with executive responsibility for marketing RCA broadcast systems in Europe, the Middle East and Africa was announced by RCA International Marketing S.A. (Geneva). In his new assignment, Boatman will supervise an organization selling RCA radio and television audio and transmitting systems in the three major markets....Joseph Stirmer, a trial attorney in the Hearing Division of the Broadcast Bureau, has been appointed by the FCC to be Assistant Chief of the Hearing Division....Harry Fine, Assistant Chief Engineer in charge of the Research Division, has been appointed Deputy Chief Engineer, Office of the Chief Engineer, by the FCC....Roy J. Stewart, attorney in the Revision Applications Branch since January 1965, has been appointed by the FCC to be Chief of the Transfer Branch of the Broadcast Bureau's Renewal and Transfer Division.

The new position of Director of International Sales, Harris Corporation, Gates Broadcast Equipment Division, has been assigned to John F. Delissio....Superior Continental International Corporation has announced the appointment of Albert W. Maile as European Marketing Manager. Maile is replacing Donald H. Foster who has resigned from the company....Two executives were promoted at Shure Brothers Incorporated. Roger W. Ponto has been promoted to National Sales Manager and Charles L. McCabe has been named Special Markets Manager.

...as seen at 1974 NAB Convention

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digital tape timer

- most advanced solid state circuitry
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- installs with one mounting nut
- power supply included
- the original exact-replacement timer for today's machines:

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| RCA | TR-60 series | AMPPEX | RB-1000 series |
| | TR-70 series | ALLEN | RB-1200 series |
| | VR-2000 series | | |
- optional remote display
 - ideal for 2" audio machines
 - one year guarantee

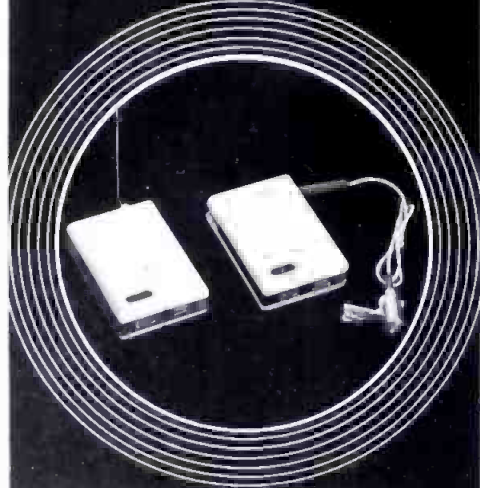


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system
without
wires**



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The PRV-1 eliminates *all* microphone wires and is easily mounted on any portable VTR that has simultaneous audio and video input. The miniature omnidirectional wireless microphone leaves hands free affording complete mobility. The PRV-1 System is one of a kind. Send for a free brochure today!

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Costa Mesa, California 92626
Telephone (714) 556-2740

(Continued from page 67)

fiberglass permit instant dismantling, packing and storing after use. It is exceptionally light in weight and yet is practically indestructible, standing up to an functioning with the most rugged handling. This new 650-Watt lanebeam, like all laniro lighting equipment, is available in the United States and Central and South America.

For More Details Circle (85) on Reply Card

Color Monitor

SC Electronics, a subsidiary of Audiotronics Corporation, recently introduced its new, high performance Setchell Carlson 5EC290 Series 25-inch Color Monitor and Monitor/Receivers.

Features include: The latest design black matrix picture tube, push-button channel selectors for both UHF and VHF with automatic fine tuning, solid-state and integrated circuit design for maximum performance and long-life reliability, automatic degaussing, video input/output, and automatic color level control.

Most importantly, the 920 series features UNIT-IZED® Circuit Modules which can be interchanged in minutes eliminating unnecessary "down time" and reduce repair costs.

For More Details Circle (86) on Reply Card

Solid State Replacement Tubes

Electronic Devices, Inc. of Yonkers N.Y. has announced a new line plug-in, solid state tubes that are exact replacements for industrial rectifier tubes. These new silicon E solid-tubes will replace most regular gaseous and vacuum rectifier tubes with ratings up to 1750 ma. and 10 KV. High voltages and currents are available as specials. The new tubes are developed from EDI's TV and communication solid-tube rectifier line that has shown these proven advantages: no need for filament transformers, (these tubes are ideal replacements in equipment where the filament transformer is faulty), solid state reliability, constant output, long life, no heat generation, compact rugged construction, and fast warm up.

For More Details Circle (87) on Reply Card

Dynamic Noise Filter

Burwen Laboratories, developer of the DNF 1000 studio and broadcast dynamic noise filter have introduced a new dynamic noise filter, Model DNF 1500 A, designed for program sources having a frequency response of 10 c

Accurate Field Strength Measurements Can Be Easy

With the Model FIM-21, electromagnetic field strengths can be measured to within 2% across the entire 535 to 1605 KHz AM band. And to intensity levels as low as 10 μ V/m. Its integral shielded antenna in the cover, front panel speaker, large illuminated mirrored meter, and ganged oscillator/receiver tuning, make it easy to operate in the field. An optional telescoping stand adds convenience. It's also a versatile instrument — use it as a tuned voltmeter for RF bridge measurements.

Contact us now for complete details on our line of field strength meters.



POTOMAC INSTRUMENTS

932 PHILADELPHIA AVE.
SILVER SPRING, MARYLAND 20910 (301) 589-3125

8 kHz.

The Model DNF 1500 A is specially designed for broadcast stations and other communications companies using class A telephone lines, video tape, optical soundtracks, shortwave and remote broadcasts.

The Model DNF 1500 A Dynamic Noise Filter operates on the principle of opening and closing the bandwidth to provide the minimum required for a program material while eliminating extraneous noise. The unit has a fixed filter with 18 dB/octave lowpass filter cutting off at 9 kHz and a variable low pass filter controlled by the input signals at a rate of 9 dB/octave.

For More Details Circle (88) on Reply Card

Versatile

Turntable Preamp

Broadcast Electronics, Inc. announces the introduction of a new Spotmaster® turntable pre-amplifier. Designated as the Model BE TMS, this pre-amp provides complete mono, stereo and dual channel capabilities. Its versatility is enhanced by a phase reversal switch on one channel that allows five modes of operation — mono in/mono out, stereo in/mono out, stereo in/stereo out, dual channel

mono in/dual channel mono out, and single channel mono in/dual channel mono out.

The BE TMS has an output level switchable between -10, 0 and +8dBm into a nominal 600 Ohm load. Transformer coupled output is available as an option. Gain of the pre-amp is 54 dB at 1 kHz and frequency response is ±2 dB, 30 Hz to 15kHz (RIAA) NAB. Also featured are channel separation better than 50 dB and distortion less than 0.5% at +8 dBm.

Spotmaster's BE TMS has front panel controls for power, left and right channel gain, mono/stereo selection and right channel phase reversal.

For More Details Circle (89) on Reply Card

Function Generator

A new function generator built for design and testing of communications equipment is now available from Heath. This is a precision generator that provides sweep or modulating signals with sine, square or triangular waveforms.

Called the EU-81A, this generator has outputs from 0.1 Hz to 1 MHz in seven decade steps, variable DC offset, with TTL-compatible sync output.

An Olympic Champion.

Making it to the top at the Olympics is a supreme achievement...for an athlete or a microphone. And often for similar reasons...superior performance, extended range and high output.

In the case of our Beyer M201, which was "the reporter's mike" at the Munich Olympics, you can add some other very special attributes, like a super-cardioid directional pattern, a virtual immunity to handling noise that makes it equally suitable for location or studio use, and extreme ruggedness and durability.

Rounding out this portrait of a champion is its small size, excellent hum rejection and flat frequency response.

Finally, what makes the Beyer M201 so outstanding is its competitiveness, only \$165.



Another innovation from Beyer Dynamic, the microphone people

Revox Corporation
155 Michael Drive
Syosset, N. Y. 11791

For More Details Circle (50) on Reply Card

Change Sound to Silence with a



TABERASER

This rugged, heavy duty bulk tape eraser wipes sound from all magnetic tapes, cartridges, cassettes and magnetic film stock; handling up to 2".

It erases with minimum residual noise because the field automatically diminishes at the end of each 30-second cycle.

A thermal control and blower keeps the unit below 71° C.

Priced at only \$395.00.

For the distributor in your area—Call or write:

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For More Details Circle (47) on Reply Card



NEW MODEL CX-1

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For More Details Circle (74) on Reply Card

The EU-81A can be used as a VCO in PLL systems, can provide frequency multiplication, and can be used to test amplifier response, linearity, and distortion. It also can be used as a BFO, tone generator, or a rate repetition generator.

The unit has a variable 20 dB output level with a fixed 20 dB attenuator.

For More Details Circle (90) on Reply Card

Color Enhancer

Dynasciences Video Products has introduced a new, low cost Image Enhancer for color television pictures.

The new Model 888, Image Enhancer, provides horizontal contour enhancement which corrects problems encountered by image degradation thereby resulting in sharper color television pictures. The Model 888 also features single knob control and ease of installation.

Dynasciences, Model 888, Color Image Enhancer now offers the educational and industrial television industry a low cost, effective color enhancer. The unit was specifically designed for users who previously could not afford such equipment.

For More Details Circle (91) on Reply Card

Digital Delay System

Lexicon, Inc., Waltham, Massachusetts, has announced a new family of digital delay systems featuring a 90 dB dynamic range for recording studio, sound reinforcement, and laboratory applications.

A second generation system, the new Delta T Model 102 Series has up to five delay outputs, each independently adjustable on the front panel. Additional slave units (up to 50 outputs) may be cascaded for long delay requirements with no degradation of audio output. The new system offers up to 320 ms of total delay per main frame in 5 ms increments in economical 40 ms modules (or up to 128 ms delay per main frame in 2 ms increments in 16 ms modules). The Delta T offers extensive options for both studio and sound reinforcement applications. Its fully modular construction permits convenient field expansion and maintenance.

Other features include a five-position LED headroom indicator to verify correct operating settings. Transformer coupled inputs and outputs are standard and all units are manufactured with computer quality components and construction for high reliability.

For More Details Circle (92) on Reply Card

Waveguide

Wellflex helically corrugated elliptical copper waveguide, offered by Cablewave Systems Inc., is now available in two basic versions.

Wellflex standard waveguide recommended for low and medium density radio relay systems, while Wellflex premium elliptical waveguide assemblies with tuned connectors are recommended for high density radio systems where low return loss is desirable. Standard and premium differ only in attainable VSWR (return loss). The use of specially designed end terminations with precision flare insures better performance.

Cablewave Systems Wellflex elliptical waveguide consists of a longitudinally welded, high conductivity copper tube, corrugated and precision formed into an elliptical cross section. The corrugation design achieves unusual high transverse stability and crush strength, yet offers excellent flexibility for forming at installation. A protective black polyethylene jacket is applied over the corrugated waveguide for improved handling and installation characteristics.

For More Details Circle (93) on Reply Card

Low Cost CCTV Film Uniplexer System

Hitachi Shibaden has announced a new low cost color television film uniplexer system. Designed to provide a modestly priced method of professionally transferring color motion picture film to a color television signal, the model "UPF-15" utilizes Hitachi Shibaden's new single tube HV-1500 color camera.

The single tube design of the camera does away with several operational adjustments associated with multiple tube cameras. Operator controls are limited to color tone and electric focus. The system is supplied with an automatic neutral density wheel. The purpose of this device is to provide automatic light compensation as the light density of the film varies between scenes.

The neutral density wheel rotates as needed to admit more or less light so that the camera video output is maintained at the desired level. The response to changes is extremely rapid and provides a 10:1 change in 0.07 second.

The automatic control may be defeated and light compensation may be done manually.

For More Details Circle (94) on Reply Card

TECHNICAL DATA

100. ADVANCED SYSTEMS INC.
 An in-house instructional system to achieve measurable changes in behavior, techniques and skills according to the new capabilities brochure. A four-color booklet describes uses of video-assisted instruction, outlines a typical system, and identifies key members and educational advisors. In addition, studio and production facilities are highlighted.

101. AILTECH—Ailtech offers its complete new catalog describing applications and detailed specifications for its line of high-power RF sources. Frequencies from 10 kHz to 8 Gigahertz, power up to 50 Watts, analog frequency set with setting up to .002%, are provided by the 100 series unit. The catalog also describes a number of options and accessory products, including AM capability, FM, a phase-lock synchronous-head-rack assemblies, etc.

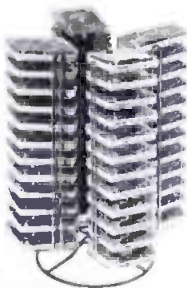
102. AMER. ASTRIONICS—Div. of Technicolor Inc. A new four-page, two-color brochure has been published covering their direct coupled and baseline servoed Log Video Amplifiers and RF Log Detectors. The brochure describes four models of Standard Direct Coupled Log Video Amplifiers designed to provide wide dynamic range logging with good low frequency response (DC to 5.0 MHz) and a capability to process pulsed data at duty factors up to 25%. It also describes Baseline Servoed Log Video Amplifiers which combine the fast recovery of direct coupled log amps with the good temperature stability associated with AC coupling RF detectors at the log amp input, and RF Log Detectors using either Astrionics DC Coupled or Baseline Servoed Log Video Amplifiers.

103. AMPEREX ELECTRONIC CORP.—A new eight-page, short form catalog of voltage regulator diodes is now available. The catalog provides technical data on more than 100 types of zener diodes, reference diodes, and stabistors available from Amperex. Included in the catalog are charts showing temperature coefficients and derating factors, noise generation, and stabistor conductance characteristics. In addition, the catalog describes the construction of the popular new "whiskerless" DO-35 zener diodes introduced by Amperex. These devices are available taped and reeled for use with automatic cutting, forming, and insertion equipment.

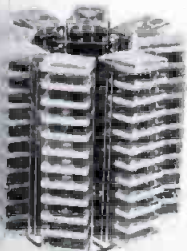
104. ANIXTER-PRUZAN—A complete spec sheet on the Hamlin Direction Tap is now available. The tap was introduced last year, and has just become more widely available through an accelerated production schedule by Hamlin. The Hamlin Tap, designed to meet user requirements, has the features to make it an attractive buy for any system.

105. BELDEN CORP.—Electronic Div. New single-source selection and application guide for CATV/MATV coaxial cable, catalogs full product line and provides technical reference data on shielding methods and efficiency evaluation. The CATV/MATV

**BACK
 UP...**



Fidellpac's new portable revolving A-round Table Top Cartridge Racks, can do just that. Model TR-96 holds 48 Type A cartridges, Model TR-48, 48. Modular and removable 12 cart per tray construction allows easy loading, easy unloading. For more information on these as well as floor standing and wall mounted A-round racks, see your Fidellpac distributor today.



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**...and no more
 painting!**

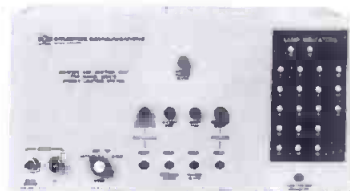


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 Strobe
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 Systems!**

A high intensity strobe warning system that eliminates the cost and maintenance of "Candy Stripe" painting. And provides effective obstruction warning during all ambient light levels, twenty-four hours a day, in all weather.

The system features...

- Automatic day/twilight/night switching of light levels
- Reliable solid-state circuitry
- Lightweight luminaires
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Control and monitor—A solid-state unit containing individual luminaire monitoring. Indicates day, twilight and night modes of operation. Mode is automatically controlled through a dual photo cell system. Manual override, system alarm and reset switches are included.

For full details, write: Dielectric Communications, Division of Sola Basic Industries, Raymond, ME 04071.

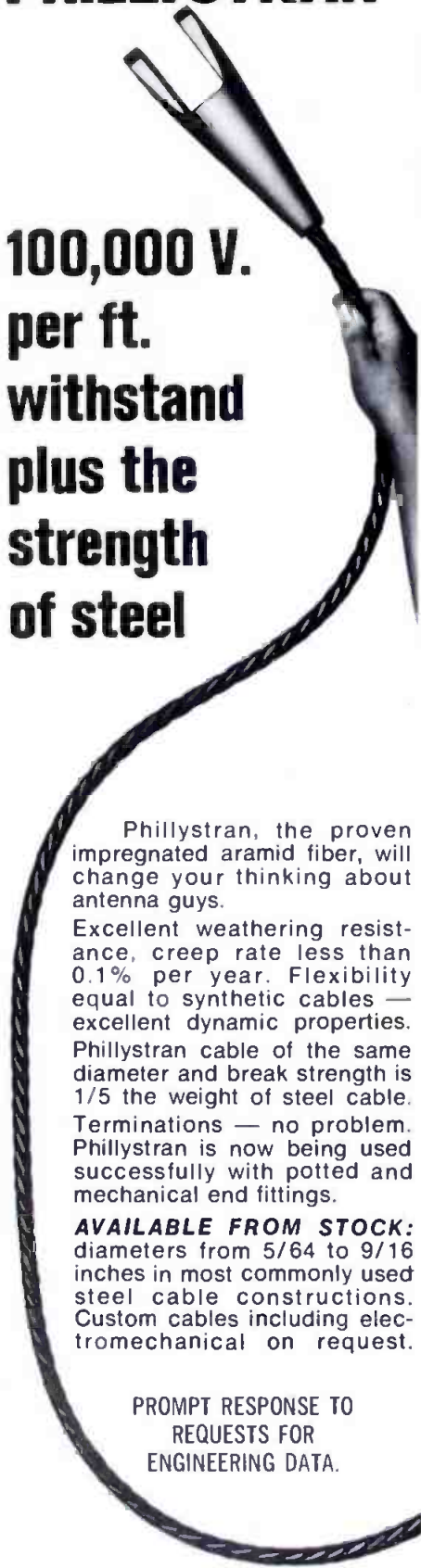
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Excellent weathering resistance, creep rate less than 0.1% per year. Flexibility equal to synthetic cables — excellent dynamic properties. Phillystran cable of the same diameter and break strength is 1/5 the weight of steel cable. Terminations — no problem. Phillystran is now being used successfully with potted and mechanical end fittings.

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74 For More Details Circle (57) on Reply Card

Coaxial Cable catalog, a 20-page illustrated booklet, presents complete physical and electrical characteristics of more than 50 standard Belden CATV/MATV cables. The easy-to-read tabular format of the catalog section divides the product line into RG-59/U type, RG-6U type, and special application classifications. Highlighted in both the catalog and reference sections are cable constructions utilizing DUOBOND—an overlapping aluminum foil tape bonded by a special process directly to the insulation core for simplified termination and reduced installation and servicing costs.

106. CABLEWAVE SYSTEMS INC.—Technical Bulletin No. 22 dealing with the subject of sampling lines for antenna monitoring sampling systems is now available. The new literature describes the purpose and function of sampling lines and covers the phase stabilized types offered by Cablewave Systems. A categorized presentation of data describing cable/line type and typical phase temperature characteristics (70-110°F) is included along with useful coaxial formulas.

107. DATATRON, INC.—A new brochure on video tape editing equipment describes Datatron's entire line of editing equipment, time code generators, time code readers and coincidence comparators marketed to the video broadcast industry. The brochure also describes the operating controls of each of Datatron's video editing products and their key operating features.

108. ELECT. ENG. CO. OF CALIF.—General specifications, controls, operation and typical application of the new BE460 Dual Cue Controller in conjunction with BE450 Wide Range Synchronizer are covered in a new four page brochure. Utilizing the SMPTE Edit Code, the BE 460 Dual

Cue Controller and the BE450 V Range Synchronizer provide complete automatic search and cue of both Master and Slave tapes and synchronizes the two tapes in perfect sync. Cueing by the new BE 460 Dual Cue Controller is completely automatic, controlling both mag tape heads individually or simultaneously.

109. GBC CLOSED CIRCUIT TV CORP.—This 16-page brochure titled "The Executive's Guide to Closed Circuit Television" tells businessmen how closed circuit television can help them save money in their operations while adding to their security and their efficiency. Included in the book are descriptions of types of closed circuit television systems, equipment needed and actual installations. A separate chapter is devoted to the use of closed circuit TV equipment in producing videotapes for training and educational programs.

110. INTERNATL. RECTIFIER CORP.—A handy, new pocket-sized Universal placement transistor crossover card is now available from the Semiconductor Division of International Rectifier. The 8½" x 3½" card, which covers over 250 IR and competitive part numbers, permits the user to quickly select the proper IR Universal transistor to replace Universal transistors made by other major suppliers.

111. MEMOREX CORP.—The complete line of Memorex video and audio magnetic tape products currently available for professional users is detailed in a new 16-page brochure. The brochure features color photographs and detailed information of each Memorex's video and audio tape products in its professional line. The three-hole punched for easy filing, the cover utilizes the color bars which have become the new packaging standard for Memorex's professional products.

112. MOSELEY ASSOC., INC.—Aural Remote Pickup Link Application Information (Technical Notes) describes the various applications system configurations for Moseley Remote Pickup Links. This comprehensive technical bulletin includes information on antennas, transmission and connectors required for interconnecting. Also included are sketches illustrating various configurations possible with this equipment such as mobile, station and repeater installations.

113. MULTIPLIER INDUSTRIES—Multiplier Industries has issued



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Catalog 6/78

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and expanded safety equipment catalog. Catalog 540 is a valuable aid in selecting the correct equipment to meet the requirements of regulatory bodies, OSHA, ANSI, DOT, Bureau of Mines, U.S. Coast Guard, Construction Safety Act and others, at state and federal. The catalog is conveniently divided into chapters covering the products required to meet specific applications, such as: Personal Safety Equipment; Work Area Safety Equipment; Personnel Safety Equipment; Aerial Bucket Safety Equipment; Office and Warehouse Safety Equipment.

14. RCA—Electronic Components. A completely revised 36-page catalog describes over 500 RCA thyristors and rectifiers. "Thyristors/Rectifiers," (500D), lists RCA thyristors and diacs, SCR's and ITR's), diacs, and diodes. Data are given for JEDEC (1N and 2N-) types, other RCA commercial types, and RCA developmental types. Application information for thyristors and rectifiers is also included. The devices offer designers a broad selection of hermetic and plastic packages; photographs and dimensional outlines are shown for each device.

15. RCL ELECT., INC.—An Engineering Handbook on miniature rotary switches, including color coded sections on commercial and standard types is now available. The new handbook includes such innovations as layout diagrams for printed circuit terminal switches, millimeter conversions of every engineering drawing, and easy reference charts to switches from 1 deck to 20 decks, and 1 pole to 12 poles per deck. The book features newly introduced switches with engineering drawings and specifications for completely enclosed switches with adjustable stops, in both standard and commercial versions, and the "Slim Jim" series, designed to be available in any depth is a prime consideration.

16. RELAY SPECIALTIES, INC. A new 100-page 1974 reference book featuring an extensive selection of relays and controls is now available. Revised and updated to include the latest items, the book covers a wide range of magnetic relays, including general purpose, power, control, mechanical, stepping, solid state, PC board and mechanical latch types; solid state and thermal time delay relays; motor-driven, pneumatic and pneumatic-driven timers; solid-state temperature controls; photo electric

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controls; counting devices; buzzers; foot switches, micro-switches and instrument cabinets. The book contains detailed specifications, wiring diagrams, illustrations and prices of the components.

117. RF COMMUNICATIONS—RF Communications announces the availability of new literature explaining the features and operation of the RF-2810 Series High Band Porta Phones. The two page illustrated data sheet describes product features such as multi-channel capability, two and five watts RF power output, power supply selection and rugged, compact construction. The different capabilities of each model is fully outlined including compatible options. Channel configuration flexibility for mobile-to-mobile, mobile-to-base, and mobile telephone system operation is explained. Also included are complete specifications for the RF-2810 Series including FCC type acceptance, frequency range, RF power output, and options.

118. SETON NAME PLATE CORP.—A new enlarged 80-page catalog including a 20-page OSHA Reference Section, has just been published. The four-color SETON Catalog illustrates and describes hundreds of Accident Prevention signs and tags which are offered to exactly meet OSHA requirements. A handy "sign selection" guide is furnished in chart form to help the reader quickly identify and select the proper signs and tags to meet OSHA obligations. Recently revised OSHA regulations require completely new sign wordings for some hazards. Such new requirements affect Radiation, Carcinogen, Asbestos Hazard, Laser signs, etc.

119. SOLA ELECTRIC CO.—Extensive engineering detail on the theory, design and operation of voltage regulators is presented in a new 20-page brochure. The new reference, Sola Electric Brochure #624, explains basic principles of ferroresonance, reviews the roles of magnetic flux distribution, magnetic shunts and capacitors, and discusses the effects

of line and load variations. Test and conclusions are illustrated information tables, schematics, graphs and photos of oscilloscope tracing

120. SOUNDCOAT CO.—A 10-page illustrated brochure entitled "Noise Control Materials" describes Soundcoat's complete line of products for sound absorption, vibration damping and noise attenuation.

121. SPRAGUE ELECTRIC CO. A comprehensive revision of its Semiconductor Manual and Replacement Guide has been published by Sprague Products Co. The new 64-page Manual K-500A lists over 38,000 of the most popular domestic and foreign semiconductor part numbers and their recommended replacement with 137 Sprague RT, TVCM, and series semiconductors. All listings are alpha-numerical to make the manual simple to use. Also included is a comprehensive product guide section which contains package, pinning and salient electrical information on bipolar small-signal transistors, power transistors, field effect transistors, silicon rectifiers, zener diodes, and electronic circuits and linear integrated circuits. Also listed are semiconductor cabinet assortments of most popular types specifically selected for handy working inventories.

122. TELECOMMUNICATIONS INDUST., INC.—A free reprint of a five-page article describing the troubles of a communications loop used in a Fire Alarm Circuit is now being offered. The article describes how the manufacturer, Harrington Signal, is changing over to solid state components, ran into troubles with surge running through and jumping of loops, wires and generally causing havoc throughout a Fire Alarm system. Step-by-step, the article tells how telephone communications techniques combined with the installation of the 3-Electrode Gas Tube surge protection eliminated the trouble at the Hicksville, N.Y. Fire Department.

INFLEXION CHROMATIQUE INFLEXION CHROMATIQUE INFLEXION CHROMATIQUE



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Globecasting

The Guild Of Television Cameramen

In May of 1972, the Guild of Television Cameramen was formed by 37 noted British cameramen. The Guild has grown extensively, and is now an influential body devoted to the furtherance of professionalism among television camera operators.

The aim of the Guild is to promote professionalism in camera operations, with the exchange of ideas between cameramen, camera equipment manufacturers, technical writers and creative personnel.

This is accomplished by local area meetings and a journal that is published quarterly.

Now the Guild would like to recruit interested U.S. and Canadian cameramen and others concerned with the technical quality of camera operation to start chapters in the U.S. and Canada. This is an excellent and worthwhile society which could have a very positive influence on the North American television industry. For information please write: Honorary Secretary, The Guild of Television Cameramen, 25 Carrholm Roads, Leeds, LS2 2NQ, United Kingdom.

Blank Screens In British Columbia

A brief from the Association of Public Broadcasting in British Columbia urging the establishment of a Public Television Service, has been presented to the provincial government. The brief sees the need for an English-speaking network to rewrite the conversion of all cable systems to public or cooperative ownership.

According to the plan, U.S. commercials would be deleted and advertising would be added. That's why the screen would be blank during commercials.

According to the brief, a \$1 fee for all subscribers per month would amount to about \$6-million a year. The network would include a microwave system that could be

used by non-commercial television and radio stations.

The main objection to U.S. commercials, according to the brief, is a cultural one. The brief insists that the black screen would make the viewer aware of how "unnatural" a vendor's propaganda is. But then, are blank screens more natural?

On Way To Colour, Australians Drop Fees

It was good news to hear that Australian television is moving to colour programming. And, for viewers, it is now good news that receiver license fees will be dropped. Operation costs of the Australian Broadcasting Commission have outstripped the revenue from licenses. The result is that the

(Continued on page 78)

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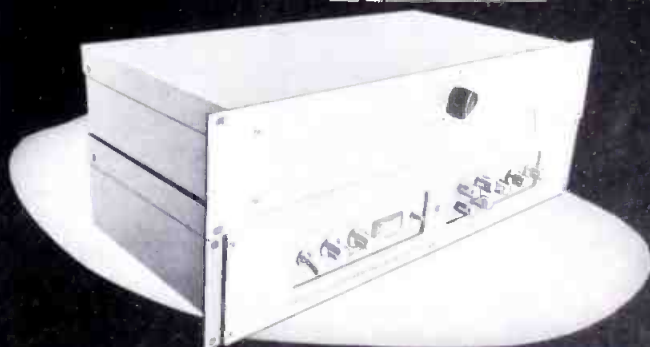
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operation will be financed directly from tax revenues.

The Treasury had asked that license fees be raised with a separate fee for colour TV licenses. However, this would have been contrary to the labor government policy to make colour TV costs to consumers as low as possible.

The government's further reasoning for taxation is that 97 percent of Australians now have access to television. It also was mentioned that now low-income workers will get a break on their contribution through the taxation system. Under the fee system, everyone paid the same fee.

Sparta Electric Corporation, full-line broadcast equipment manufacturer in Sacramento, California announces an order from the government of Malaysia for that nation's first FM transmitting equipment.

The Malaysian Ministry of Information will use twin Sparta Model 610A 10kW Transmitters atop a mountain about 20 miles from Kuala Lumpur. The stereo signal will be the first to reach any Malaysians, and is expected to serve about one-fourth of the country's entire population. The Ministry has splendidly equipped modern studios in the nation's capitol, from which Sparta-supplied composite STL will feed the transmitter site on 6,000-foot Mt. Ulu Kali.

On-site instruction in operation and maintenance will be provided by Sparta Transmitter Division engineers.

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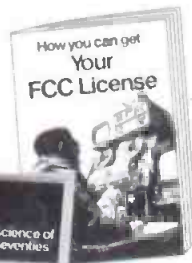
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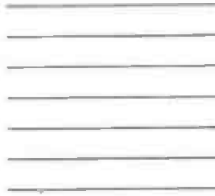
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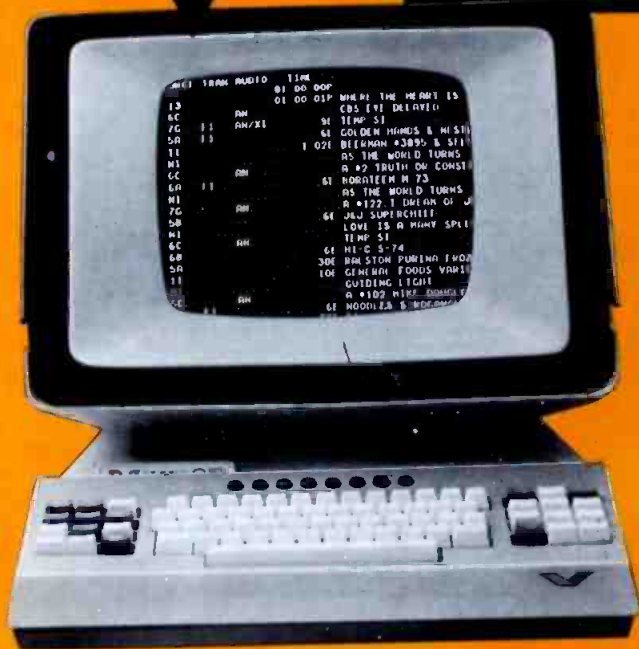
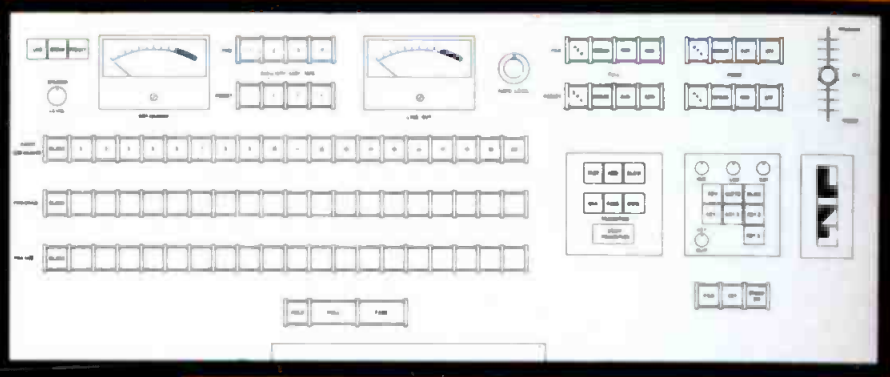
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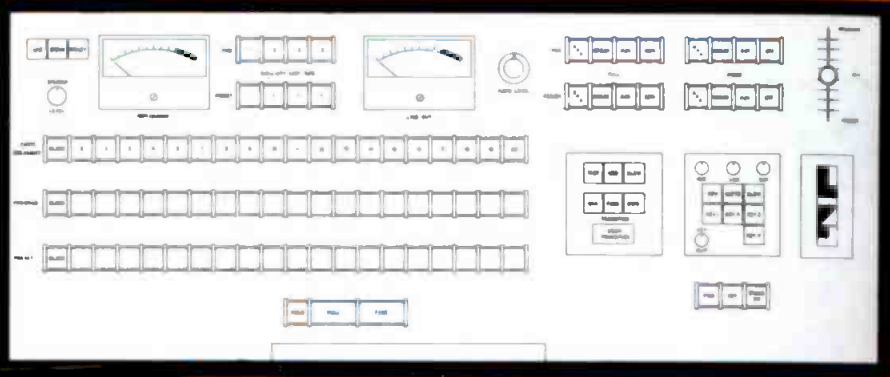
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**VIMAX
27**



the Vital way to tv automation

- New modular computer concept
- Extremely versatile, fast and reliable
- Easy operation with no computer training
- Standard and custom formats available
- 64 characters per line
- 27 events displayed at one time
- Full editing capabilities
- Multiple pre-rolls without time restrictions
- Full transition capability including fades, dissolves, pattern wipes and inserts
- Complete logging facilities for management and FCC purposes
- Manual override always "hot"
- Power failure protection
- Complete plant communications with auxiliary monitors
- Full spectrum of equipment can be controlled in any configuration and quantity
- Events on-air — by real, elapse, duration or cue time, plus manual
- Two automation systems in one; on-air plus 8 programmable selections for microwave switching, VTR's into record, etc.
- Optional mass data storage available for advanced scheduling from 27 events to one year

Several stations in America now enjoy daily use of the Vital Automation System. Write for your brochure describing our VIMAX-27 system.

Make Vital Industries, Inc. your single responsible source for your total system needs.

34 Autumn Lane, Hicksville, N.Y. 11801
516/735-0055

Fox Hill Rd., Lynchburg, Va. 24503
804/384-7001

3820 Ridgewood Rd., N.W., Atlanta, Ga. 30327
404/233-9450

7960 W. Beverly Blvd., Los Angeles, Calif. 90048
213/653-9438

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GOOD ENGINEERING IS VITAL



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