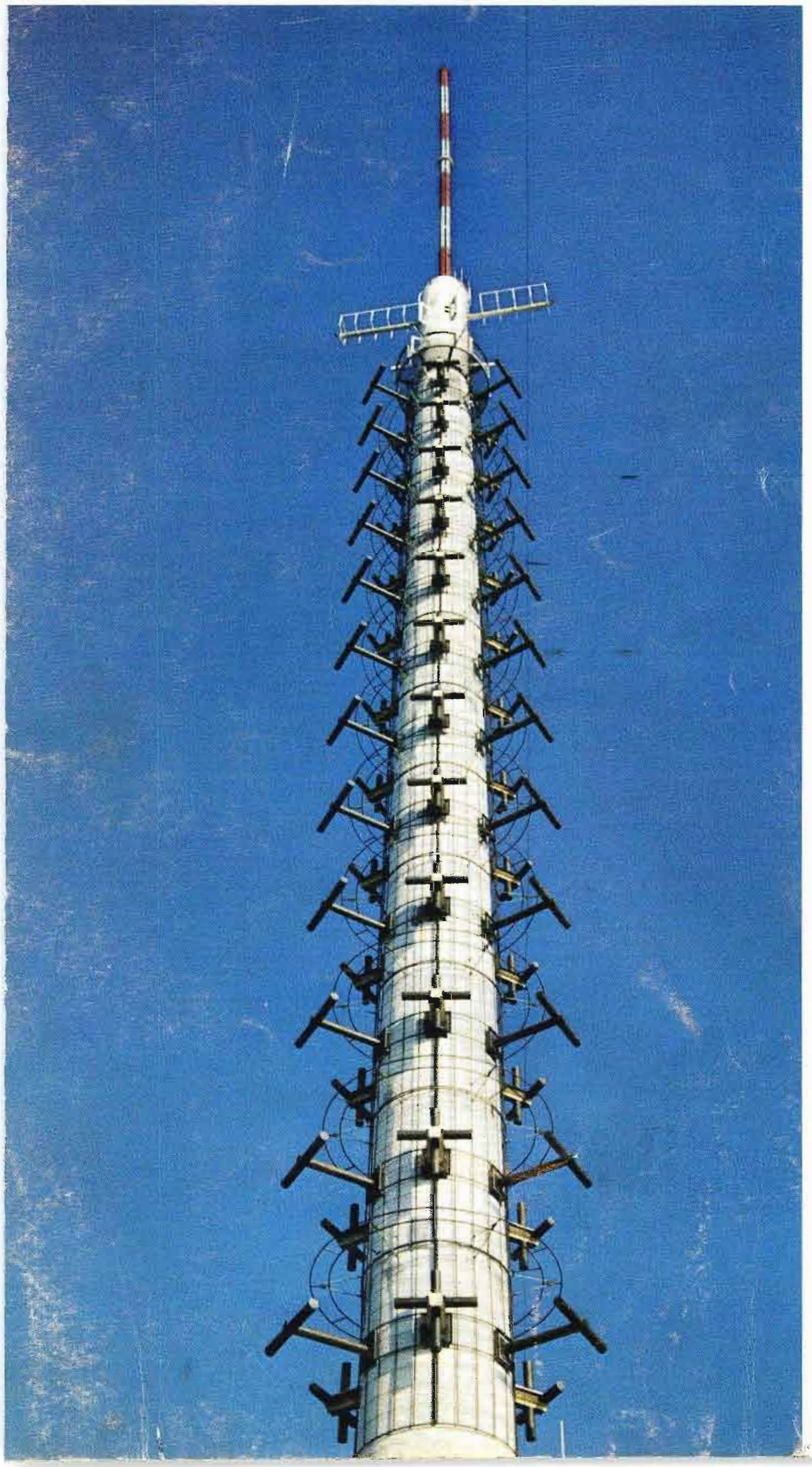
April, 1973/75 cents

BROADCAST ENGINEERING®

the technical journal of the broadcast-communications industry



New sample transmitter logs page 40

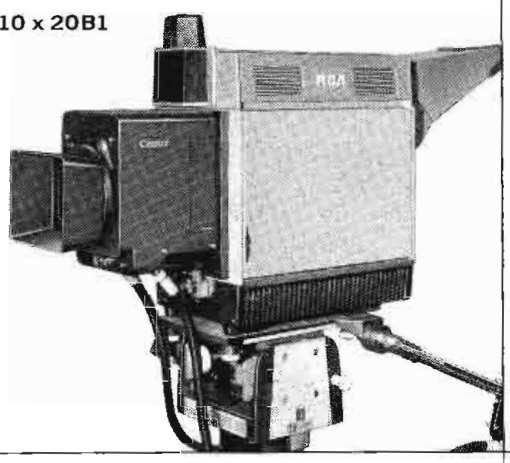
Microphone Attenuation

Digital Audio Preselector

Remote Control Assistance

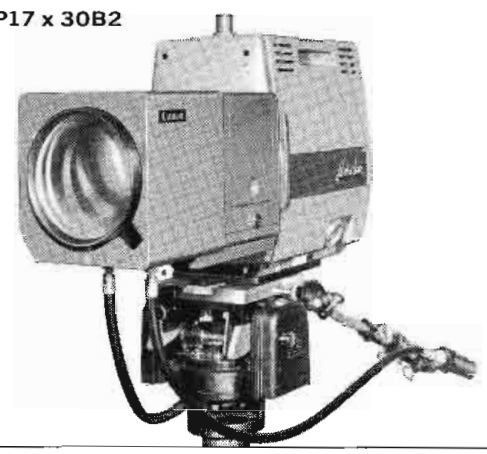
Canon offers the perfect zoom lens for the camera of your choice

P10 x 20B1

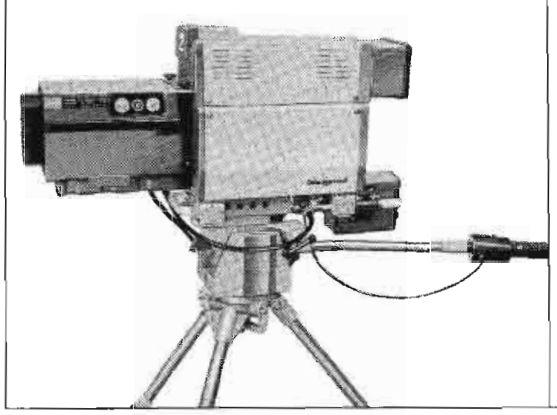


P17 x 30B1

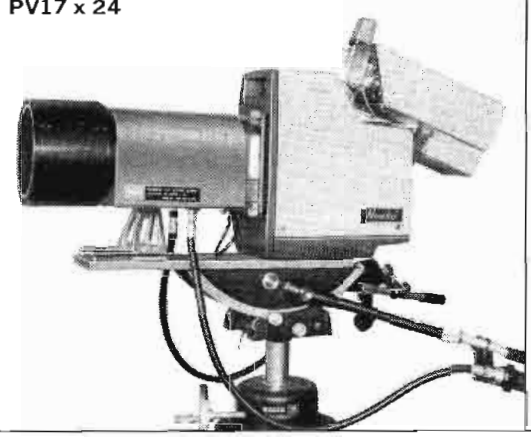
P17 x 30B2



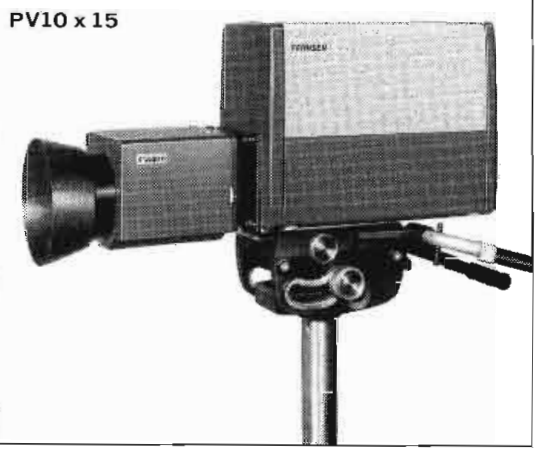
PV10 x 16B



PV17 x 24



PV10 x 15



More and more people are discovering how significantly superior Canon Zoom Lenses are for TV broadcasting purposes. Their outstanding color characteristics, even in dim light, is one of the many reasons why Canon was chosen for telecasting the Munich Olympics.

Canon's wide range of excellent zoom lenses encompass three types of operation control—all-servorized, via flexible cables and by effortless push-pull rod control. And it can be attached to fit and operate with any make of TV camera.

Shown on this page are only a few examples of the quality lenses Canon has available to more than meet your particular demands. Specify Canon to stay ahead.

The following are Canon TV Zoom Lenses for the Plumbicon® color cameras currently available on the market:

Size of image tube	Lens	Image format covered
1¼" Plumbicon® color camera	**P10 x 20B4** **P17 x 30B1** **P17 x 30B2**	17.1 x 12.8mm (21.4mmφ)
1" Plumbicon® color camera	**PV10 x 16B1** **PV10 x 15B2** **PV17 x 24B1** **PV 6 x 18B1**	12.8 x 9.6mm (16mmφ)

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The Canon TV Lenses Naming System

P10 x 20B

- Glass Compensation for Beam Spliter
- Minimum Focal Length
- Zoom Ratio
- Application

Applications	Image Format	Pick-up Tubes
P	21.4mmφ	1¼" Plumbicon
PV	16mmφ	1" Plumbicon

Apart from the above, Canon has available TV zoom lenses for 3" or 4-1/2" image orthicon cameras and can also build special lenses to fit your requirements.

Canon

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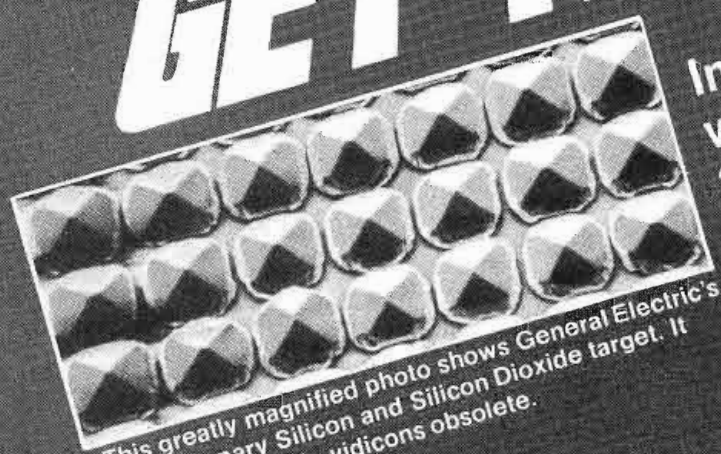
For More Details Circle **(1)** *on Reply Card*

Still using
lead oxide vidicons
in your
color camera?

GET THE LEAD OUT!



This greatly magnified photo shows General Electric's revolutionary Silicon and Silicon Dioxide target. It makes lead oxide vidicons obsolete.

Improve your camera performance with General Electric's Z-7900 30 mm Epicon™ Silicon Target Vidicon

- Improved red response
- Higher sensitivity
- Sharper pictures
- Burn resistant

Now you can replace the lead oxide tubes used in your PE-350, PC-70, and TK-44 color cameras with something better: General Electric's new 30 mm Z-7900 Epicon. It is so sensitive that it can be used for remote pick-ups where low light levels are often a problem.
Get the lead out! Put General Electric's Z-7900 Epicon in.
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GENERAL ELECTRIC

365-06

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April, 1973 • Volume 15, No. 4

BROADCAST engineering ®

The technical journal of the broadcast-communications industry

in this issue...

ABOUT THE COVER

The cover photo this month was supplied by Gates Radio. Cover design by Webb Streit.

DEPARTMENTS

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Robert E. Hertel, Publisher

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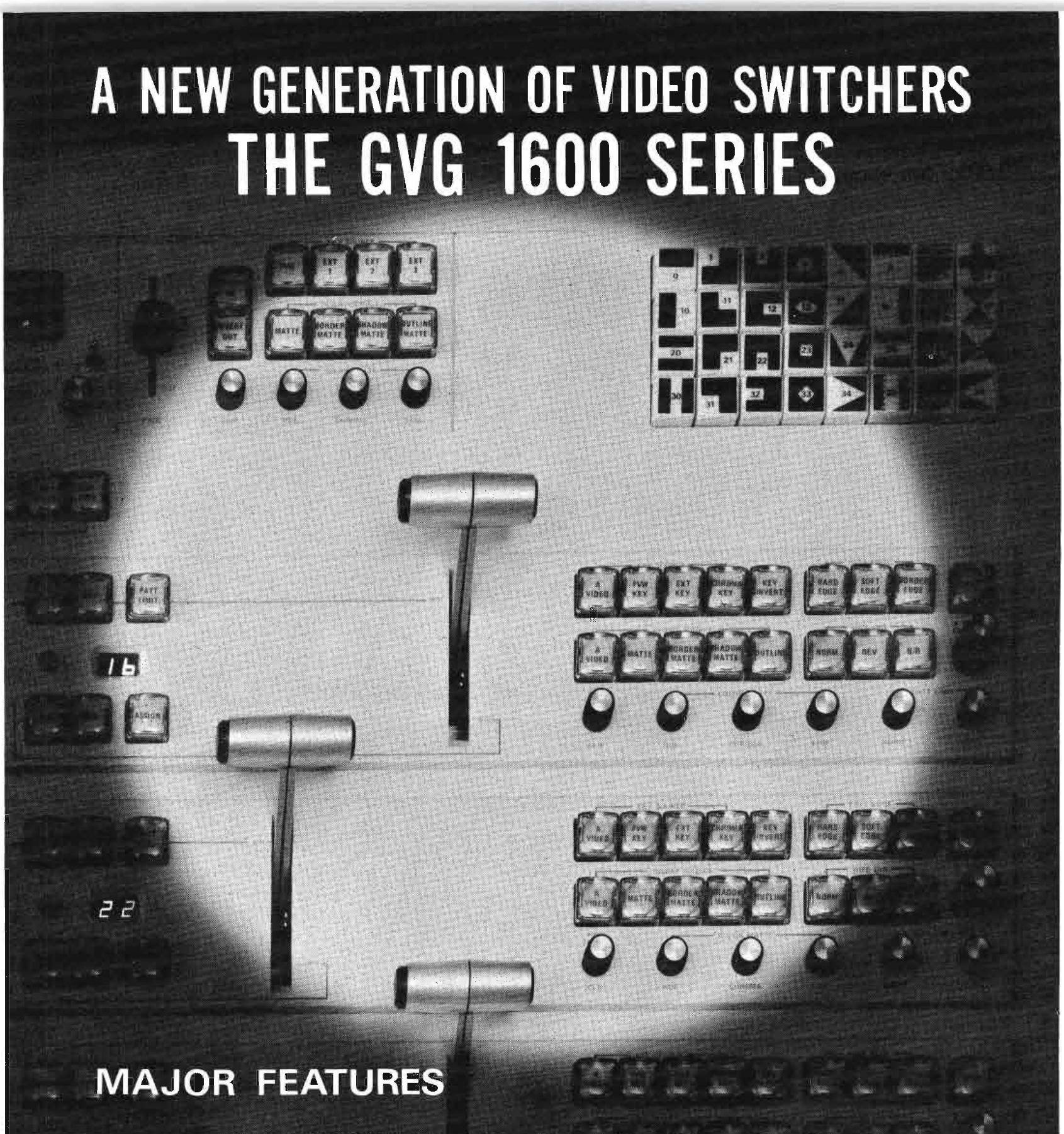
THE GVG 1600 SERIES



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*Optional

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DIRECT CURRENT FROM D. C.

April, 1973

by Howard T. Head

Channel 1 for ETV?

Educational television authorities are continuing to seek new avenues for the expansion of educational (public) television broadcasting. A proposal for the "drop-in" of VHF Channel 12 (204-210 MHz) at Washington, D.C., on an "experimental" basis is pending before the Commission, (see October, 1972 D.C.) but the mileage shortages are so severe that even the most enthusiastic proponents of the scheme realize that the Ch. 12 operation may never be authorized.

One recent proposal which is attracting attention at high official levels is for the restoration of television Channel 1 to VHF channel allocations, and its reservation exclusively for ETV purposes. Channel 1 was first assigned to television broadcasting in 1941, when the present monochrome standards were adopted for commercial operation. Channel 1 was assigned at 50-56 MHz in 1941, but was changed in 1945 to 44-50 MHz.

Channel 1 was to be reserved for a "community" class of station limited to 1 kW at 500 feet. Only one construction permit-at Riverside, California-was ever granted on Channel 1, and this station was never built. In 1948 Channel 1 was reassigned from television to the land mobile services (sound familiar?), and in turn land mobile sharing of Channels 2-13, which had been permitted but proved unattractive, was discontinued.

Old Channel 1 is still assigned to land mobile, but today there is ample frequency space to permit land mobile reassignment elsewhere in the spectrum so as to free the band for television purposes once again. This may present some problems, but probably fewer than some of the other schemes for ETV expansion.

Appeals Court Rules Cable Systems Liable for Copyright

The U.S. Second Circuit of Appeals, reversing a lower court decision (see July, 1972 D.C.) has held that CATV systems are subject to copyright liability for programs carried from "distant" TV stations. The big, and entirely unclear, point is just what constitutes "distant" carriage.

When you take Cohu's Model 1500 Color Film Camera and combine it with Eastman Kodak's CT-500, it's quite a system, especially when these two units together are priced nearly the same as the base price of other color film cameras alone. It's like getting two for one.

In addition to its moderate price, the 1500 gives you a proven and superior method of correcting for film base and dye transfer errors utilizing instant black and white paint, auto sensitivity and black level control. For gross film errors, continuously variable gamma correction is available in all three channels.

The Model 1500 was designed with a simple and efficient optical system which transmits better than 65 percent in any one channel through the sealed dichroic beamsplitter.

This permits the camera's vidicons to be operated at relatively low target voltages and very low dark current resulting in low lag, long life, and better black level stability. This sensitivity precludes the need for expensive lead-oxide tubes.

Featuring a rear-loading parallel yoke system that can be retubed in seconds, the Model 1500 is virtually free of registration problems encountered in other color film cameras and can be totally retubed and set up from scratch in 20 minutes by an experienced operator. Cohu's yoke system is not removed during tube changes and you are not subjected to alignment problems inherent in systems requiring yoke removal.

A passive remote control station is included and does not contain video circuitry which would be subjected to interference and signal degradation. Throughout, this film camera features simple circuitry, unencumbered by the requirement for 'extras' such as complex test equipment for sophisticated circuitry.

It all adds up to the reason why broadcasters are turning to Cohu's Model 1500 Color Film Camera — it's the choice, not an alternative.

You expect more from Cohu, and you get it.

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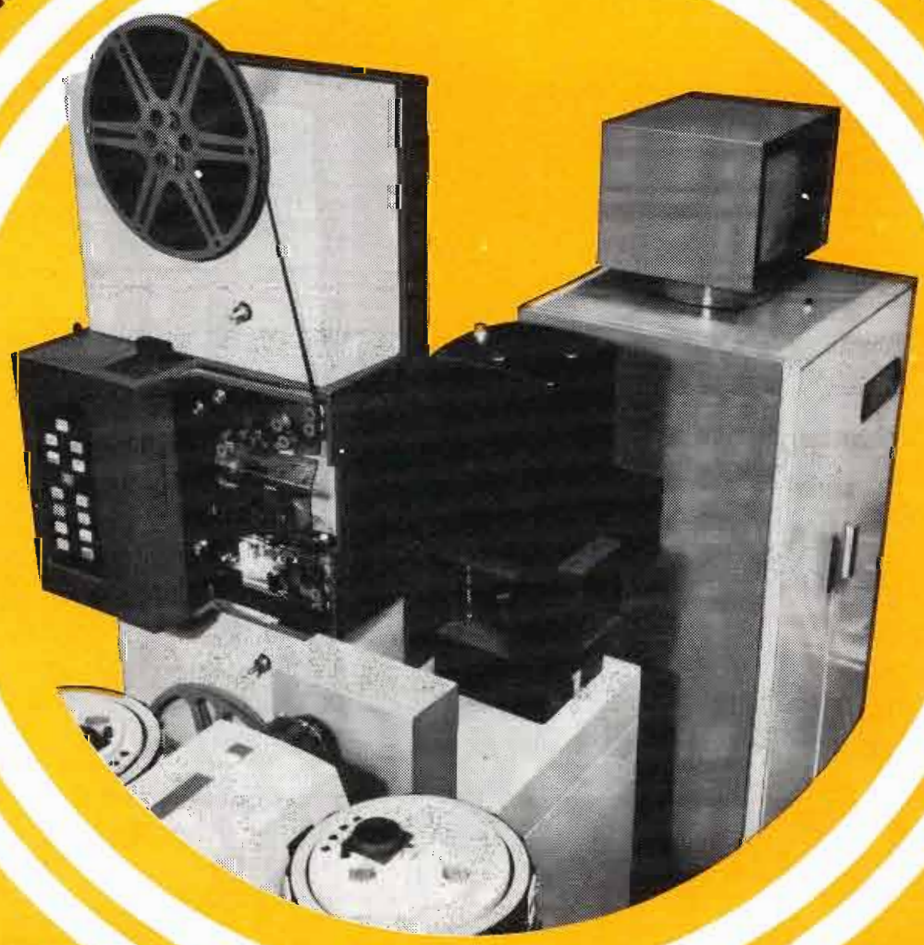
Cohu's 1500 Color Film Camera & The Kodak CT-500 Perform Rings Around Other Combinations



(Continued from page 4)

Under the FCC Rules (Part 76), "distant" carriage is simply carriage beyond the predicted Grade B coverage contour (with certain exceptions). The Appeals Court, however, held that the FCC definition of "distant" carriage was unsuitable for copyright purposes. Instead, said the Court, a "local" signal is one which can be readily received in or near the CATV community, at a favorable receiving location, otherwise the signal is "distant". The use of microwave to bring in such a signal would be almost presumptive proof that the signal is "distant" rather than "local".

Sampling System Standards Proposed for AM Directionals

The Commission has issued a Notice of Proposed Rule-Making and Inquiry looking to the establishment of minimum standards for the installation and maintenance of sampling systems for standard broadcast directional antennas. All directional AM stations would be affected.

The Commission's proposal is a radical departure from usual practice in setting engineering standards. These are ordinarily specified in terms of performance, but in the case of AM sampling systems, the Commission proposes to specify even minute details of materials and techniques. Sampling line lengths would be specified (all equal), solid outer sampling line conductors would be required, and the use of base current sampling devices would be restricted to towers shorter than one-quarter wavelength.

The new proposal could have a profound effect on a majority of existing AM licensees. A special article in the May issue of Broadcast Engineering will go into the Commission's proposals and their implications in detail.

Short Circuits

Consultants and lawyers report that inquiries are brisk following the lifting of the AM "freeze"; a special article in next month's issue will carry full details of the new requirements...A combination AM and FM licensee in Virginia has petitioned the Commission to discontinue the use of the suffixes "-FM" and "-TV" in assigning call signs, charging that the present system of suffixes is unfair and leads to confusion, especially where the AM and FM are separately programmed...The "TeleGlobe" system of pay-TV has received FCC approval; it's the third system to be so approved... The Commission has reminded all licensees that "clipping" network commercials or promos is illegal--unless, of course, you tell the network what you are doing...The Commission has ruled that training systems for deaf persons must continue to use the 72-76 MHz band, ruling out use of the FM broadcast band (88-108 MHz).

WHERE ACCURACY COUNTS ...COUNT ON BELAR AM FM TV

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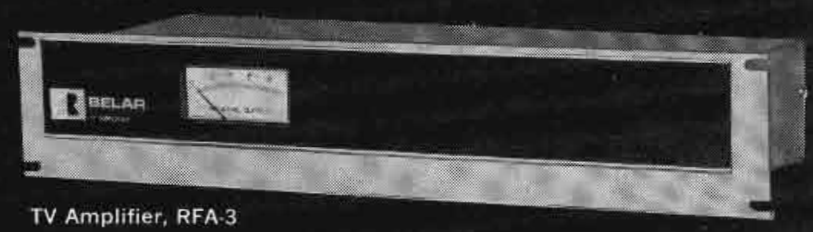
Stereo Monitor, FMS-1

SCA Monitor, SCM-1

FM Amplifier, RFA-1

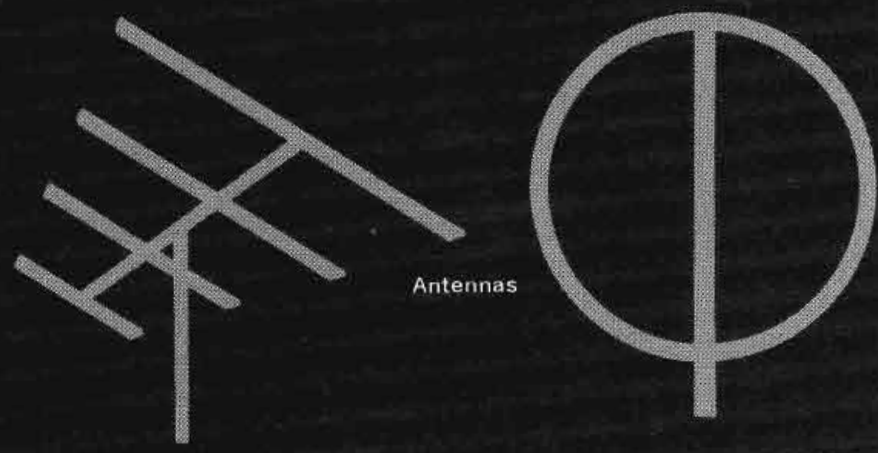
AM Monitor, AMM-1



TV Amplifier, RFA-3

TV Frequency Monitor, TVM-2,3

TV Monitor, TVM-1



Antennas

AM Amplifier, RFA-2

The secure feeling that you have purchased equipment that will accurately do the job you intended it to do is most comforting. When you buy Belar AM, FM, or TV frequency and modulation monitoring systems, you'll know that feeling. You'll know that you have the right equipment that will give you ease of operation, functional checks and unquestionable ACCURACY. And you'll measure all your program material, including the peaks accurately.

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LETTERS TO THE EDITOR

What Are We Selling?

Dear Editor:

In regard to "Adding IM Tests to your Audio Proof" (**BE**, January, 1973): Dennis Ciapura's points are well-taken, particularly the fact that the audio proof may meet Federal standards, yet appall the serious audiophile. Thus, the FM station engineer should be particularly sensitive to the problems of IM distortion.

Our current FM Stereo installation at WOBR has prompted study of IM distortion measurements, with an eye toward preparing **before** the stereo signal is aired for the first time. I've found that Harold E. Ennes' **AM-FM Broadcast Maintenance** (Broadcast Engineering Notebook, Vol. 3, Howard W. Sams) provides excellent supplementary material to Ciapura's article in Section 3, paragraphs 3-14. With the availability of suitable IM Distortion measuring devices at low prices, even the very low power installation should be able to squeeze enough out of the budget for such a worthy cause.

After all, isn't our signal what we're trying to sell?

Paul H. Bock, Jr.
Staff Engineer
Radio Station WOBR
Wanchese, N.C.

Advice Welcomed

Dear Editor:

I'm writing in reference to the article in the January issue of **BE**. The article was about educational radio station WLTL. I say three cheers to James White, Chief Engineer.

I too am Chief Engineer of a high school radio station. WYCS, 21 Kilowatts, a primary EBS station, the most powerful FM station of its type in the U.S.A. When I took the position Nov. 14 of last year I was horrified at the students' opinion of the station and the lack of organization. It was well taken care of when first established back in 1966; but over the years even the York County School Board, owner, has lost interest. Currently I'm making strides to change all phases of the station operations. Anyone who has experienced similar situations, your advice will be welcomed.

Gary Becknell, CE
WYCS-FM
Edu. Radio
Box 452
Yorktown, Va. 23490

Rolls in...Rolls Out

Dear Editor:

In connection with your January, 1973 issue, it occurs to me that a meeting should be arranged between authors Knupp and Coddington, since anyone who has his studio equipment mounted on casters and equipped with plug-in connecting cable is eventually going to need one or more security systems.

Reg McCausland
Technical Dir.
Radio CJCH-920 Ltd.
Halifax, Nova Scotia

Technical Note

Dear Editor:

I would like to know who to call about information on the Signetics NE540L IC used in the Article "A New IC Approach To Audio Power" in the October 1972 issue of **BE**.

I like your technical articles very much. Keep up the good work.

Thomas J. Little
Chief Engineer
KYSN
Colorado Springs, Colo.

Editors Note:

The address for Signetics is: 811 East Arques Ave., Sunnyvale, Calif. 94086.

Whose headache?

Representatives of the television industry have adopted strong and sweeping rules regulating the advertising of non-prescription medications on television.

The unanimous action was taken by the nine-member Television Code Review Board of the National Association of Broadcasters. The rules, which go into effect September 1, 1973, are designed to encourage advertising which:

provides factual information about the products, consistent with objective package/label information;

avoids representations that a product will alter a user's mood or attitude beyond that reasonably experienced through the relief of symptoms/conditions for which the product has been proven effective;

advises users to read and follow label instructions/cautions;

avoids over-statements in both audio and video of a product's capabilities.

Representative Paul G. Rogers (D-Fla.), chairman of the House Public Health and Environment Subcommittee has commended the broadcasting industry for adopting rules regulating the advertising of non-prescription medications on television.

He said he is "very pleased that the broadcasting industry has taken the course of self-regulation in the area of mood drug advertising. I consider the guidelines as a public service of the first magnitude."

His remarks on the House floor followed adoption of a strong set of rules by the Television Code Review Board of the National Association of Broadcasters.

Congressman Rogers said he believes the most critical new rule "is the one which says that ads will avoid depicting someone who has taken a pill in one mood, rapidly and handsomely changed after taking the pills. I hope that this will result in an end to the Cinderella syndrome which over-the-counter drugs have created on television.

"I am sure the pharmaceutical industry will cooperate fully with the broadcasting industry in making these changes for the benefit of the public. I commend the broadcasting industry for this move."

INDUSTRY NEWS

Now it's program logs

The National Association of Broadcasters again has urged the Federal Communications Commission to abandon a proposed rule which would require radio and television stations to make their program logs part of their public file.

It said in comments replying to those filed by the National Citizen's Committee for Broadcasting that the proposed rule would impose a substantial burden on broadcasters that cannot be justified "since the benefit to the public interest is practically non-existent."

NAB described as "simply untrue" NCCB's claim that inspection of program logs is "the only method of obtaining a completely accurate picture of a station's programming."

It pointed out that a renewal application already in a station's public file contains a "wealth of information" that reflects programming more accurately and completely than the entries of title, source and time listed on its program log.

NCCB, it said, is naive in suggesting that making logs available for public inspection would require only "a few more cubic feet of storage space."

"Every licensee submitting comments in this proceeding," NAB said, "has bemoaned the tremendous bulk of program logs—and with good reason. Three years of logs in file cabinets would fill a small room, leaving little space for 'public inspectors'."

The Association objected strongly to NCCB's suggestion that the FCC require licensees to either furnish log copies at cost or permit interested parties to remove the logs and have copies made on their own.

It said "low-cost" copying would be impossible where licensees without on-premises copying equipment got it done commercially and would be prohibitive for licensees in small communities since they'd have to transport the bulky records to the nearest town with copying facilities.

As for the suggestion that a licensee "turn over custody of his logs to anyone who asked for them," NAB said that "the degree of risk is enormous; many licensees would be compelled to purchase copying equipment for no other reason than to copy logs **IF** anyone asked for them."

It said NCCB also "ignores the necessity of confidentiality of certain data included on program logs, especially where a station's competitors are concerned." (Some stations enter the rate charged for advertising and use the logs for bookkeeping purposes.)

NAB said NCCB has completely overlooked the true meaning of broadcaster-community dialogue and has "ignored the willingness of licensees to cooperate with responsible community groups" in the area of programming.

New President For TV Code Board Of NAB

Charles A. Batson, president of Cosmos Broadcasting Corp., Columbia, S. C., has been named Chairman of the Television Code Review Board of the National Association of Broadcasters, effective March 28.

Harold Grams, vice president-broadcasting of station KSD-TV, St. Louis, Mo., was appointed to the Board, also effective March 28, to succeed Max Bice, vice president and general manager of KTNT-TV, Tacoma, Wash. Bice, now Board chairman, is serving his second consecutive term and is ineligible for reappointment.

Roger D. Rice, vice president and general manager of KTVU, Oakland, Calif., was reappointed to his second term on the Board.

The Board changes were announced by NAB President Vincent T. Wasilewski who said they will take place at the close of NAB's 51st annual convention on March 28.

Other TV Code Review Board members are:

Morton S. Cohn, vice president and general manager, WLOS-TV, Asheville, N.C.; Joseph E. Drilling, vice president and general manager, KJEO, Fresno, Calif.; Wayne Kearl, president and general manager, KENS-TV, San Antonio, Tex.; and Alfred R. Schneider, vice president, ABC; Thomas J. Swafford, vice president-program practices, CBS Television Network; and Herminio Traviesas, vice president-broadcast standards, NBC, all of New York, N.Y.

Citizens Licensee Snubs FCC

Have you heard the one about a group that thinks it can affect changes in FCC Rules by ignoring official correspondence and by staying on the air even after a license has been revoked?

You're absolutely correct. It couldn't. . . .it wouldn't dare happen in commercial broadcasting. But it's happening among the ranks of Citizens Radio licensees.

According to an FCC release (95619), it has taken a cease and desist order to get a Kansas City Citizens Radio licensee to stay off the air. And it all comes about because licensees want to look at the use of those frequencies as hobby first, forget the rest.

Anyone who has operated on this band or has listened to it know that typical conversations from top to bottom indicate that just about every rule covering the use of these frequencies is being violated. There is nothing new about that. (Odds on, there are more violations per lincense in this service than in all the rest combined.)

No matter. According to the release, this Kansas operator is the state representative for the United CB'ers of America. Says the release, "This organization instructs its members to continue to violate the Commission's rules in an attempt to force the Commission to allocate the Citizens Radio service to hobby use and to approve a petition calling for recinding of all fines and citations for the past five years."

$2,000 Broadcast Course

Educational costs are rising, and that includes special short courses in Rules violations.

A New Jersey station has been ordered to forfeit $2000 for failure to make log entries, falsification of logs, failure to inspect equipment, and for using an unlicensed transmitter. But then, you never know when you're being watched. The FCC noted that surveillance and inspection "revealed" the violations.

The station argued that its owners are without radio experience, yet they pointed out that the legislative history of the forfeiture provisions of the Act makes it clear that they are educational rather than punitive in nature.

But FCC history also tells us that if circumstances warrant, forfeitures may be reduced. However, they have always added that licensees are responsible for acts or omissions of their employees. They insist that a licensee will not be excused for violations by taking corrective action.

Bill Monroe Will Be Featured Speaker For Assn. Presidents

Bill Monroe, Washington correspondent for NBC's "Today" show, has been named luncheon speaker for the annual conference of State Broadcaster Association Presidents to be held in Washington on Wednesday, May 2.

Mr. Monroe is a past president of the Radio-Television News Directors Association and of the Radio-Television Correspondents Association.

The conference will be held at the Mayflower Hotel under auspices of the National Association of Broadcasters.

Re-regulation: Let's Get Going

Dear SBE Members:

For the past several months the FCC has been accepting statements, formal or informal, from interested parties on their opinions, ideas, or suggestions for changes in FCC Rules & Regulations. The Commission has already issued several changes and it is expected that the review and change process will continue for many months.

SBE members are directly involved with Part 73 of the Rules and should be interested in any changes made therein.

Three SBE board members have been appointed by SBE's board of directors to serve as national chairmen in coordinating responses from the Society's membership:

TV: John Wilner/1573 Parkside Avenue
Trenton, New Jersey 08683
AM: James Wulliman/Milwaukee Journal Stations
720 E. Capitol Drive/Milwaukee, Wisc. 53201
FM: Edwin Karl/WSNL-TV/425 Broadhollow Rd.
Melville, New York 11746

It is suggested that this subject be made a project for each chapter as well as individual members. Why not appoint a local committee and forward your conclusions to the appropriate national chairman for submittal to the FCC?

Suggestions from individuals are also welcome.

Robert W. Flanders, President
Society of Broadcast Engineers, Inc.

Chapter News Reports

Chapter 1–Binghamton, N.Y.
Chairman: Larry Taylor,
WENY TV, Mark Twain Hotel,
Elmira, N. Y. 14901

The business and technical session on Feb. 13th was preceded by refreshments and dinner at the Treadway Inn, Owego, N. Y. Chairman Larry Taylor presided, introducing as guest speaker Charles Hallinan who was most instrumental in founding the Binghamton Chapter and who had served terms in national SBE offices as President, Executive Vice-President, and Executive Secretary. Hallinan, who is now sales engineer for CCA Electronics, talked on his company's equipment. He brought along for examination several

(Continued on page 15)

Bob Griffiths, left, of Telemet, receives thanks from Larry Taylor, for having filled in when scheduled speaker could not make it. Looking on are Tim Braddock, standing at the right, and Louveer Stantz, television consultant, seated at the left, and Wiley Bates, chapter secretary treasurer, seated, right.

Chapter Report Deadlines

Reports of SBE chapter meetings and announcements of future events will be published in these pages monthly. It is important that chapters send information on meetings and other news as promptly as possible. Include photographs whenever available; preferred photo size is 8 x 10 but smaller sizes are also usable.

The monthly deadline for submitting copy is the 25th of the 2nd month preceding the month of publication. For example, the date by which copy must be received by the SBE editor for the June 1973 issue is April 25th; for the July 1973 issue, the date is May 25th; and so on. Letters to the SBE Editor and articles for publication in the Journal, are welcome.

Send all material for publication to: SBE Editor, Joe Risse, P. O. Box 131, Dunmore, Pennsylvania 18512.

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

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EMPLOYER _____ CITY _____ STATION _____

( )ADDRESS _____ CITY _____ STATE _____ ZIP _____ PHONE _____

FCC LICENSES _____ OTHER TECHNICAL SOCIETIES _____

EMPLOYMENT RECORD: most recent first	Station or kind of business	Time Employed From	To	Position or Duties
a. Employer b. Address				
1 a. _____ b. _____				
2 a. _____ b. _____				

Total Years of Responsible Engineering Experience: _____ Field of Activity: Radio _____ Television _____ Other _____

EDUCATION:

TYPE OF SCHOOL	NAME AND ADDRESS OF SCHOOL	COURSE	NUMBER OF YRS. COMPLETED	GRADUATE? DEGREES?	LAST YEAR ATTENDED
College					
Trade or Mechanical					
Corresp. or Night					

Two references familiar with your work:

	Name	Address	Occupation
1.			
2.			

Be Sure To Sign

Enclose $10.00 (or $5.00 for bona fide students). No action taken without Dues.

Signed _____ Date _____ 19 ____

I agree to abide by the Constitution and By-Laws of the Society if admitted.

ADMISSIONS COMMITTEE ACTION: Date _____ Approved for Grade _____

Action Deferred for More Information _____ Candidate Notified _____

Chairman's Signature _____ Entered in Records _____

items including a 40-Watt, solid-state, remote-pickup transmitter, and a modulation monitor providing indication of both positive and negative peaks simultaneously. Other equipment displayed were a digital readout frequency monitor and a new CCA cartridge machine.

Chairman Taylor reported on plans for the Joint Meeting planned for May 8th with the Syracuse and Scranton/Wilkes-Barre chapters. Location, not yet definite, will be either Owego or Binghamton. Probable guest speaker will be a prominent official of the FCC, Harold Kassens, if his schedule permits. Since final plans should have been made by publication time, details are probably now available from Larry Taylor, chairman of Chapter 1, WENY TV, telephone (607) 734-3636.

Chapter 2–Northeastern Pa.
Chairman: Paul Evanosky, WVIA TV
Old Boston Rd., Jenkins Twp., Avoca, Pa.

On March 5th, the chapter met at the new studios of WVIA TV for a tour of the facilities at this new location of the area's educational TV station. Chairman Paul Evanosky, chief engineer of WVIA, and chapter chairman, was honeymooning in the Bahamas, so the tour was under the direction of other station personnel. Recently-elected chapter officers aside from Evanosky are vice-chairman, John Kowalchik of WILK; secretary, Charles Morgan of WARM; treasurer, Milan Krupa of WPTS. Directors are: Robert Fulton of WCNR; J. Pat Gallagher, consultant; Joe Risse of ICS and the University of Scranton; Charles Sakoski, Jr. of WBRE TV; and Chet Sawicki of WNEP TV. Program committee is Morgan, Krupa, and Risse. Attendance by both members and guests was good.

Chapter 15–New York, N. Y.
Chairman: John M. Lyons, WWRL AM
41-30 58th St., Woodside, N. Y.

The officers of the New York chapter want everyone interested in attending their meetings to know that they meet every 2nd Thursday, at a convenient location only 2 blocks from the Port Authority bus terminal at 41st St. and 9th Avenue, where parking is available. The meetings are held at the WQXR Presentation Studios, **New York Times** Bldg., 9th floor, at 229 West 43rd St., New York. Those attending are welcome to use the Times' cafeteria which opens at 6 PM. Meetings generally start at 7:30 PM. Meetings are scheduled well in advance. Information on next meeting may be obtained from chairman Lyons at (212) 335-1600. At nearly every meeting, topics are included to interest engineers employed in both radio and television.

The April 12th meeting will include a talk by Tom Schoonover on "Paralleling TV Transmitters" and "RF Switching Systems". Schoonover, of Gates Division of Harris Intertype Corporation, will travel from Chicago for this meeting.

In the second half of the technical session, Bill McCarren of CBS Radio Division will discuss "Matching AM Transmitters to Antenna Systems".

Chapter 16–Seattle, Wash.
Chairman: Clay Freinwald,
KMO Radio
P. O. Box 1277, Tacoma, Washington 98401

On February 14th the chapter met at the Norselander Restaurant, for a social hour, lunch, and technical session which centered around the president of CCA Electronics, Bernie Wise. Bernie, widely known as a most capable designer of broadcast products, talked on CCA participation in the VHF-UHF TV transmitter and antenna market as a result of having acquired the Ampex line of TV transmitting equipment. FCC actions of the previous month were covered by Bob Dietsch.

The March 14th meeting was "Electromagnetic Pulse Protection for Broadcast Facilities", by Don Clark of the U. S. Navy Engineering Labs. Further details in the next issue.

Chapter 18–Philadelphia, Pa.
Chairman: Jack Jones, WCAU TV
City Line and Monument Avenues, Philadelphia, Pa. 19131

The February 26th meeting followed a social hour and dinner at Williamsons Restaurant. CBS Labs presented a program on new professional products: Processing Amp, Sync Generators, and Test Package. Equipment was demonstrated. The present officers were renominated for 1973. Results of election will be reported next issue. Also to be reported on later are the following topics and meetings:

April: Microphone and Audio Demonstration, by Shure Brothers.

May: Audio and Video Tape Presentation, by 3M Company.

Chapter 20–Pittsburgh, Pa.
Chairman: Henry R. Kaiser, WWSW
One Allegheny Square, Pittsburgh, Pa. 15212

On January 18th the members and guests took part in a general discussion on new equipment items and news events. Also considered at length were

Indianapolis Chapter 25

the pros and cons of Remote Operation of AM, FM, and TV Transmitters. President at the meeting, which took place at Buddies Restaurant, was chairman Henry Kaiser. Membership applications were distributed for the benefit of the guests.

Chapters in the Making

The following areas represent locations for possible future chapters. Information on any planned organizational or technical meetings may be obtained from the individual listed as the contact in each case. Anyone interested in formation of a chapter in other locations may contact SBE President Robert Flanders, P. O. Box 88123, Indianapolis, Indiana, 46208, or at WRTV, 1330 North Meridian, Indianapolis, Indiana. It is also urged that you keep the SBE Journal editor advised at P. O. Box 131, Dunmore, Pa. so that your efforts to form a chapter might be enhanced by publication in our Journal.

Chapter 25–Indianapolis, Ind.
Chairman: Bob Wyckoff, RA-DIS-CO Inc.,
814 N. Senate Avenue, Indianapolis, Ind. 46206

Bob Wyckoff presided at the January 17th meeting at WIRE-WXTZ. Gordon Trout, chief engineer hosted a tour of the facilities of WIRE (AM) and the just-completed facilities of WXTZ (FM). Photos were taken during the tour and business session of the meeting.

Chapter 28–Milwaukee, Wisc.
Chairman: Ed Wille, KENCOM,
7835 W. Caldwell Ct.,
Milwaukee, Wisc. 53218

On February 13th, guest speaker, Howard T. Souther, vice president, engineering, Koss Corporation, spoke on "Headphones and the Hi-Fi Sound". The Koss Corporation is located in Milwaukee. Mr. Souther compared listening to speakers and listening through headphones, and discussed the advantages and disadvantages of both. Perception of ambience and benefits of four-channel reproduction from both the recording and reproducing aspects were dealt with. Ability to perceive sounds from the rear, using headphones, was discussed in detail.

Chapter 29–Corpus Christi, Texas
Chairman: Arthur T. Jones,
KCCT Radio, Corpus Christi, Texas

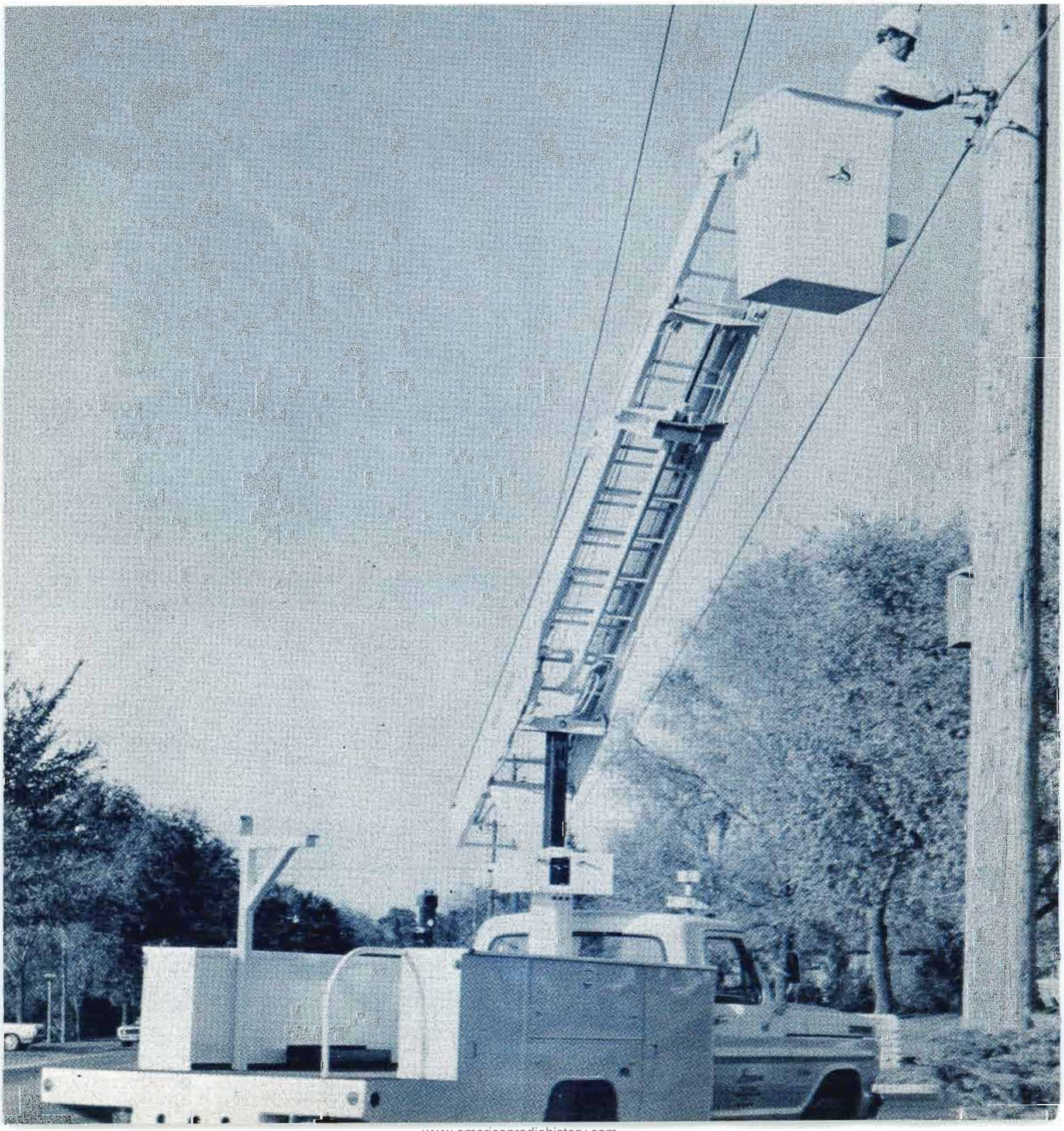
Claude E. Sessions, Jr., KMIO Radio, presided at the meeting, which took place at Luby's Cafeteria. Carrie Fitch of KIII TV discussed the relationships of the vertical sync pulse, horizontal sync pulses, equalization pulses, and the color burst. Question-and-answer and discussion followed. During the business session, nominations were presented for the upcoming chapter election, as follows:

Chairman:	R. N. Douglas, Arthur T. Jones, J. H. Mayberry
Vice Chairman:	Leonard Schmidt, Mark Parma
Sec'y/Treasurer:	Claude E. Sessions, Jr.

APRIL, 1973

CABLE ENGINEERING

in this issue...



Practical Performance Tests

by Archer Taylor

The Federal Communications Commission's technical standard on co-channel interference to Class I Cable Television channels is somewhat obscurely included in Sec. 76.605(a)(9) and 76.605(a)(10), reproduced in Figure 1. Subparagraph (9) establishes the 36 dB signal to noise ratio, but also includes co-channel interference from undesired broadcasting signals "operating on proper offset assignments". Subparagraph (10) establishes the 46 dB ratio for "discrete-frequency interfering signals not operating on proper offset assignments".

This part of the series will deal only with co-channel station interference; a subsequent part will consider the more general problem of the coherent disturbances included in subparagraph (10).

What Percentage When?

The Rules, and the Commission engineering staff as well, are silent as to **when** co-channel measurements should be made, or what percentage of time must be in compliance. It is a well known fact that, even within a few miles of most VHF transmitting stations, objectionable co-channel interference to direct home reception is likely to occur from time to time, especially on Channels 2, 3, and 4. At Grade B levels, in certain allocation configurations, co-channel interference is a frequent experience of non-cable viewers for several weeks at a time, particularly in the equinoxial seasons.

Evidently this rule was adopted primarily to provide a basis for evaluation by FCC field engineers, or in litigation which might arise as a result of a significant pattern of public complaints to FCC about co-channel interference on cable. But the operator is left to his own devices in deciding how to demonstrate compliance without going to unreasonably extreme procedures.

The proper determination of percent-of-time the desired-to-undesired signal ratio is below 36 dB during a full seasonal cycle would seem to be beyond the intent of this rule requiring annual performance tests. Unfortunately, unless the rule is clarified by petition or by the Commission itself in a policy statement, it may have to be clarified in expensive litigation. Every operator will hope he does not become a party to such a test case.

Under these circumstances, in addition to making some sort of test as part of the annual test procedure required in Sec. 76.601(C), the operator may wish to include an explanatory statement describing in general terms the extent of co-channel interference on each applicable channel.

It should also be noted that the standard on co-channel interference applies only to signals received within their Grade B contour, which probably helps some. It is only necessary to test for co-channel interference on local channels, or microwave channels originally received within Grade B contours.

To substantiate a general statement, and for several other reasons, as will be developed further in this series, we would recommend recording weekly or monthly observations at a series of pre-designated monitor test points. A statement concerning the results of such observations, reporting on the existence or absence of co-channel interference should be quite helpful in the annual report to determine the extent of compliance. To this end, 52 weekly reports would be better than 12 monthly reports. In my opinion, but admittedly not the accepted policy of FCC, the occurrence of co-channel interference in a few weekly monitor check point observations, on one or two channels, could not be considered unreasonable. In fact, a citation for non-compliance because of such a condition would appear to be highly unreasonable.

It has been contended that the measurement of co-channel station interference requires either the $10,000 spectrum analyzer, or a very narrow band (5-10 Hz) selective voltmeter such as the General Radio Wave Analyzer. Because a single measurement of

76.605 Technical standards.

(a) The following requirements apply to the performance of a cable television system as measured at any subscriber terminal with a matched termination, and to each of the Class I cable television channels in the system:

(9) The ratio of visual signal level to system noise, and of visual signal level at any undesired co-channel television signal operating on proper offset assignment, shall not be less than 36 decibels. This requirement is applicable to:

(i) Each signal which is delivered by a cable television system to subscribers within the predicted Grade B contour for that signal, or
(ii) Each signal which is first picked up within its predicted Grade B contour.

(10) The ratio of visual signal level to the rms amplitude of any coherent disturbances such as intermodulation products or discrete-frequency interfering signals not operating on proper offset assignments shall not be less than 46 decibels.

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If the only thing bothering you about your helical VTR is the picture you play back, you can relax.

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It replaces the original sync and blanking with EIA-format sync, while our SYNC GUARD circuitry gives you a rock-solid picture even with distorted or industrial sync. It provides dc restoration and removes tilt and bounce. Clips white and black levels and clamps the video signal to reduce noise and transients. Gives you full front panel control of burst amplitude and phase, video and chroma level, sync and set up. And optional plug-in modules are available for video and chroma AGC and color regeneration.

If you've got more problems, add our D-100 Dropout Compensator (DOC). It replaces lost video information with fill-ins perfectly matched for luminance and chrominance, with no lines, no flashes, no color mismatches. Video stability and full color interlace are maintained even through multi-generation dubs.

And while it does all this, our DOC reduces your system costs by allowing more passes on your tapes because it corrects for dropouts due to wear, while its built-in dropout simulator allows system test without the expense and inconvenience of a test tape.

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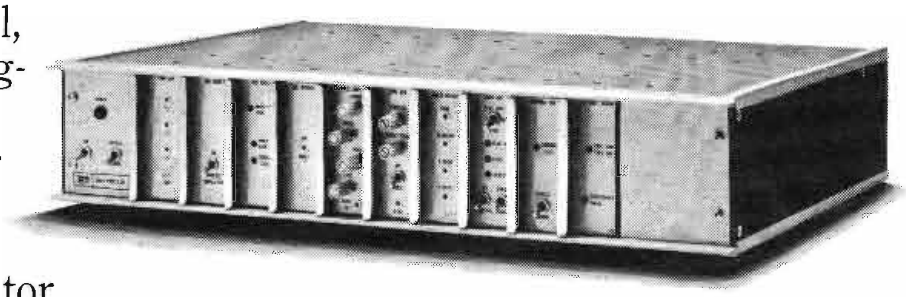

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co-channel interference ratio might be an almost meaningless exercise anyway, without determining the frequency of occurrence, some simpler, less costly way of "determining the extent to which the system complies with subparagraph (9) must reasonably be acceptable to FCC.

We suggest the following ideas, which have been discussed with FCC engineers but not endorsed by them. Of course, if the proper spectrum analyzer or sharply selective voltmeter is available for other purposes, it should be used. But we do not consider that compliance with the FCC rules presently in effect necessarily **requires** the use of such instrumentation.

Three Practical Methods

Perhaps the simplest method of all would be to connect an oscilloscope (vertical response to 500 kHz is adequate) to the video output terminals of a Signal Level Meter (sometimes called Field Strength Meter, or FSM). A co-channel beat will normally be seen as a ripple in the sync tips when displayed at field rate. If possible, the sweep rate should be synchronized to the ripple frequency rather than the sync pulse, though this may prove difficult to do.

The Signal Level Meter should be connected either at the antenna terminals or the processor output, where the carrier to noise ratio is normally greater than 50 dB. Since the IF pass band of the Signal Level Meter is only 0.5-0.6 MHz, the video signal to noise ratio should be close to 60 dB, and even the noise peaks will be close to 50 dB below sync peaks. FCC specifies a minimum ratio of carrier amplitudes of 36 dB. This means about 4 IRE units, peak-to-peak, well above even the peak noise voltage expected.

Baseband Filter

Another technique would be to connect a 10 kHz or 20 kHz baseband filter to the video output terminal of the Signal Level Meter. An oscilloscope or VTVM could be used to measure the RMS voltage of the 10 or 20 kHz signal which will be approximately equal to the carrier voltage of the interfering signal. The ratio to the desired signal level could then be calculated.

Before they departed from the scene, SKL (Spencer-Kennedy Laboratories) supplied a 10/20 kHz filter (Model 7220) to be used in phasing antennas. Some of these may still be available, though probably difficult to find. The filter should not be too sharp, since the beat frequency could deviate as much as $\pm$ 2 kHz from the nominal 10 or 20 kHz assignment. But it should provide at least 30 to 40 dB attenuation at 15.75 kHz and 31.5 kHz. Insertion loss in the nominal pass band is not critical. It may be hoped that some manufacturer, reading this discussion, will produce such a device for this purpose.

Audio Voltmeter

Similarly, a selective audio voltmeter could be used such as the General Radio Model 1232-A Tuned Amplifier and Null Detector, with less than 6 percent bandwidth. As a matter of fact, a selective audio voltmeter can serve so many useful purposes, it should be seriously considered as part of the standard test equipment complement.

This technique may not be suitable, however, where the desired and undesired stations have the same offset. Although the pattern of offset assignments was designed deliberately to minimize such situations, they can and do occur.

Signal Insertion

If co-channel interference is not perceptible at the time of the performance tests, another simple procedure would be to insert, through an appropriate coupler, a cw signal from a source such as the RCA WR-99A marker generator. Adjust the frequency to any one of the "proper offset" frequencies (i.e. 10 or 20 kHz above or below the desired visual carrier frequency). Then adjust the level until the "venetian blinds" are just perceptible while observing a TV set at close range, in subdued lighting. Now measure the level of the cw carrier and the incoming cable carrier, and, after allowing for attenuator and coupler losses, determine the desired to undesired signal ratio. It will probably be greater than 36 dB.

Thus we have shown there are at least three useful methods, not requiring expensive or sophisticated equipment, for making the performance tests required by Sec. 76.601(c) ". . . directed at determining the extent to which the system complies with . . ." Sec. 76.605(a)(9) regarding interference from co-channel television broadcasting stations.

Outside Assistance

If co-channel interference is, in fact, a problem significantly affecting performance in the view of the public and the franchise administrators, a much more thorough study is probably warranted. While Sec. 76.601(c) does not appear to require engaging a consultant merely to prove that fact, the services of a consultant may be useful for designing a feasible solution to the problem.

Houston To Get Multipoint Television

Soon Houston will have its own private television network. It is a unique system known as Houston Multipoint Television and was scheduled to be in service early this year according to Paul Taft, president of Taft Broadcasting Corporation, the organization authorized by the Federal Communications Commission to operate the system in the Houston metropolitan area.

This is a 'private' television service and is designed to serve commerce, industry, education, medicine, and government facilities.

HMT television signals are transmitted from the antenna atop One Shell Plaza and are received at locations selected by the user. For example, if a company wishes to make use of this service, a special directional receiving antenna is placed on top of the company's building or buildings.

Connection is then made from the receiving antenna to the television sets within the building. Between the antenna and the sets, an encoder is installed so that even though HMT is transmitting a number of consecutive programs, only that transmission desired by the company is received.

In other words, HMT is meant for specific users and is private in the sense that one user cannot receive another's program.

While special equipment as described is required, the signal is received on any conventional home television set via Channel 7.

An obvious advantage of the system is that receiving sets are on the premises of the user and viewers are not removed from their job sites.

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The situation:

it is now well known that expanded polystyrene provides superior electricals in coaxial cable. It permits longer trunk runs using smaller cables with fewer amplifiers, than is possible with expanded polyethylene.

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NCTA President Hits OTP Interview

(In an interview on the PBS program "Firing Line" scheduled for airing February 18, 1973, Clay T. Whitehead, director of the Office of Telecommunications Policy, made a number of remarks about the cable television industry. Following is a statement by NCTA President David Foster in reply to charges made by Mr. Whitehead.)

I am appalled at the remarks made by Mr. Whitehead in his "Firing Line" interview with respect to the integrity of the cable television industry and its position on the complex copyright question. He says that OTP believes that copyrights ought to apply to CATV but that "The cable industry doesn't exactly see it that way." Mr. Whitehead is not just grazing the truth, he's driving a wagon train around it.

The facts he omits are these. The Supreme Court has held that CATV is not liable for copyright under existing law. Despite this ruling—and even prior to the court's decision—the cable industry has consistently and publicly demonstrated its willingness to pay reasonable copyright fees.

The issue is not and has not been one of will CATV pay copyright. The issue is what are reasonable copyright fees. Mr. Whitehead knows this quite well. To suggest otherwise before a national television audience does a grave disservice to the public, to the CATV industry, and to the resolution of an important and complex issue.

To dredge up the old unfair competition and cable-is-a-parasite shibboleths should be beneath the dignity of OTP. Those are the clubs of only the most hardline and irrational opponents of cable.

As for his remark that the cable industry hasn't been one of the most forward-looking industries in the country, I would suggest that such talk unfortunately seems to be consistent with Mr. Whitehead's general posture toward the media in this country.

Our position is quite clear. We consider the early passage of copyright legislation embodying fair copyright payments by CATV systems to be of the utmost priority. We are working toward that goal.

I would earnestly suggest that OTP apply its energies towards speedy enactment of copyright legislation, rather than towards clouding the issue. It is, after all, a matter for Congress to decide, not the Office of Telecommunications Policy.

Special Cable Program Set For May

A conference on cable television programming and a workshop in videotape techniques will be held in May 1973 at the University of California at Berkeley, with joint sponsorship by two UC Extension departments, the Center for Filmmaking Studies and the Department of Urban Affairs.

Both events are planned for representatives of groups and organizations interested in using cable TV channels set aside for education, government, public access, and programming produced by local cable systems. The overall aim is to provide answers to questions about how the new FCC rules apply to the participants' communities, what precedents have been set in other communities, and what skills and resources are required for TV production.

The conference, scheduled for May 5, will bring together speakers from a variety of backgrounds who are involved directly or indirectly with cable TV. Their discussions will cover FCC regulations on cable channels; mobilizing access and origination channels; program sources; community, educational, and local government programming; making videotapes; program production; and the state of the art in cable casting. Concurrent panels during the evening session will take up educational, government, and community programming.

Among the speakers are representatives of the FCC, the National Cable Television Association, the Cable Television Information Center, and organizations involved in program production on the East and West Coasts. Panelists will include many Bay Area people concerned with cable programming. The conference registration fee is $40.

The videotape workshop, scheduled for May 19-27, is designed as an intensive course in the basic skills of ½-inch videotape production. It will study the videotape medium and its applications, the technical aspects of videotape equipment, camera techniques, scripts, documentation and graphic displays, TV appearance and interviews, and editing. It is intended for persons in schools, government agencies, industrial organizations, public relations activities, and community groups who may wish to use videotape.

Paul Turner, an instructor in broadcast communication arts at California State University, San Francisco, and Shelley Surpin, a San Francisco videotape maker, will conduct the workshop. Weekend sessions May 19-20 and 26-27 and evening meetings May 21-24 are planned. The registration fee is $105, and enrollment is limited. Optional academic credit may be earned.

Further information about the conference and workshop is available from the Center for Filmmaking Studies, University of California Extension, 2223 Fulton St., Berkeley, Ca. 94720; or phone (415) 642-4101.

Plan Now... To Attend Your NCTA Convention

Co-Channel Beats Got You Down?
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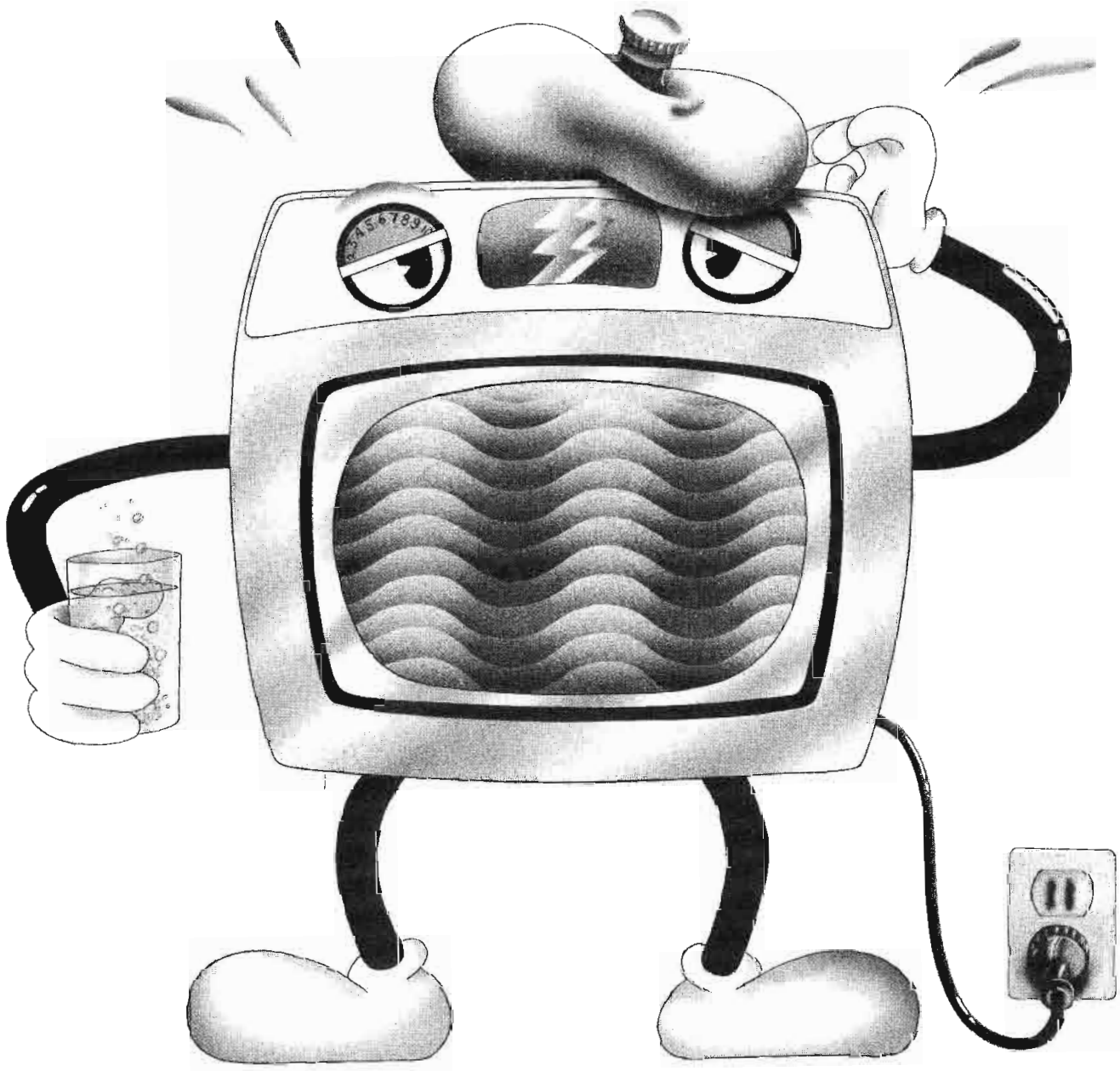

EiE has what you've been waiting for. A performance proven phase-lock color television modulator that allows you to "reclaim" those cable channels which have been vacated due to direct "off-air" pickup in strong signal areas. Co-channel beats can now be eliminated with our CTM2 Phase-Lock Modulator which synchronizes the modulator output to the interfering broadcast signal.

The model CTM2 is only one in a series of broadcast quality EiE color television modulators which includes: the CTM1 standard modulator; the CTM3, for microwave applications; and the CTM4, a phase-lock version of the CTM3.

All CTM series color television modulators feature modular design, low differential phase and gain distortion and minimum group delay. Spurious beat suppression on all channels is in excess of 60 dB below visual carrier at +60 dBmV (maximum output) without the use of external bandpass filters. An optionally available network provides group delay predistortion characteristics which conform with FCC transmitter requirements.

Call or write today for more information on EiE's complete line of headend equipment.

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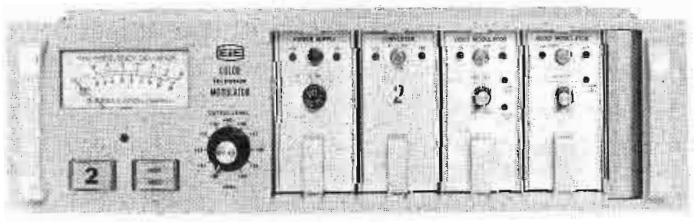

Electronic Industrial Engineering
A Division of RCA

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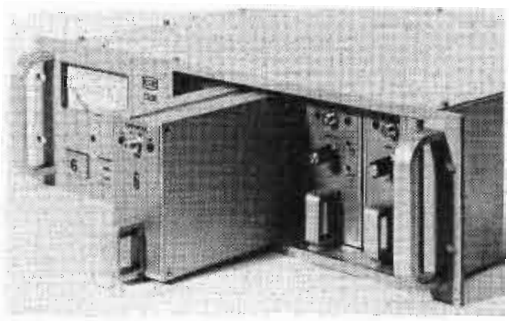
NEW PRODUCTS

Color TV Modulator

Electronic Industrial Engineering, a division of RCA Corporation based in North Hollywood, California, has introduced a new phase-lock color TV modulator that enables CATV systems to offer programming on channels used by television broadcast stations, without objectionable interference patterns.



The solid-state Model CTM2 modulator produced by EiE is capable of synchronizing the modulator RF output to a received broadcast signal, allowing a CATV system to use the same channel allocation as that of the broadcast signal.

This phase-lock feature eliminates "co-channel" bars, or beats, that would make viewing on a conventional receiver intolerable.

Of major interest to the broadcast industry is the fact that a quality, low cost and relatively simple method of meeting a station's "in-house" monitoring requirements can be designed around the EiE CTM1 series of color television modulators and CTD1 demodulators.

EiE's CTM Series also includes the CTM1 standard modulator, available on sub-low, standard VHF, mid-band and super VHF channel allocations. Both modulators use an integrated device selected for its ability to transmit the color sub-carrier without impairing its saturation or hue characteristics under a wide range of modulation conditions, with extremely low values of differential gain and phase.

The assembly of both modulators consists of four totally shielded plug-in modules: Video Modulator, Audio Modulator, Converter and Power Supply. The phaselock circuitry is incorporated into the converter Module and an auxiliary sub-assembly (Phase Lock Module) which is mounted within CTM2 housing.

The modules are contained in a housing which provides facilities for external connections and inter-module wiring as well as a precision attenuator for output level control. Except for the converter, the modules associated with each modulator are identical, thereby minimizing the stocking of spares.

The basic housing for both models includes metering to facilitate the adjustment of modulation depth in the case of the visual carrier and deviation in the case of the sound carrier.

For More Details Circle (60) *on Reply Card*

Rack Mount Color Monitors

Universal Media Corporation, introduces a complete line of color monitors specifically engineered for broadcast, closed-circuit, cable and teleproduction applications. The Unimedia SMT Series Monitors include 9-inch, 12-inch, 15-inch and 17-inch models. Each features the Sony Corporation Trinitron picture tube. The single-gun Trinitron system eliminates convergence problems and moire and produces brighter, sharper pictures with excellent colorimetery and stability.

All monitors rackmount in standard 19-inch racks, with the 9-inch model available as a dual installation or in a frame for use with a half-rack waveform monitor.

Primary controls are all front mounted and talley lamps are provided. A built-in audio speaker/amplifier may be included. Three professional features may be ordered as options—a front panel switch control of underscan, A-B selection of two inputs, and switchable horizontal and vertical pulse-cross display.

For More Details Circle (61) *on Reply Card*

Cassette Recorder And Slide Projector

Spindler & Sauppe now has available their model 740 QueSette Recorder. This cassette recorder has an extra track for use with external multi-media/multi-screen programming equipment. In addition, a built-in synchronizer makes it possible to use the unit with only one still projector.

In addition, the company is now showing their Selectroslide model 900 professional slide projector. The new unit allows 50 to 500 slides to be shown in continuous rotation. Slide advancement is one-half second. Their patented four-element condenser system produces even illumination. It delivers full brightness with f/2.5 lenses of any focal length from 1½ to 12 inches, and lowers center to edge fall-off to about 15 percent.

For More Details Circle (62) *on Reply Card*

Studio Lighting Kit

Smith-Victor's K71 HI-FI Focusing Quartz Studio Kit is a deluxe, professional lighting kit, yet is portable. The kit consists of 3 lights with a total of 1800 Watts, 3 10-foot stands, 2 barn doors, two scrims and a carrying case.

The lights provide highest quality lighting for photography and TV and they are ideal for Fill and Punch lighting applications.

Three 710 HI-FI Focusing Quartz lights, each with a 600 Watt DYH lamp are rated at 3200° K and have a long 75 hour life. Cable length is 10 feet, 3-wire. Stands supplied are the SA10 aluminum type and fold to 27½" but extend to a generous 10 feet. Locked extensions prevent accidental separation. Entire stand is matte black finished to prevent reflections. The kit is packed in a carrying case measuring only 29" × 16" × 7" with a total weight of only 34 lbs.

Complete specifications and prices are available from Smith-Victor Corp., Griffith, Indiana 45319.

For More Details Circle (63) *on Reply Card*

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If you would like to know more about the BC-230B, contact your local Ampex representative or write *Ampex Corporation, Audio-Video Systems Division, 401 Broadway, Redwood City, CA 94063.*

*TM N.V. Philips

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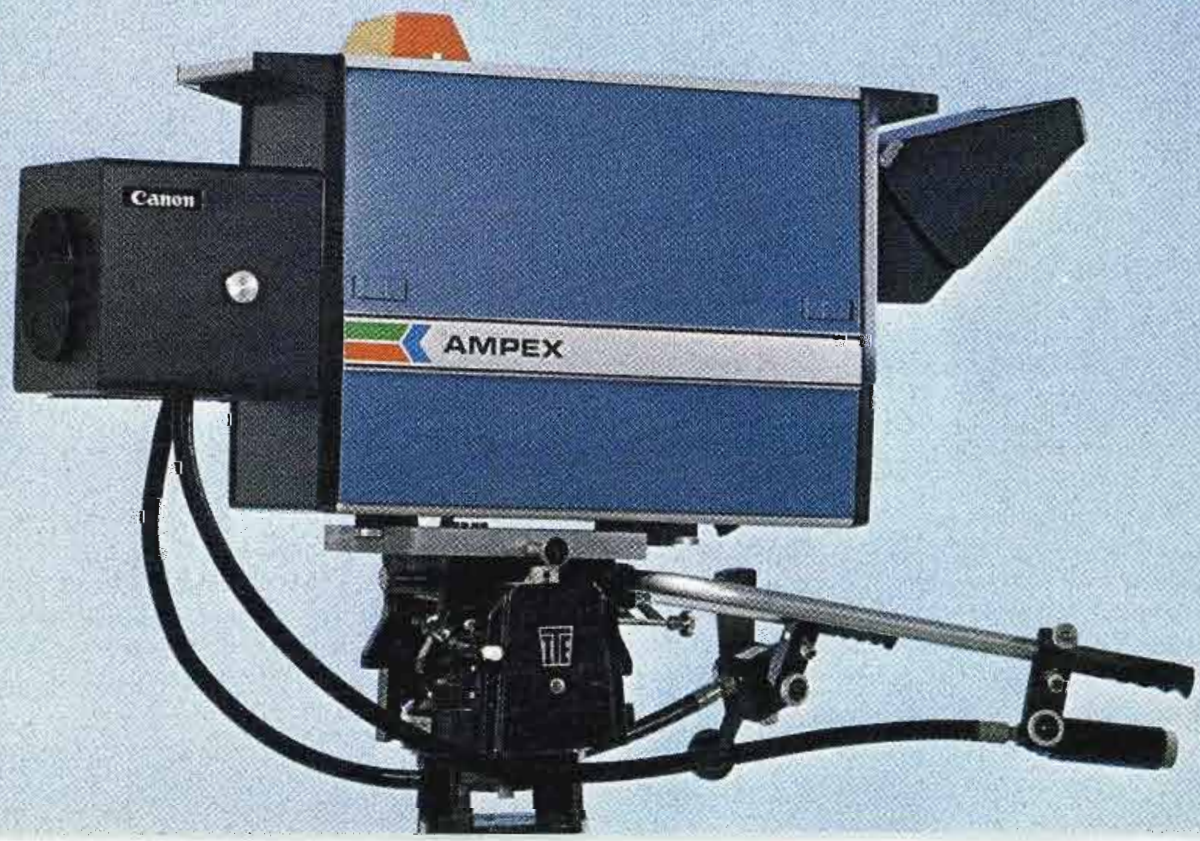


Microphone attenuation: When is it really needed?

By Todd Boettcher*

Most professional microphones, except for some condenser types and a few special-purpose types, generate output voltages in the vicinity of -60 dB.* As a result, it has been a common practice to use microphone preamplifiers in the audio board with 60 dB gain. When louder-than-average sound sources are to be mixed, problems result from such a "hot" mix.

The first problem comes as the mixer fader is barely cracked open, making gain riding virtually impossible. Chances are good that the first preamplifier stage, which usually precedes the input fader, will be driven to the clipping point, causing severe distortion.

The V.U. meter will not show that the input is overloading, because it is tied across the board output. An alternative, if the first stage is not being driven into distortion, is to bring the board master down. That's a poor alternative because of the potential reduction in S/N ratio as well as the possibility of overdriving the line amplifier in the board. And just as important, it will prove to be a hindrance to providing a good mix with other, lower level audio sources since those faders would have to be almost wide open.

WTMJ, Milwaukee, Wis.

A Comfortable Range

There are two good alternatives available to provide a comfortable mixing range on the fader: active attenuation through the use of relatively lower gain input preamps, and passive attenuation through the use of resistive pads. The ideal, under current state-of-the-art practices, is to incorporate a variable front panel gain control on the first stage of the microphone preamp. When utilizing op-amp or IC preamps, a variable feedback resistor (potentiometer) will provide the desired result. In modern audio boards not using an op-amp or IC design, the gain of the input stage can be adjusted by changing a fixed resistor on the preamp printed circuit board. Experi-

Management Highlights

Hopefully, the best thing you have to sell is your sound. Even if you bypass the mathematics the author presents, you can see that (whether home brew or commercially purchased) attenuator pads can improve your product. And in this case, the cost for making the improvement is minimal.

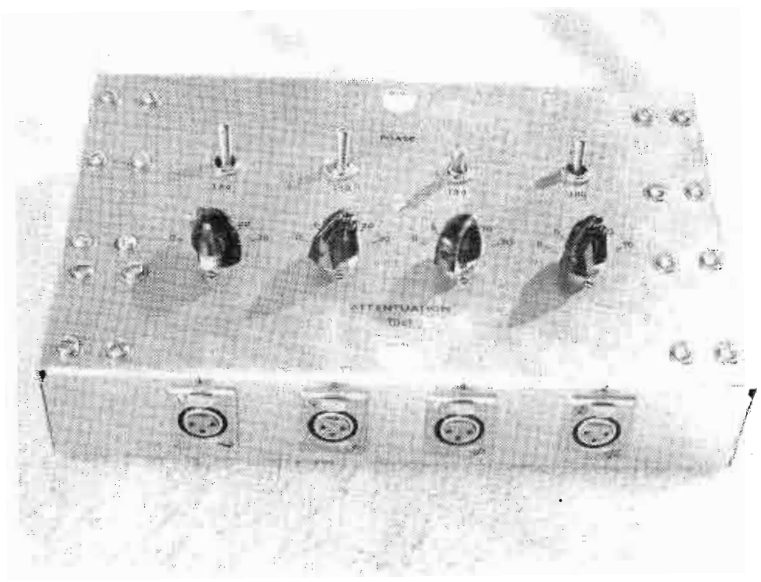


Photo 1. External view of the microphone attenuator box. Note that dry transfer labels were used for their lasting quality rather than adhesive-backed tape or paper labels. "Inline" layout also contributes to ease of use with input connector, switches, and output connector (hidden) in a straight line.

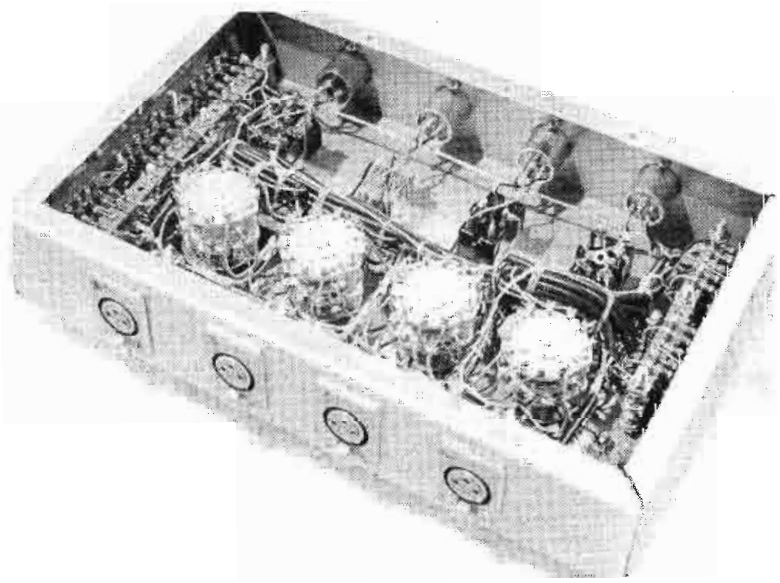


Photo 2. Internal view shows wiring and component layout. Resistors were hard-wired on boards for rigidity so that continued handling would not loosen the connections. Resistor boards were stacked because of the large quantity of resistors used. The non-shielded hook-up wire used is a 20-gauge. All wires were laced down to keep internal parts' movement to a minimum.

mentation with a potentiometer to replace the fixed resistor may provide usable results; however, added hum induction or a reduction in high frequency response may occur with such a modification due to the additional lead length.

Passive Attenuation Pads

The alternative is to use passive attenuating pads in the microphone line preceding the first stage of amplification. The passive attenuator in the microphone line is the only recourse for almost all broadcasters and for recording studios using the older-type boards. The pads should be inserted as close as practical to the input of the first preamplifier stage to help keep microphone line noise to a minimum. The pad will attenuate noise as well as the signal. For example, a 10 dB pad will attenuate the signal by 10dB, but at the same time it will attenuate line noise prior to the pad by 10 dB. Room noise picked up by the microphone will also be attenuated by 10 dB, keeping S/N ratio the same as if an attenuator had not been used. **Caution must be taken: do not use too much attenuation, because the internal amplifier noise could then effectively reduce the S/N ratio.**

Several audio equipment manufacturers have in-line plug-in pads available commercially, usually providing 10 dB of attenuation. If more than 10 dB of attenuation is required, several of these units can be plugged in series. This is adequate for limited microphone setups, but when a multiple-mic setup is used for a band, for example, the cost and awkwardness of using many plug-in pads becomes prohibitive.

Calculating Attenuator Values

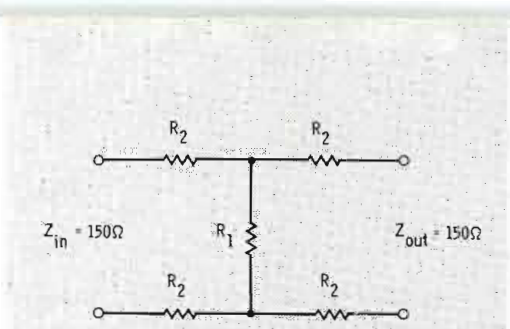
The "H" pad is a familiar device to all audio professionals. Composed of five resistors, the "H" pad provides a given value of attenuation to a balanced circuit (See Figure 1). The "H" pad has a given input impedance (Z_i) and a given output impedance (Z_o). In the pads used for microphone line attenuators, the input and output impedances are both 150 Ohms to conform with current industry standards. When the input and output impedances are the same, all four series resistors (R_2) are identical. Specific resistor values for a given level of attenuation can be calculated by specifying the attenuation in dB, the pad impedance (assuming that $Z_i = Z_o$), and the "k" factor. The "k" factor is the actual voltage gain for a given increase in dB. Assuming that the output voltage (V_o) is greater than the input voltage (V_i), then $k = (V_o/V_i)$. The relationship of dB and "k" can be seen by the following formula:

$$dB = 20 \log \frac{V_o}{V_i}$$

$$\text{if } V_o \quad V_i, \text{ then } \frac{V_o}{V_i} = k$$

$$\text{thus } dB = 20 \log k$$

If the calculated resistor values are within the tolerance limits of the available standard resistors, then those resistors may be used to build a pad with the assurance that the finished pad will have an actual attenuation nearly identical to the design goal. When using 5 percent resistors, the finished pad will have an overall accuracy within 5 percent of the design goal. In practice, the accuracy is usually measurably better than the 5 percent error, typically between 1 percent and 2 percent.



All resistances shown are standard E.I.A. 5% values.
All values were found by calculation as shown previously in this article.

	R_1	R_2
6dB	200	24
10dB	110	39
20dB	30	62
30dB	10	68

Fig. 1 The basic "H" pad, comprised of five resistors. This pad provides proper imedance matching for both the input and output signals.

A Practical Solution

The basic requirements I established for the construction of a passive microphone attenuator were compactness and versatility, Since we have a number of studios in which this could be used, portability was also a factor. For that reason, the attenuators were not built directly into the audio board.

Cannon XLR connectors were used for compatibility in all our studios. Four "H" pads were used to provide varying levels of attenuation: 6 dB, 10 dB, 20 dB, and 30 dB (See Chart 1). All pads have a 150 Ohm impedance. A straight feed-thru (O dB attenuation) was also included. Four of these switchable attenuators were built into one 11" x 7" x 2" chassis so that only this one item would have to be found when needed (See Photograph 1).

Any number of separate channels could have been included, limited only by cost and chassis size. With all four attenuator channels set for maximum attenuation, this chassis duplicates the attenuating potential of twelve commercial in-line attenuators.

In broadcasting, set-up time is at a premium. Frequently, set-up time a half hour or less, especially in local station production, even for complex microphone placement situations. Thus, the rotary selector switch for variable attenuation saves a lot of time when compared to plugging and unplugging in-line attenuators of a fixed value.

All resistors used have a 5 percent tolerance. These were used to reduce cost, yet maintain adequate precision. Precision resistors were not used because more accurate attenuation values are not really necessary in practice. Remember, the goal is to attenuate to a usable level, not necessarily to laboratory standards.

Separate pads were built for each

value; they were not added in series to increase attenuation. Even though 5 percent resistors were used, remarkable accuracy was realized on attenuation value. The 6 dB and 10 dB pads were accurate within 0.10 dB or less. The 20 dB pads were accurate within 0.25 dB, and the 30 dB pads were accurate within 0.50 dB.

Four-pole rotary switches were used to switch both the input and the output of each pad. No pads or portions of pads remain in the circuit when not switched in (See Figure 2). Passive resistor noise is negligible. All internal wiring is shielded (Belden 8451) to add to the shielding provided by the steel chassis. A 12-gauge ground bus also doubles as an anchor to which the wiring is laced. Resistors were mounted on terminal boards lining both sides of the chassis. Because of the number of pads involved (a total of 80 resistors), terminal boards were triple-stacked.

Phase Reversal

One additional feature I felt was desirable to incorporate on this chassis is a phase reversal switch. The phase reversal feature is not found on boards for broadcasting, nor on small recording studio consoles. A DPDT toggle switch was used, although a rotary switch probably would provide better contact life. This switch is important for two reasons: to correct for an out-of-phase microphone, and to deliberately switch a microphone out of phase for special effects.

At times an out-of-phase microphone can be used to good advantage to simplify mixing. Broadcast mixing is considerably more limited than mixing in a modern multi-track recording studio. The broadcaster is frequently limited to four to ten microphone inputs for a given production, depending on the size of the console available.

My goal as a broadcaster is to take a potentially complex mixing situation and reduce it to the barest essentials and still produce good results. For example, in a two microphone interview, an out-of-phase microphone can cancel an unwanted hollow room sound without affecting the voice quality if the microphones are kept far enough apart from each other with respect to their primary sound sources. **The rule of thumb is that the distance between the microphones must be at least three times the distance between each microphone and its respective sound source.**

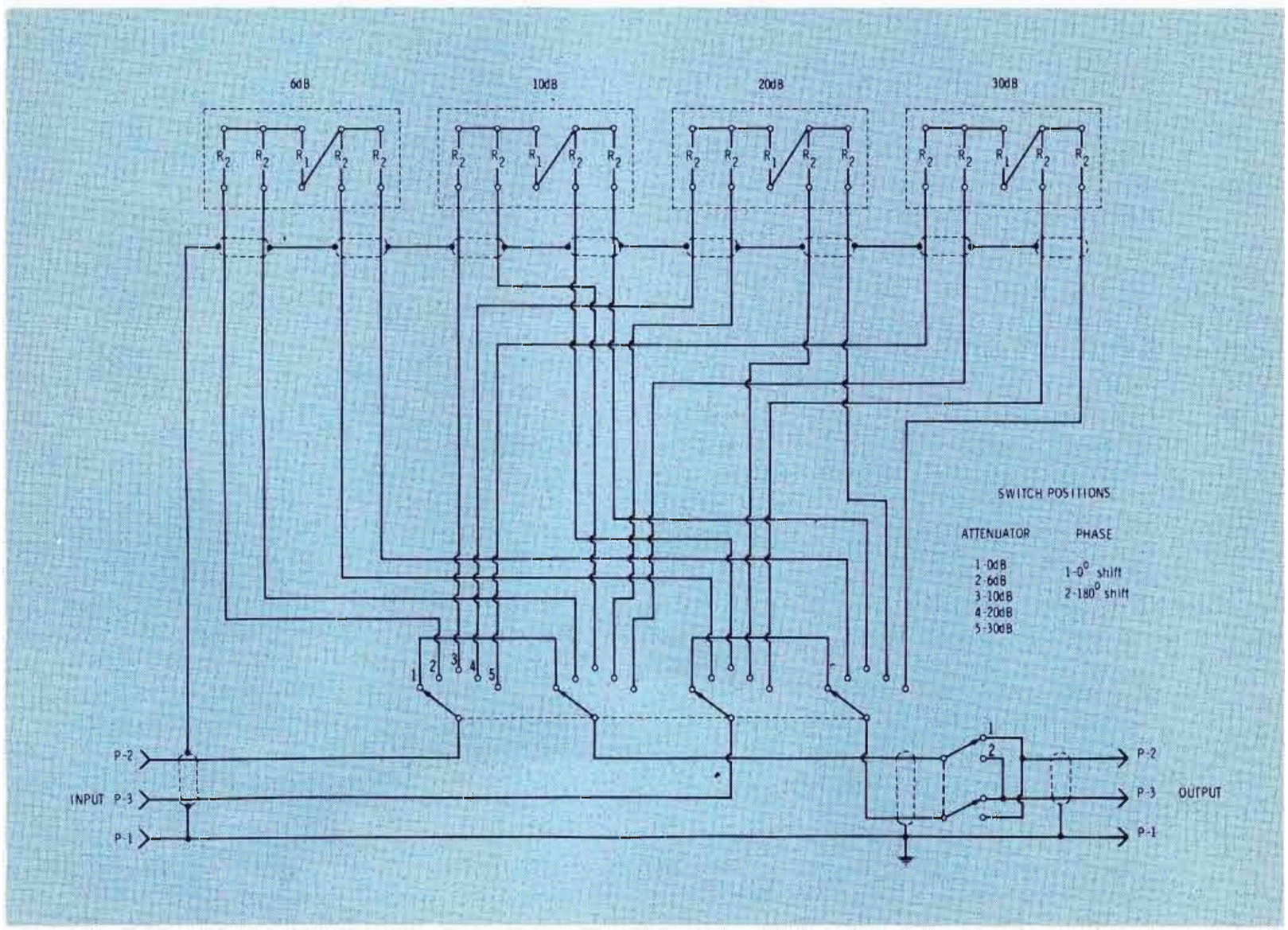


Fig. 2 Schematic for one of the four attenuator-phase shift circuits. Switches are shown in the 0 dB attenuation position and the 0-degree phase position.

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Calculating Resistance Values

One good reference for a table of "k" factors is the **Audio Cyclopedia** by Howard M. Tremaine.

As an example, the following steps are necessary to calculate the resistance values of a 10 dB balanced "H" pad with a 150-Ohm impedance:

For 10 dB, "k" = 3.1623

$$R_1 = \frac{k}{k^2 - 1} 2Z \qquad R_2 = \frac{\frac{k - 1}{k + 1}\ Z}{2}$$

$$R_1 = (0.35137)\ 2Z \qquad R_2 = \frac{(0.51950)\ Z}{2}$$

$$R_1 = (0.35137)\ 2(150) \qquad R_2 = \frac{(0.51950)\ 150}{2}$$

$$R_1 = (0.35137)\ 300 \qquad R_2 = \frac{77.92500}{2}$$

$$R_1 = 105.411 \qquad R_2 = 38.9625$$

Closest E.I.A. 5% values:

R_1 = 110 ohms R_2 = 39 ohms

When taping a rock band in a broadcast situation (without the use of an isolation booth), the lead singer's microphone is often picking up too much instrumental sound to carry the singer's voice, let alone provide a decent mix. Put the lead singer's microphone out of phase with respect to the instrument microphones and the singer can be mixed at will. The instrument sound will be cancelled out of the singer's microphone to a considerable degree. The out-of-phase sound for the instruments will not be heard if the 3-to-1 rule previously mentioned is followed. Best results will be obtained if all microphones are the same.

Other Uses

The attenuators will find use in almost every situation other than a straight voice talking at a normal or reasonably normal level. Forced dramatic readings, singers used to performing in legitimate theatre, singers of classical music, most bands and full orchestras are just a few examples where microphone attenuation would most likely prove helpful. For example, an opera singer can easily produce crescendos 20 dB above the

**Reference: 0 dB=1 mw/10 dynes/cm²*
**Reference: 0 dB=10⁻¹⁶ Watt/cm² (threshold of audibility)*

Parts List

1 Bud	CB-1193	2 x 11 x 7 steel chassis	@ 2.55
1 Bud	BP-670	11 x 7 steel bottom plate	@ 1.50
4 Cannon	XLR-3-31	female panel receptacle	@ 2.12
4 Cannon	XLR-3-32	male panel receptacle	@ 1.21
4 Keystone	15036	terminal boards	@ 2.05
1 Belden	8451	shielded wire (partial spool—25')	@ 1.75
4 Ohmite		10 ohm, ½ watt, 5% resistor	@ .12
16 Ohmite		24 ohm, ½ watt, 5% resistor	@ .12
4 Ohmite		30 ohm, ½ watt, 5% resistor	@ .12
16 Ohmite		39 ohm, ½ watt, 5% resistor	@ .12
16 Ohmite		62 ohm, ½ watt, 5% resistor	@ .12
16 Ohmite		68 ohm, ½ watt, 5% resistor	@ .12
4 Ohmite		110 ohm, ½ watt, 5% resistor	@ .12
4 Ohmite		200 ohm, ½ watt, 5% resistor	@ .12
4 Centralab	PA-2010	4 p 4 pos cer rot sw (short)	@ 3.72
4 Kurz-Kasch	S-292-3L	black pointer knob w/brass insert	@ .17
4 Cutler-Hammer	7592K7	DPDT toggle switch	@ 1.36
Alternate for toggle switch:			
4 Centralab	PA-2002	2 p 2 pos cer rot sw (short)	@ 2.76

average level. Rock and jazz bands can produce constant levels 20 dB to 30 dB above a normal conversational recording level.

Another way to approach the problem is with reference to the sound pressure level (S.P.L.)* at the microphone. A voice speaking at a conversational level will produce an S.P.L. of 60-70 dB at a microphone placed 2-3 feet from the source. An orchestra will produce an S.P.L. of 85-95 dB at 25 feet during loud passages. A 20-piece jazz band and a rock band will produce an S.P.L. of 100-120 dB at the same distance. The purpose of the attenuator is to reduce these varied S.P.L.'s to one average voltage level in the area of -65 dB to -55 dB at the input to the first stage of preamplification.

In practice, I have found that the 6 dB and 10dB positions of attenuation are most useful for bringing a "hot" microphone in line with others used for a normal-level recording. The 20 dB and 30 dB positions are most useful for musical groups. For rock and jazz bands, the most-used position is 20 dB.

After more than a year of use, there have so far been no problems connected with the use of this device. Very rugged construction plus thorough shielding have proven to be a definite benefit in this instance. Total parts costs were held to under $50. If space or finances are even more limited, I would suggest incorporating at least a switchable 0 dB and -20 dB attenuator into your present facilities. This would eliminate the majority of the loud-source audio problems in your station, studio or remote. □

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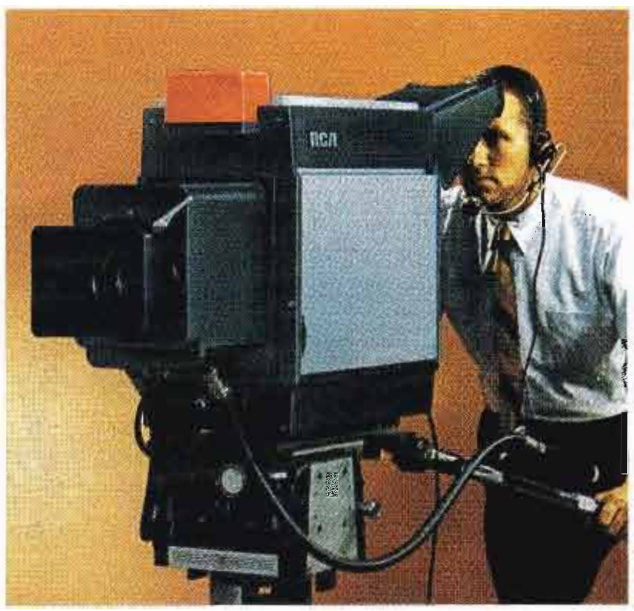

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Remote control operator assistance

By Mel Hart*

The operation of a transmitter by remote control deprives the operator of most of his important information in the event of trouble. He no longer can rely on his senses of sight, sound, smell and touch. All that he has left is his ability to read a remote meter and attempt to diagnose the failure from the very limited information available.

He cannot see the rectifier arcing or smell a hot component, his only course is to try to get back on the air as quickly as possible by blindly operating the remote controls. This often leads to errors under the pressure of being off the air.

With most remote control systems he can operate only one control at a time and read only one meter at a time. In order to minimize down time he must have mechanical assistance in the form of relay operated or motor driven systems that will automatically perform the functions that he would perform if he were present at the transmitter site.

Older transmitters, such as the Gates BC-5A (circa 1948) at WIL require five separate operations performed in the right order to get on the air, filament on-driver on-antenna transfer-plate on-automatic reset on. Skipping any function in it's proper order will result in no operation.

In order to alleviate this situation at WIL I have designed and built some automatic devices to assist the operator. First of all, the normal automatic reset features in the main transmitter, a Gates BC-5P2 will take care of momentary overloads. In the event of an AC power failure the panel shown in Figure 1 will automatically, as soon as the power is restored, reset the filament power and five seconds later reset the plate power. The transmitter is usually back on the air before the operator can begin to dial up the remote control. In the event of a prolonged AC outage the 50,000 Watt

*WIL, St. Louis, Mo.

Management Highlights

Air time lost is money lost. If it isn't lost, it's because you managed to shuffle make-goods into the lineup. As the author points out, without adequate remote sensing and control, even a backup transmitter may not eliminate dead air. Is you transmitter really remotely controlled? If it is, how much time is lost in switching to a backup when your main transmitter is down?

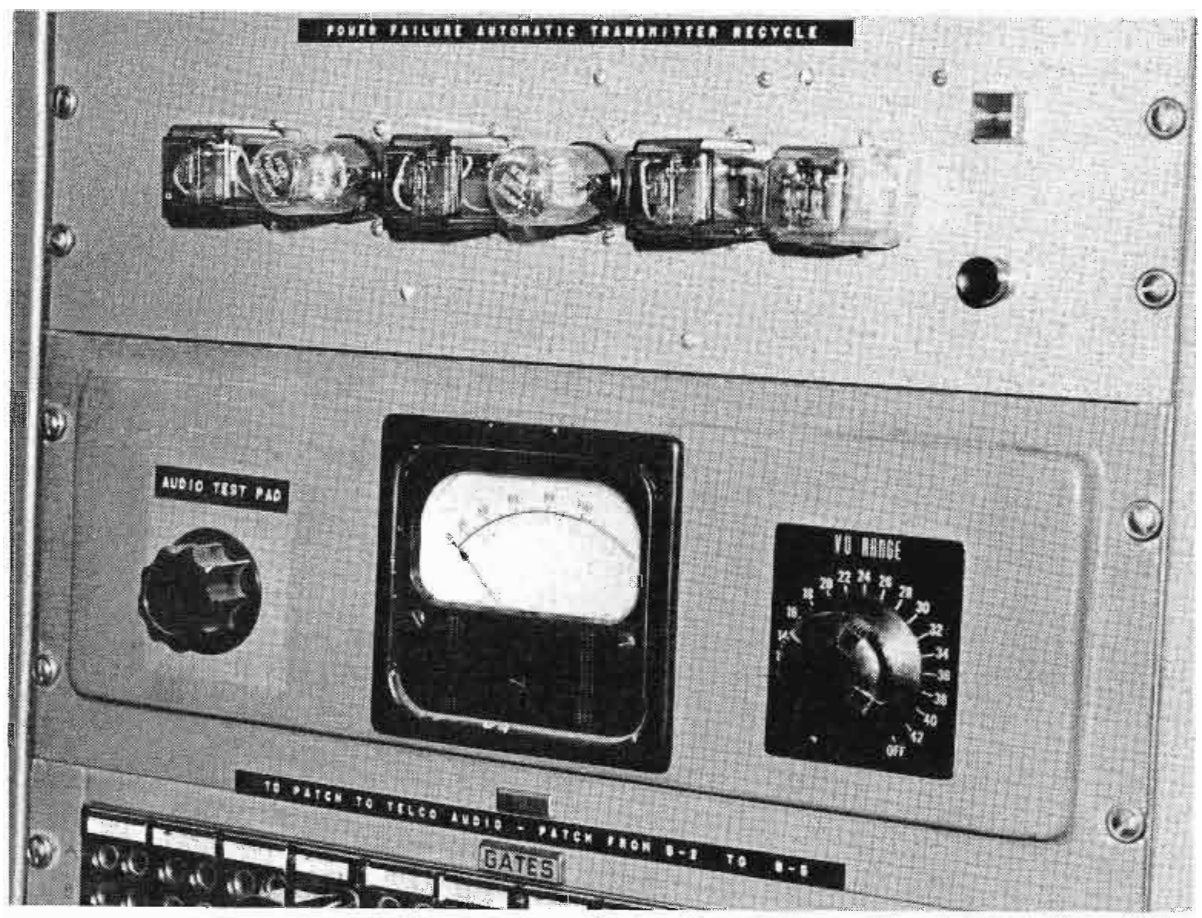

Fig. 1 The power failure recycling panel is at the top of the photo. A momentary failure of the AC allows the first relay to drop out. When power returns, the back contacts of this relay energize the filaments and the time delay relay. After five seconds the second relay pulls in, closing the plate circuit and the path to the second time delay. The second delay resets the first relay after five seconds, making it ready for another failure. Lamp to the right remains on until push-button is pressed. This indicates that unit has been operated.

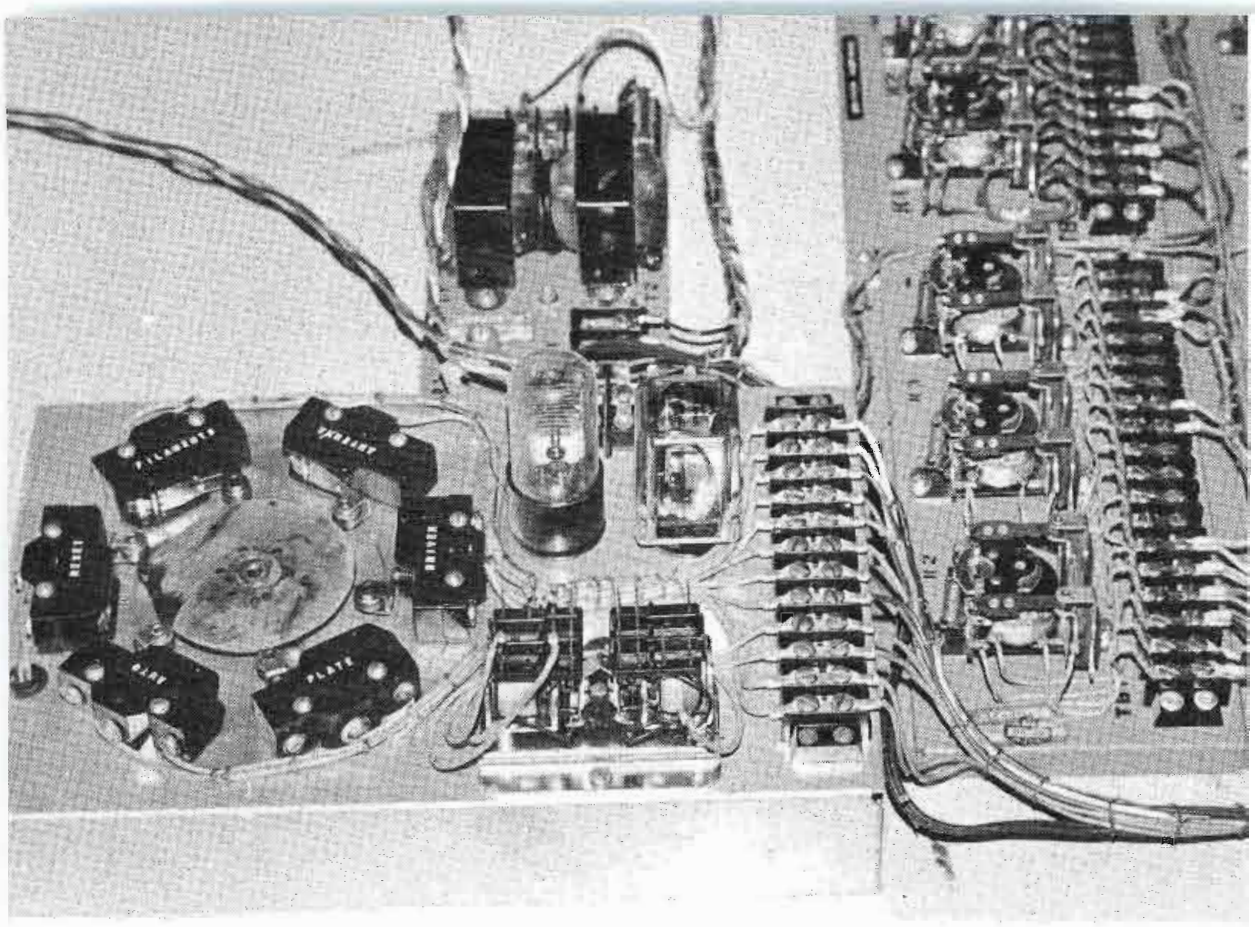

Fig. 2 The cam switch is driven by a one RPM motor and actuates the micro switches in the proper sequence to turn on the filaments, switch the antenna, turn on the driver, plate voltage and automatic reset of the auxiliary transmitter. The last micro switch turns off the motor and makes the unit ready for the action again.

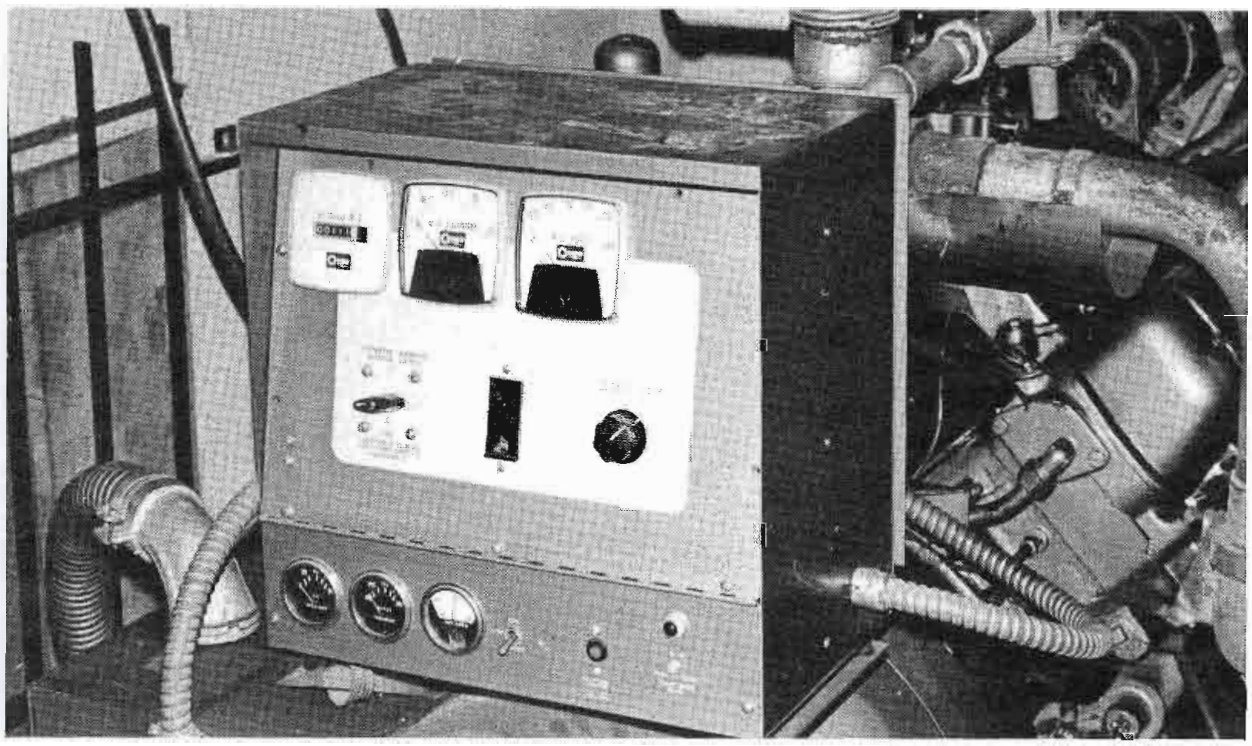

Fig. 3 Operation of the 50,000 Watt generator is completely automatic. Failure of any one of three phases of the commercial power will start the unit. When the power returns to normal, the generator will continue to run for about five minutes and then shut down. (Note the security bars over the air intake at left.)

Onan generator will automatically start and take over the load in less than 10 seconds. The panel shown will then reset the transmitter automatically.

If the transmitter is not back on in 15 to 20 seconds the operator knows that he has real trouble and must use the auxiliary transmitter. This is accomplished by dialing one position on the remote control and operating the "raise" key for 5 seconds or more. The panel shown in Figure 2 then goes into operation and performs, automatically, all of the necessary functions to switch transmitters. An explanation of the panels functions is given in the captions.

Figure 3 shows the installation of the 50,000 Watt Onan generator in its own room at the transmitter. Cooling air is drawn from the outside through the louvers at the left and expelled through a louver directly in front of the radiator. An electrical engine heater keeps the water warm at all times. The fuel is LPG stored in a 1,000 gallon tank. This is also used for the building heat.

As the travel time from the studio to the transmitter is about a half hour the systems described have saved many hours of down time for WIL. An outage that is not automatically reset within 15 to 20 seconds calls for the use of the auxiliary transmitter, the total off the air time should not exceed one and one half minutes in any event other than a failure in the directional antenna system which, unfortunately, cannot be duplicated.

Several years ago the old antenna system was completely redesigned and a new phasor and antenna tuning units were built on the site by the author. Separate cabinets were used for the day and night phasors and upper and lower sections of a 3' by 5' aluminum panel were used for each antenna tuning unit to allow the repair of either pattern components while the other pattern is in use. □

Who is Ben F. Waple?

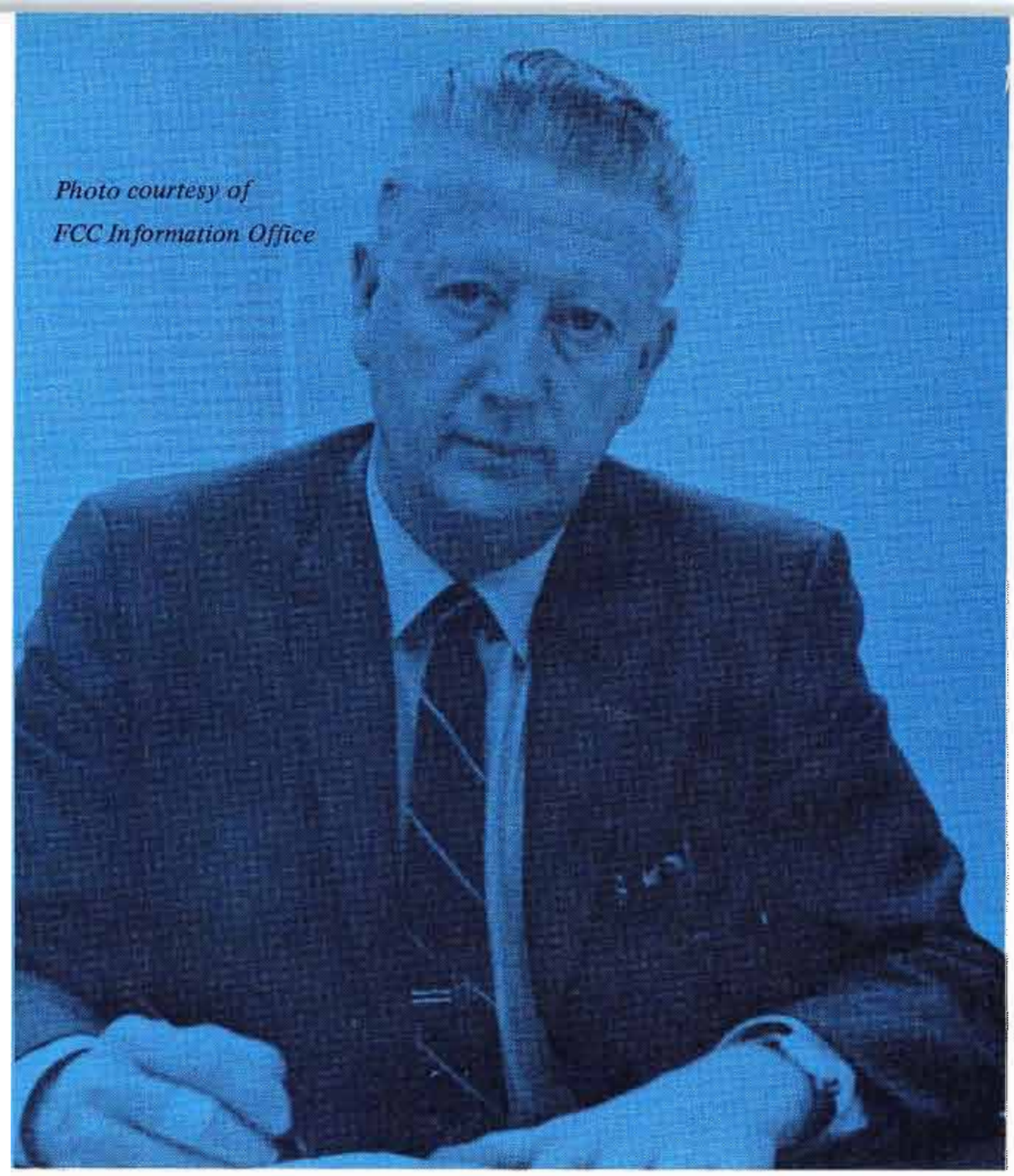

Photo courtesy of FCC Information Office

Ben F. Waple

We've all seen Colonel Sanders on TV. Unless our eyes deceive us, he exists. We see pictures of Betty Crocker on cake mixes, so we know at least what she's supposed to look like.

For years now, all those of us who have FCC licenses have wondered about another name: Ben F. Waple.

We recently pulled a letter from our mail bag that said what many of us have, over the years, considered. In its entirety and unedited, here's the best phrasing we've seen of that old question, who is Ben F. Waple?

Dear Editor:

A couple of months ago, I was looking at some FCC documents and happened to take note of the most famous signature in broadcasting, Ben F. Waple.

"Who is he?" I asked someone.

"Secretary of the FCC, you idiot," was the reply.

"Yes," I said, "but who is he?"

Nobody really knew. No one had ever seen him, not even his picture. One engineer said he thought he knew somebody who might have met him once. But nobody really knew anything about him. In fact, no one could remember if there was a day long ago when there was no Ben Waple.

Is he for real? Could one man possibly have lived so long? My conclusion, after talking to many engineers, is that there is no Ben Waple. He is just like Betty Crocker. . . .an image with a rubber stamp signature.

Am I right, Mr. Editor? How about ending this mystery that has baffled broadcasters for years, and give us the truth? Is he for real or isn't he? That's what I want to know.

Lance S. Micklus
Field Engineer
Vermont Educational Television

Suspecting that you might be on the right track, Lance, I decided to do some checking. Howard Head (A.D. Ring & Assoc. Wash. D.C.) supplied the answer to your question.

Yes, Virginia,
There Is A Ben Waple

Ben F. Waple was born in Washington, D.C. back in October of 1911. He began his government career as a messenger with the Civil Service Commission during the great depression, 1930, to be exact.

Along about 1936 he transferred to the FCC as a clerk in its Mail and Files Division. It wasn't long until Mr. Waple was head of that division and on his way to making his mark in broadcasting. After four years had passed and World War II was about to involve the US directly, he set up and administered a similar division in the Commission's war-time Foreign Broadcast Monitoring Service.

In the years that followed, Mr. Waple found a place on the staff of the FCC's Services Division, and Antenna Survey Branch. He became Assistant Chief of the Dockets Division, Administrative in the General Counsel's Office.

In 1957, he was appointed Assistant Secretary of the Commission, and Acting Secretary in April of 1960.

So it was then, that on June 13, 1963, the Commission announced the appointment of Ben F. Waple as Secretary, a position from which he was to earn acclaim as having the most famous signature in broadcasting. □

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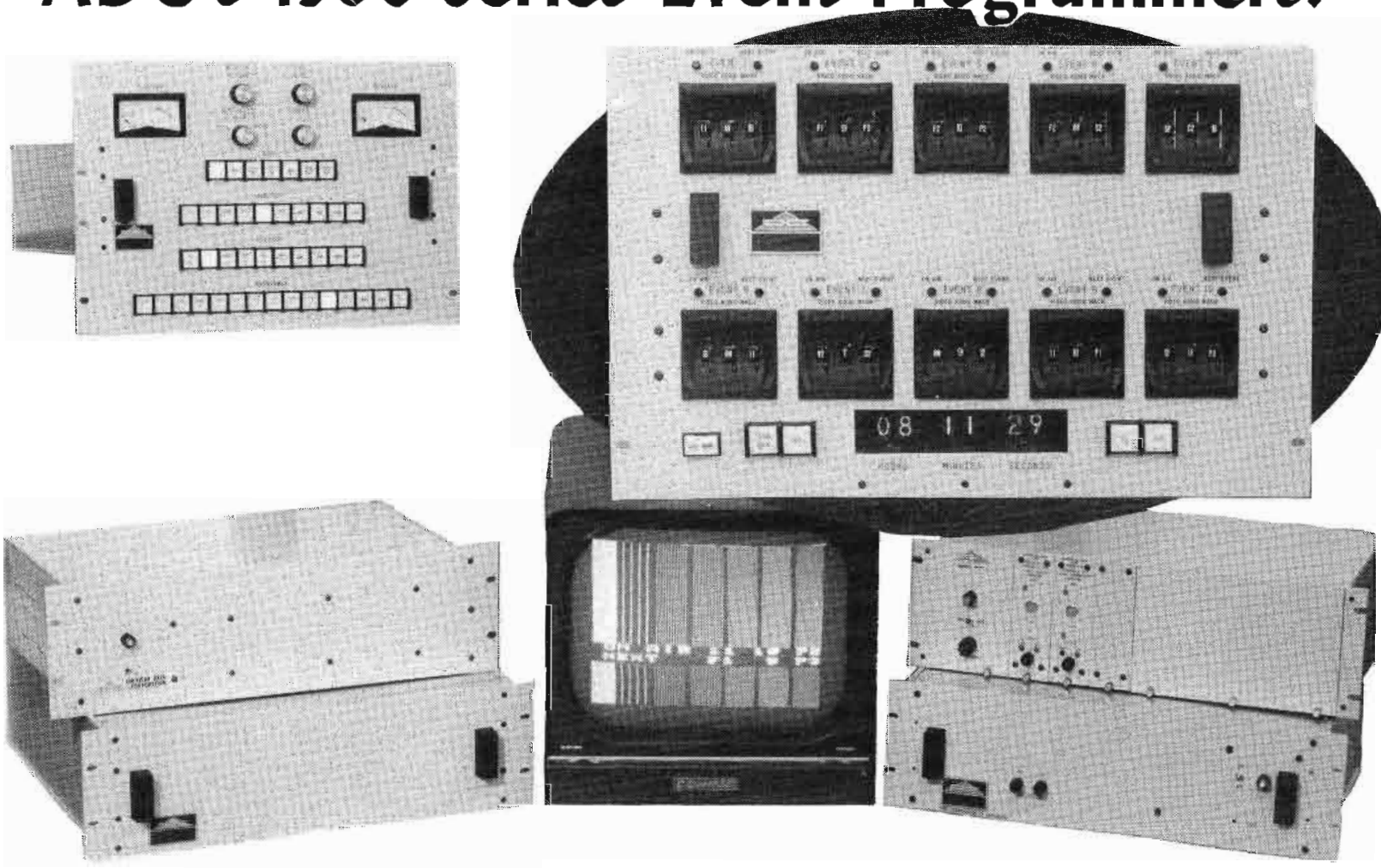

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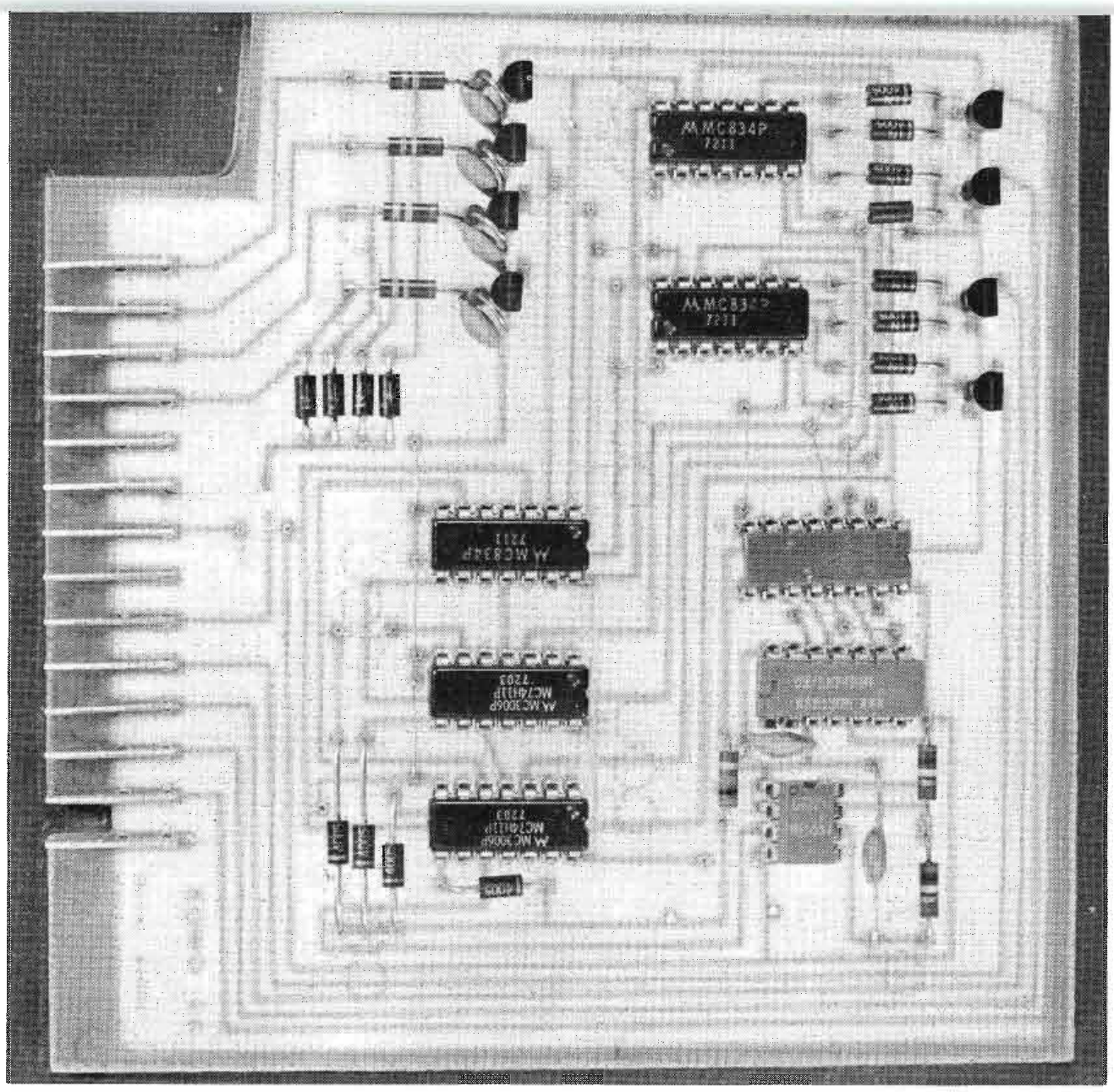

Fig. 1 Board layout of parts. Note the NE555V clock in the lower righthand corner. This corner layout is represented in Figure 3.

Digital memory for audio pre-selection

By Fred Fowler*

The KOMO TV Master Control panel had eight audio inputs with an attenuator for each. Although more than adequate when it was installed, it fell behind a creeping inflation in the number of audio sources. Primarily, it was adding Video tape machines which finally forced us to the moment of decision. A choice was clearly required: Do we add more inputs or combine some existing sources?

Automated Combining

We took the direction of automated combining, or, more accurately, automated selection of audio from the four TR-70 tape machines. This seemed reasonable as the TCR 100 Cart machine would carry the commercial load and the TR-70's would be relegated to Studio production or program playbacks. Side benefits appeared in the form of fewer operator errors. It became more difficult to make a wrong choice of audio. If you push the correct video button, the pre-selector furnishes the correct audio. Push the wrong button and you're on your own.

The main control room video switcher is an RCA TS-40, its 24 Volt tally voltages instruct the pre-selector,

Management Highlights

As your station grows, audio source additions can outstrip the potential of your master control panel. The author suggests that this uncomplicated audio pre-selector used at KOMO-TV can help solve this problem. In fact, one of the main benefits was in fewer operator errors. So here's an improvement that will help you keep your product at the professional level.

*KOMO-TV, Seattle, Wash.

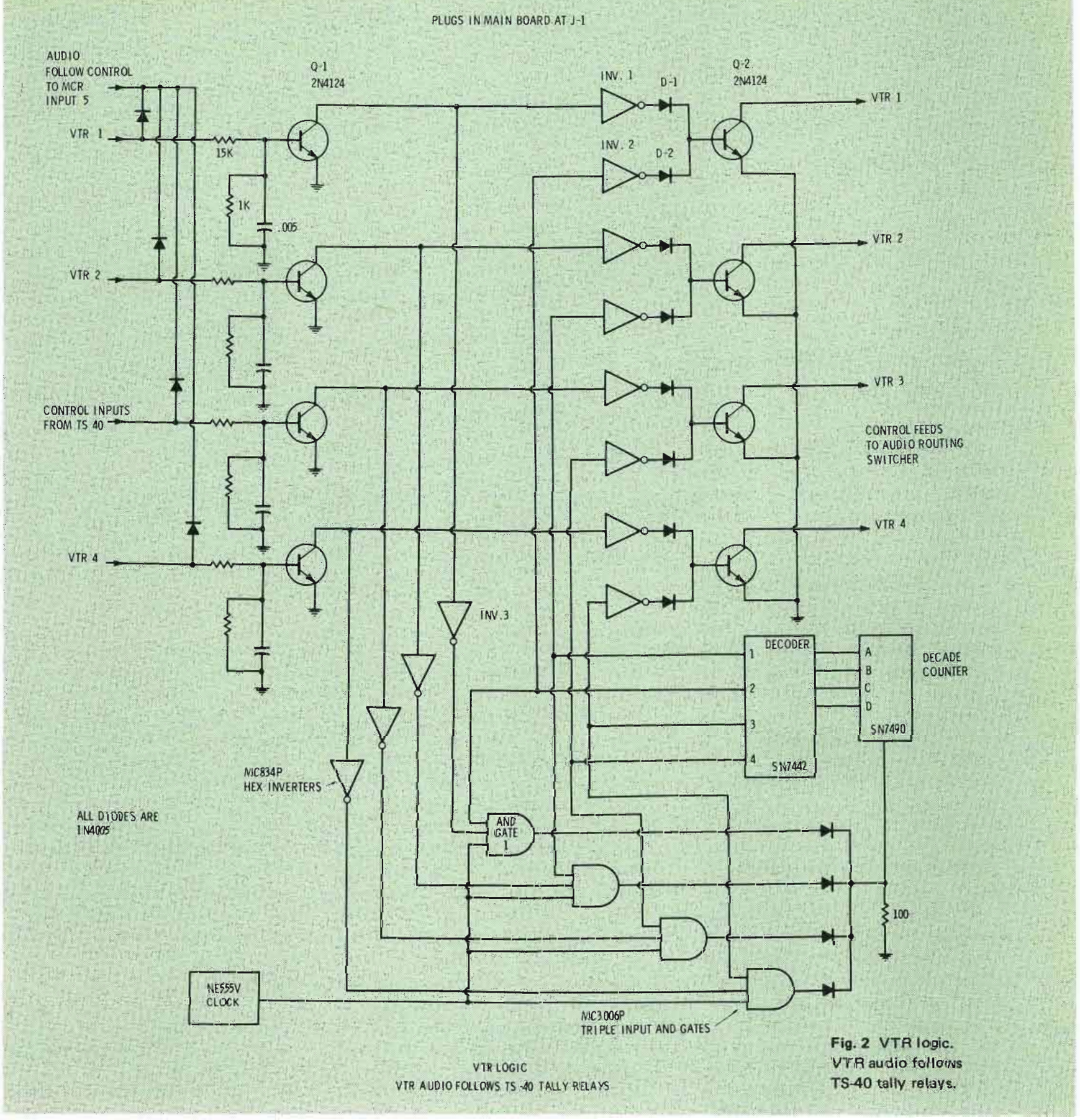

Fig. 2 VTR logic. VTR audio follows TS-40 tally relays.

this in turn, instructs a row of a Grass Valley Audio Routing Switcher.

The "What If" Approach

One preliminary step before finalizing a design at KOMO TV, is a "What If" approach. What if it is desired to cover the video from the tape with a 35mm slide while the audio continues? Obviously, the tape audio would disappear if the video source were changed.

Selecting the correct audio is only part of the duty of our new helper, it must also remember which tape machine was used last, so audio will continue in the event that program requirements or video problems dictate this mode of operation.

Our Grass Valley audio routing switcher has approximately 13 Volts on all its crosspoint relays at all times, grounding the other side of the relay coil is GVG's method of activating the crosspoint and putting the selected audio on the bus. It is no problem translating the +24 tally voltage via an inverting transistor so it will ground the appropriate relay, but Memory is a whole new ball game. We decided to use digital memory to insure against the possibility of remembering more than one source. Locking two sources in the same row of any crosspoint matrix creates some startling "round robin" effects, all of them bad.

To summarize; we wanted the video

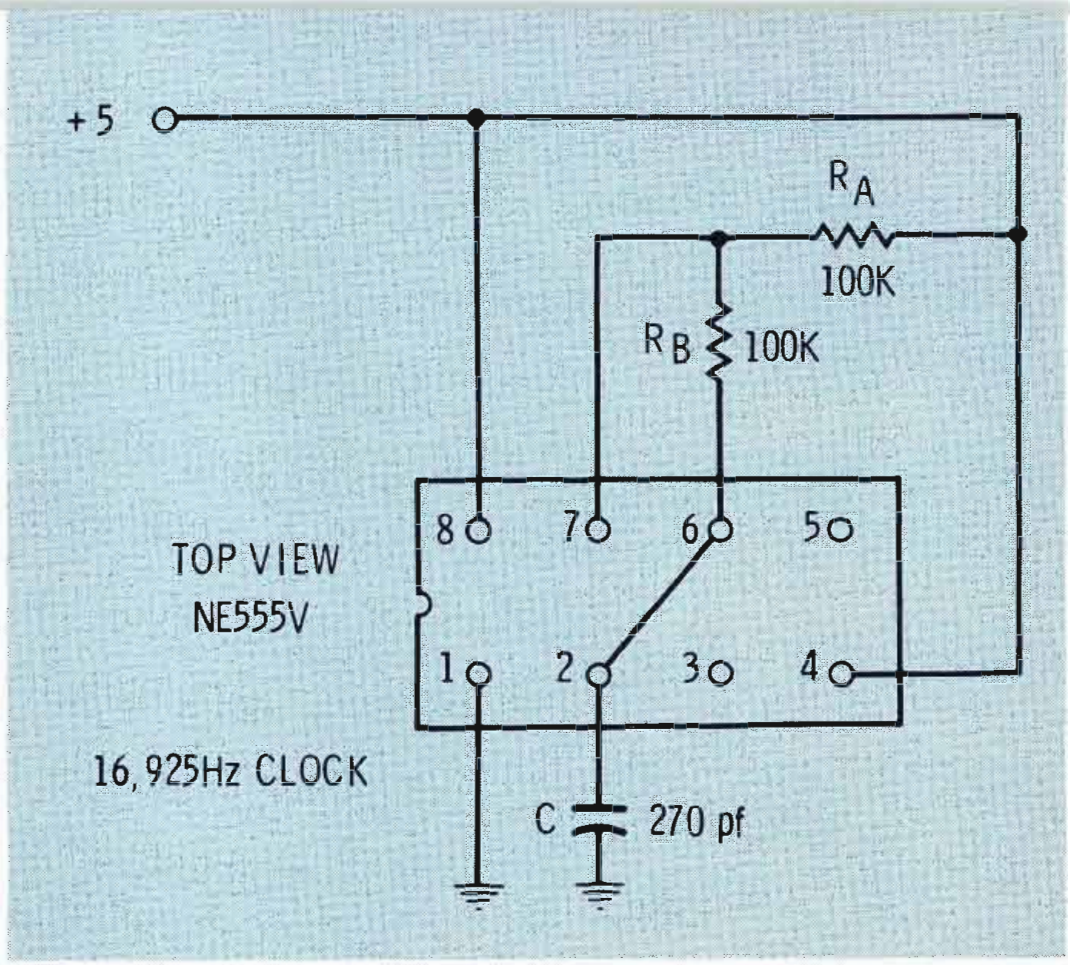

Fig. 3 Schematic for the 16,925 Hz clock.

switcher to slave the audio routing switcher and to remember which crosspoint it last used.

Theory Of Operation

Inspecting the logic diagram, video switcher tally instructions come in from the left hand side of the page in the form of +24 Volts. Let's begin with VTR No. 1 on the air.

The 24 Volts is reduced to 1.5 Volts by the voltage divider R1, R2. C-1 gives a path to ground for any noise spikes to prevent accidental turn on. Q-1 will turn on, and switch its collector to near ground potential, Inverter No. 1 turns this into a high, (a positive voltage above ground), this routed via D-1 to the base of Q-2. The collector of Q-2 which had been showing an open circuit to the 13 Volts from the audio crosspoint relay, now drops it to ground and VTR No. 1 audio is on the bus and going on the air.

At the collector of Q-1, another line goes down to the memory section via Inverter No. 3. Inverter 3 feeds a high to one input terminal of a triple input AND GATE. The Decade counter will be feeding a high to another input of the same AND GATE, (assuming a different VTR was used previously), and finally the Clock is banging square wave pulses against the last input to the AND GATE.

Each positive excursion of the clock pulse will create a situation where all three inputs are high, thus the clock pulses will be duplicated at the output of AND GATE No. 1. Via D-3, these square wave pulses step the Decade Counter until it counts to the output which is connected to the input of the same AND GATE which is causing it to count. This output drops to low AND GATE No. 1 no longer allows the clock pulses to go through. (Three highs must appear at the input of a Triple input AND GATE in order to produce a high at the output).

The same low that closed the gate goes up to Inverter No. 2 and through D-2, tries to turn on Q-2. Nothing happens as Q-2 is already turned on, but switching the TS-40 to a Slide camera removes the original 24 Volts. Then, Q-2 remains on, held there by the positive voltage from Inverter No. 2. This constitutes a Memory of such tenacity, only a loss of Vcc or airing another VTR will move it. Of course! Airing another VTR repeats the whole process using a different AND GATE.

Examination of the Motorola data sheets will show the purpose of the guiding diodes. Without them the outputs of the inverters and AND GATES would short each other to ground and disable the system.

A fast reed relay will close in 1 millisecond. A careful observer may have noticed our Decade Counter could inspect all relays in its search for the correct one. We simply set the clock speed so high, the relay will not have time to close. The frequency is 16.925, making a positive pulse width of such short duration that no self-respecting relay will take offense.

Continuous Running Clock

The clock is a continuous running square wave generator made from a Signetics NE555V. We have featured it in other roles in this publication, and would hasten to say it has many other uses as well, and is available in a "T" package if desired. This circuit was furnished with the Signetics Specification sheets. The external capacitor charges through R_a and R_b, but discharges through R_b only. The ratio determines the duty cycle, or pulse width, this was not a crucial factor so we just used two 100 K resistors.

The clock period is equal to .6885 (R_a + R_b) C. One divided by this answer - frequency. The difference between this frequency and 16,925 Hz is due to tolerance factors of the components.

Pitfalls

As often happens, the system performed with precision on the test bench, but showed personality quirks when plugged in its new environment. Accidental triggering of TTL I.C.'s can occur when the devices are used where they can come under the influence of fields created by other equipment. The particular noise triggering we encountered was coming from the Video Switcher Tally relays. As one turned off, its capacity coupled enough of its counter EMF into adjacent wiring to fire a different input transistor. Suppressing diodes were installed across the relay coils and this problem also led to the addition of .005 mfd capacitors from base to ground on the input transistors. □

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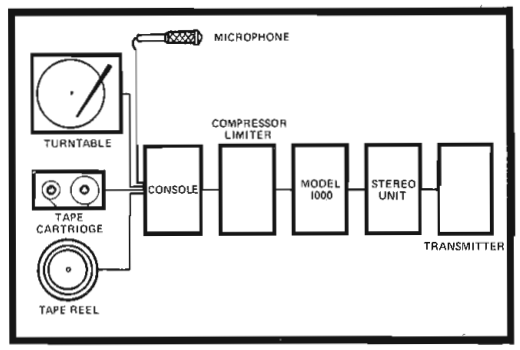

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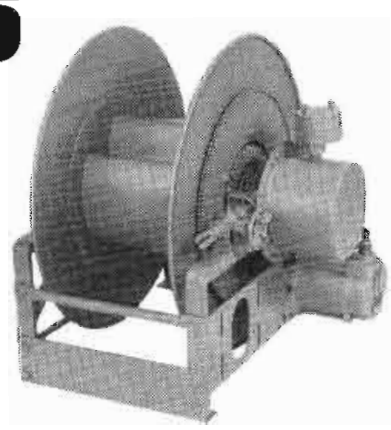

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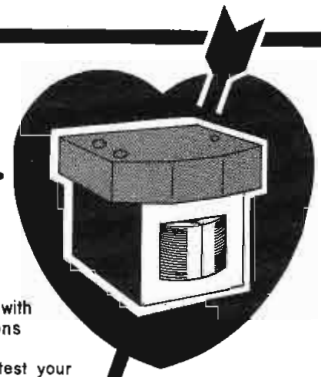

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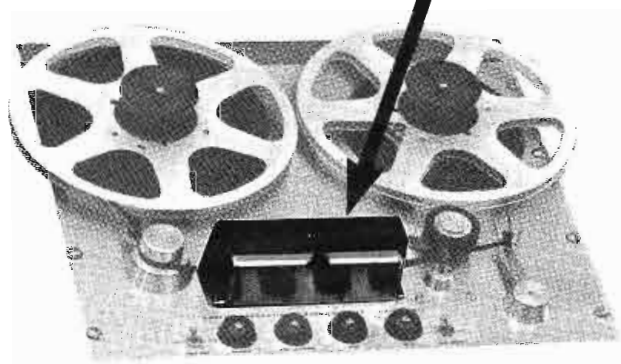

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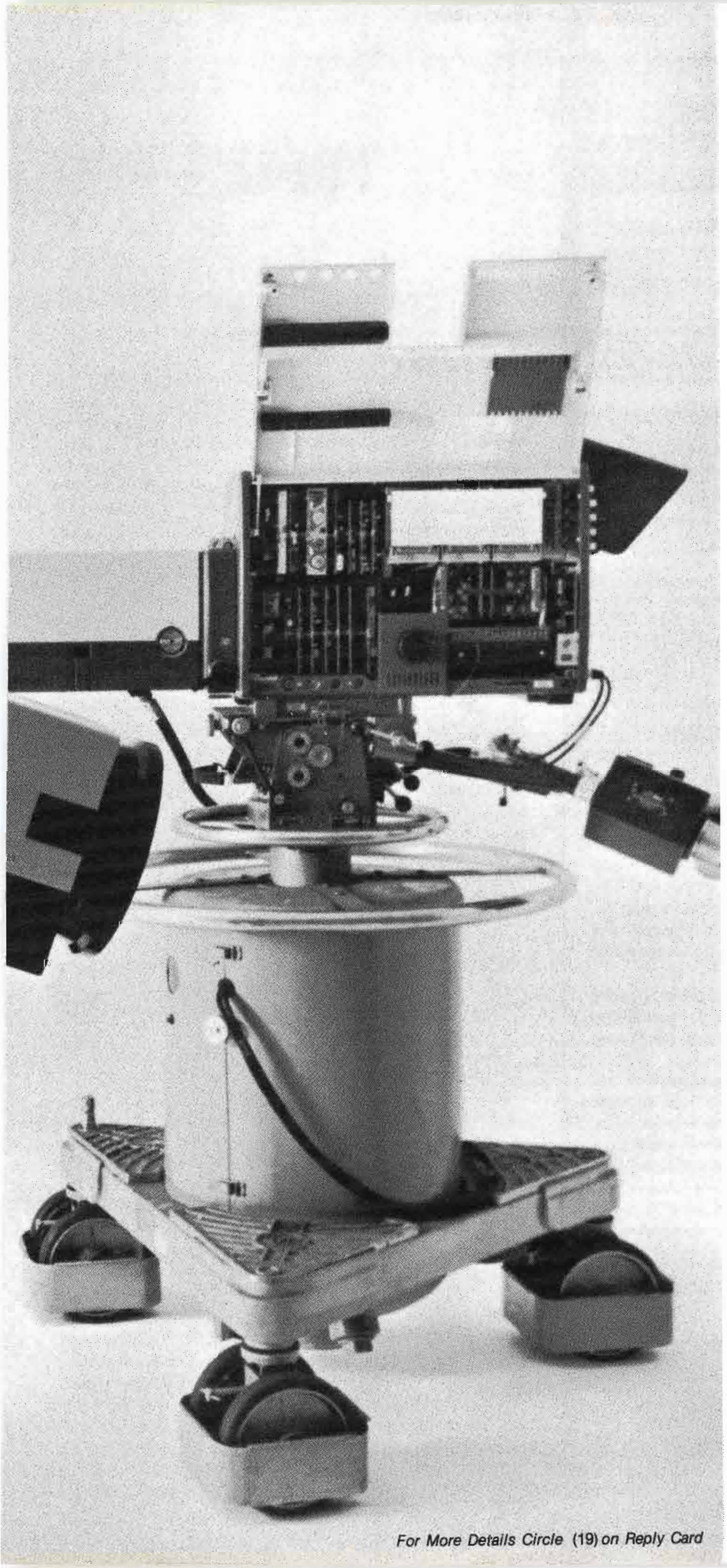

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the wings of vision

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PEOPLE IN THE NEWS

Broadcasting

Stanley W. Merrell has been elected corporate vice president-planning and development of General Instrument Corp., a new position with the company. . . .**S. L. (Roy) Thomas** has joined Cohu, Inc. as General Sales Manager. . . .**Ralph H. Lee** has been appointed Chairman for the National Electrical Safety Code Committee (NESC). The announcement was made by the IEEE. . . .**Ted Newcomb** has been appointed Station Chief Engineer, KOCO-TV, Oklahoma City. . . .

Broadcast Electronics has named **Gene Bidun** to the position of Regional Sales Manager, Eastern Seaboard, and have assigned **Don Herman** the task of coordinating field sales activities in the states of Delaware, Maryland, Virginia, W. Virginia and District of Columbia. . . .

Leonard W. Eden, development engineer for WWJ AM-FM-TV, has been appointed to the Television Board of Examiners in the Department of Buildings and Safety Engineering (BSE) for the City of Detroit. . . .

RCA Corporation has announced the election of **William J. Kennedy, III,** to the Board of Directors. . . .**Robert F. Ennist, Sr.,** who recently joined Jerrold Electronics Corp., is assuming the position of Manager of Turnkey Project Operations. . . .Communications Technology Corp., Los Angeles, has announced the appointment of **Hans E. Bannies** to the Position of Director of Foreign Marketing. . . .

CATV

A recent addition to the sales arm of The Magnavox Company, CATV Division is **George Kazacos.** . . .George J. Mitchell, Vice President and General Manager of WKEF-Dayton 22, announced the promotion of **H. Louis Woosley** to Assistant Director of Engineering for the Springfield Television Broadcasting Corporation and the promotion of **Darrell Hunter** to Chief Engineer of WKEF-Dayton 22. . . .**Douglas F. Raymond** has joined GTE Sylvania Inc. as Contract Advisor for SYLTEC, the company's technical service operation. . . .**Bill Feitz** has been named advertising and sales promotion manager for Switchcraft, Inc.. . . .**Salvatore L. Raia** has been named National Sales Manager of Vicon Industries, Inc. . . .

In a move to expand service to the Midwestern CATV industry, **Don Nelson** has joined Anixter-Pruzan's St. Louis office as sales representative. . . .**John D. Albee** has been named manager of the Midwest District for Anaconda Wire and Cable Co., Telecommunications Div. . . .The Magnavox Co., CATV Division has announced the recent promotion of **Andrew F. Tresness** as Marketing Systems Manager. . . .**Dr. George Bahder** has been elected a vice president and director of research and development, General Cable Corp. . . . .**David Michael Ganley** has been named Western Regional Manager of the Cerro CATV Division.

Double duty from a stifled teletype machine

By C. Dave Copeland*

Have you ever wanted to shut up that teletype machine after a day of irritating noise? We did!

WLCC is the Public Radio Service of Lincoln Christian College, which broadcasts to central Illinois. We have recently installed the UPI machine in our entrance-office area in such a way that the copy is viewed by passersby through the window in one of our main doors.

Since news is always an interesting item, we get more student interest by this open door to our work. Something of this nature is a good idea for any station, as Public Relations, where there are a number of people passing by the establishment. The cost to us for the cabinet was about $40 compared to a factory made cabinet which sells for approximately $300, which doesn't include some of the features we wanted.

Box Advantages

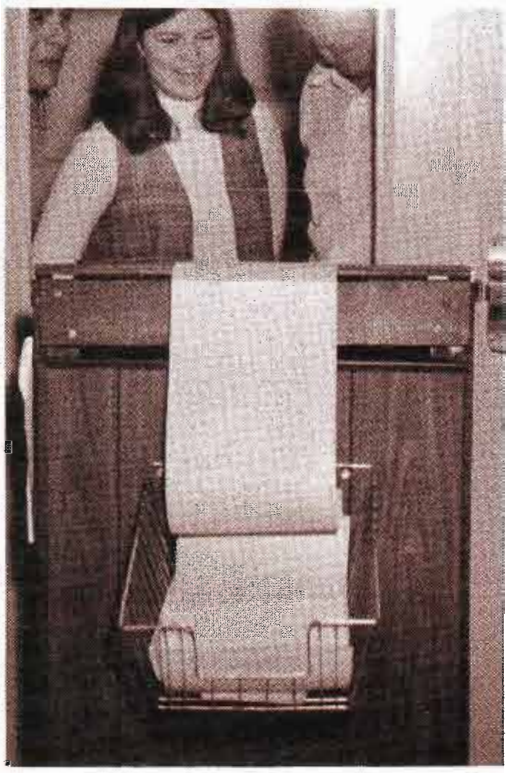
We specifically aimed at the following characteristics:

1. That it be quiet enough for the office people who happen to have this as their work area.
2. That it be easy to load the machine with new paper.
3. That someone be able to remove the copy without opening.
4. That a reasonable amount of reading area be provided, but not enough to cause crowding when viewers stay too long.
5. That the machine get enough ventilation to keep the heat from burning up the motor when left

Management Highlights

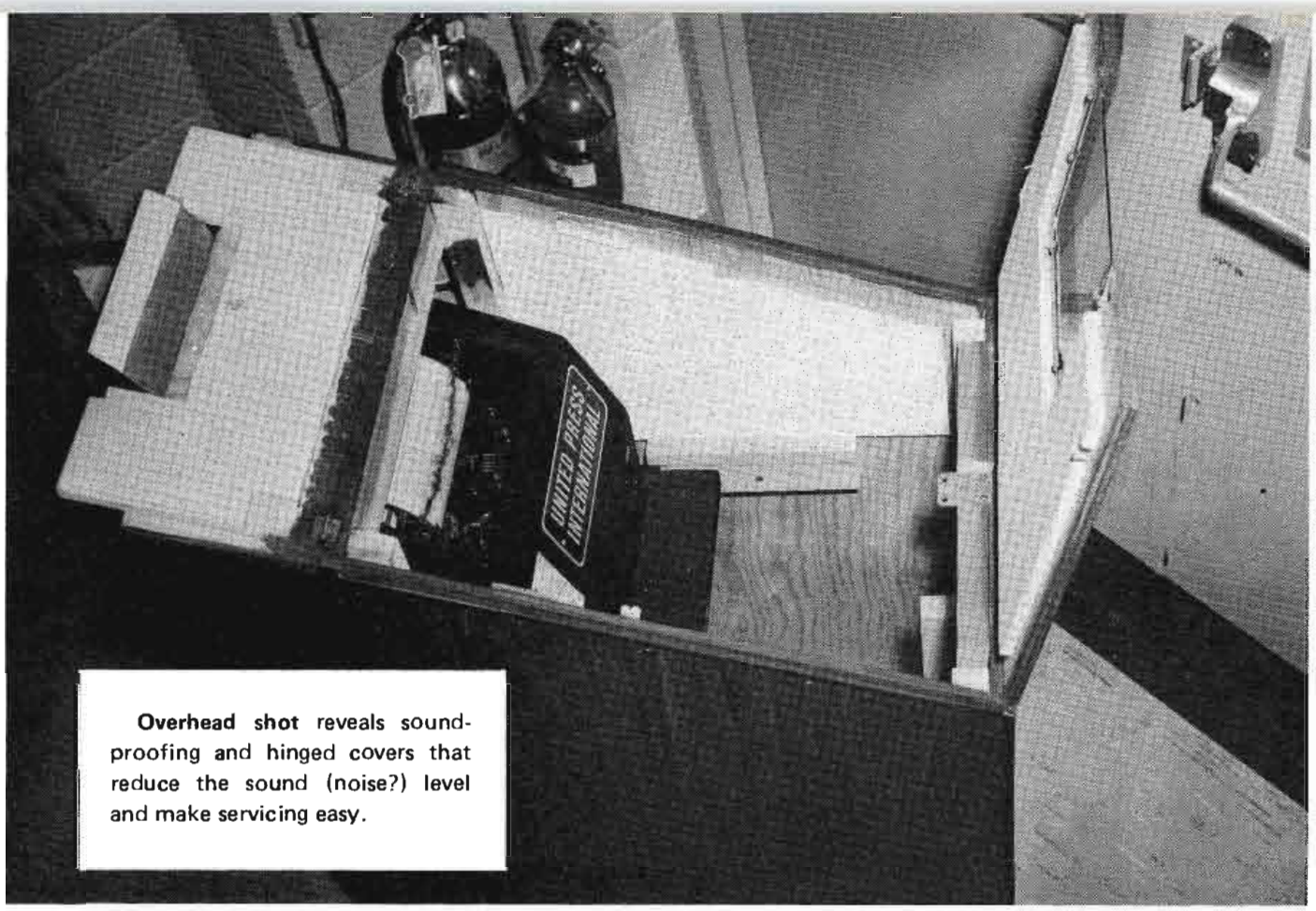
College or commercial, makes no difference: visitors will be impressed by your facility detail as much as decor. Besides, this improvement cuts down on noise pollution, while it improves your PR image. And, it's inexpensive.

*Technical Director, WLCC, Lincoln, Ill.



Good news? Well, hopefully. But anyway the machine - as WLCC sees it - can take on a second job: PR. Meanwhile, this "silent" approach may sooth your jangled nerves.

Inside view shows around-the-machine details for construction.



Overhead shot reveals sound-proofing and hinged covers that reduce the sound (noise?) level and make servicing easy.

closed continually—a very real problem.

6. Something which can be removed by one person for cleaning and repair of the machine.

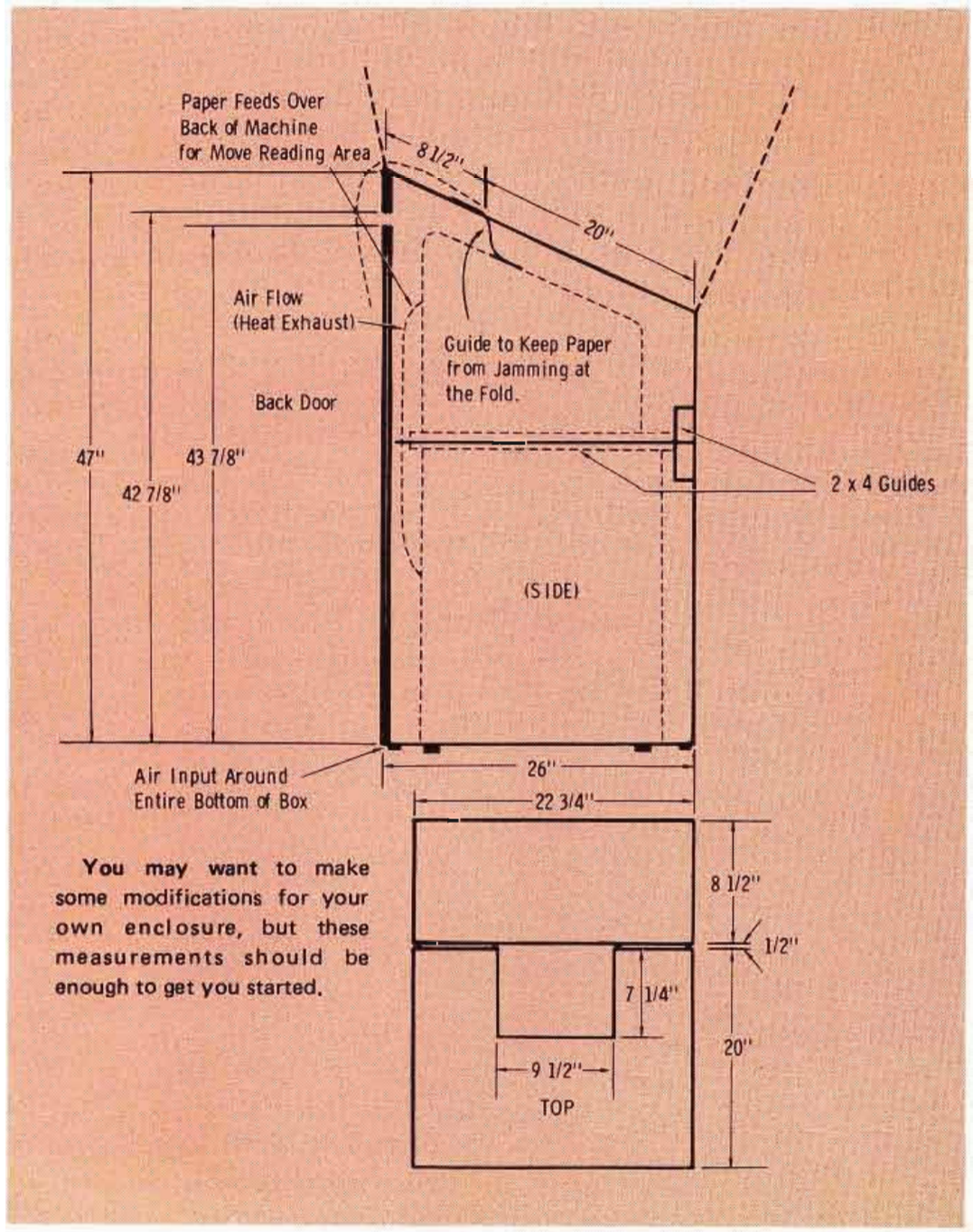
Inside Construction

The main structure is made of 3/4-inch plywood with 2x2-inch corner reinforcement, put together with screws and glue. We used paneling to help the appearance and take up some slack on rough edges and corners. Accoustical tile was used on the inside for high frequency absorption. The back door was made up just high enough to clear the teletype machine. There is a one inch opening which allows a path for hot air to flow, after rising up the quarter inch opening around the bottom of the cabinet.

Paper Flow

Designing of the top openings took the most time. Perhaps redesigning is the more correct term. The paper has a tendency to jam up in the machine when the path out of the cabinet isn't within certain tolerances. Of course, the slit out of the top of the machine can't be too wide because of the noise coming out of the teletype machine at this point.

After a few tries, we came up with a continuous sheet of construction paper to guide the copy up from the machine. It will probably be replaced



You may want to make some modifications for your own enclosure, but these measurements should be enough to get you started.

with a piece of plastic. In the drawings and pictures you will note the aluminum strip which is used to support the paper guide. You can easily get by with a 1/16-inch slit between the two top doors, and the copy can be removed by the edge of the glass or on top of the cabinet with a ruler.

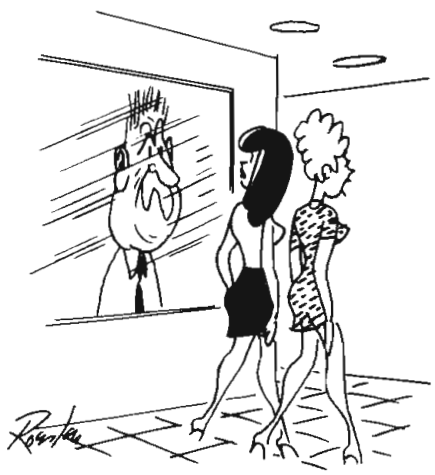
You might cover the top with plastic instead of the plywood doors, but the inside walls have to be finished a little better for that. Also, the basket we used for catching the paper is a legal sized office type. It saves a lot of mess on the floor and makes for better cleaning.

Running next to the teletype table edge is a two-inch guide made of 2x4's on the sides. The front needs four inches and is a 2x4 on edge. These guides allow about 1/2 inch total play on the sides, and the front is just pushed up to its guide. Snap type holders were used for the doors, such as used in kitchen cabinetry.

There is one unpleasant note, the ribbon will have to be changed more often, for the tourist's vision. Fortunately for us, our maintenance department came up with a good cleaning compound which doesn't chap the hands, SBS-30 for those who are interested.

Getting to Work

The diagrams and pictures should be very handy. And, as was pointed out earlier, there isn't anything too critical in the project. Don't forget that the paneling will cover up a lot of rough edges and you can come out with a good looking device which attracts a lot of people and cuts down on noise pollution. □



"IMAGE ENHANCER, NOTHING. - THERE'S A FLAW IN THAT GLASS."

Transmitter log clarification

If there's an easy trap to fall into these days, it certainly must be your logs. How many times has there been some small point overlooked or forgotten? You can bet that the FCC batting average on finding this point has been and will continue to be high.

But one refreshing thought is that the Broadcast Bureau in Washington, D.C. is blessed with men who understand your operation and your problems. Knowing this to be so, I forwarded the following letter to Harold Kassens for his opinion, because it seemed that here was a potential problem (during inspections) that could be solved now. The letter is from John Tucker, KURV, Edinburg, Texas.

Dear Editor:

The new-regulation rules of the FCC are driving me nuts! After (number deleted) years of making absolutely sure that the transmitter was read and logged each 30 minutes I find that I'm a nervous wreck before three hours have elapsed . . . and I've lapsed into reading the darned meters four times an hour just to make sure this ultrastable system doesn't drift.

But that's not the point of this letter.

Re-regulation has brought about the necessity of new log forms. We could find no examples and so, like one supposes all other stations, we were forced to devise our own.

This log covers our operation on 710kc (I don't believe in kHz) with 250 Watts non-directional day and directional night. We established a system whereby entries are made at 3:00, 6:00, and 12:00 (both AM and PM) **plus** entries at sign-on, sign-off, and when switching from directional to non-directional or vice versa.

This abbreviated our routine transmitter log to the point where it was possible to put a comprehensive maintenance log on the same sheet of paper if we used legal-size sheets. It is our opinion that keeping a comprehensive record of routine readings is an excellent method of forecasting required maintenance—one becomes accustomed to writing down certain figures and when they change it immediately is brought to attention, even more than the small change on the meters indicate.

(I hate to admit it, but our printer "blew it" when he made up our logs. Immediately under the heading "Transmitter Log" he was to have printed "Times shown are C___T" but he omitted the space where we were to enter an "S" or "D"; all of the entries in the Notes and Remarks column were supposed to be mixed upper and lower case to conserve space and in this column he was to have entered the "Directional Off" and "Directional On" before the "Tower Lights" entry. Oh, well—he came close.)

By the way, our towers run with a negative phase angle which explains the negative sign in the Phase column and in the maintenance section.

May I suggest that stations be invited to "swap" forms around so that we can see each other's thinking and maybe help out a station or two struggling with the new approach. We sure could have used any ideas.

Thanks for a wonderful magazine! I don't know how one could keep abreast of today's developments without it.

John F. Tucker
KURN
Edinburg, Tex.

The FCC Answer

In Mr. Kassens' reply he commented, "Apparently the KURV log forms were changed prior to the release of the Report and Order in Docket No. 18455. This Order which becomes effective April 20, 1973, will require numerous changes in the operating and maintenance logs of many stations.

"Since KURV does not operate by remote control, entries should be made in the operating log as required by section 73.113(a)(1) and (2). Entries should be made in the maintenance log as required by section 73.114(a)(1) through (9)(i)."

As you can see in the blank log (as compared to the one filled in), Mr. Kassens has made suggested changes.

As in KURV's case, it pays to check out your ideas. And the home office of the FCC has usually made itself available to answer Rules questions. However, we suggest that when you have a doubt, check it out with your field office. . . . and get it in writing.

RADIO STATION KURV

Edinburg, Texas

TRANSMITTER LOG

Day Friday — Times shown are CST — Date January 12, 1973

OPERATOR	ON	OPERATOR	OFF
Frank H. Jones	5:45A	Frank H. Jones	9:30A
William P. Smith	9:30A	William P. Smith	5:30P
John L. Doe	5:30P	John L. Doe	11:15P

TIME	FREQ. DEV. CPS	FINAL AMPLIFIER PLATE mA	FINAL AMPLIFIER PLATE kV	ANTENNA SYSTEM D.A. COM. POINT	BASE CURRENTS 1 NORTH	BASE CURRENTS 2 SOUTH	ANTENNA SYSTEM PHASE (–°)	NOTES AND REMARKS
5:30A	+2.5	280	1.35	1.71	3.50	2.99	126	CARRIER ON: 5:28A
6:00A	+1.0	275	1.35	1.71	3.50	2.99	125	PROGRAM ON: 5:30A
7:05A	+1.0	260	1.30		4.13			PROGRAM OFF: 11:01P
9:00A	0	265	1.28		4.14			CARRIER OFF: 11:03P
12:00N	+0.5	260	1.30		4.13			TOWER LIGHTS: on and
3:00P	0	265	1.26		4.13			OK at 5:25A FHJ
6:00P	+0.5	275	1.35	1.71	3.50	2.99	125	Directional off at
9:00P	+1.0	280	1.32	1.71	3.50	2.99	126	7:02A FHJ
11:00P	+0.5	275	1.35	1.71	3.50	2.99	125	Directional on at
								5:57P JLD

COMPOSITE READINGS AND MAINTENANCE LOG

Plate Voltage (Volts)	1360	N Base Current, Non-dir (Amps)	4.13
Plate Current (mA)	275	N Base Current, Dir (Amps)	3.50
P.A. Grid Current (mA)	82	S Base Current, Dir (Amps)	2.99
Modulator Plate Current (mA)	40	N Loop Indication (Units)	50
R.F. Driver Plate Current (mA)	115	S Loop Indication (Units)	45
R.F. Line Current (Amps)	1.70	Common Point Current (Amps)	1.71
Filament Voltage (Volts)	10	Base Current Ratio (S÷N)	.854
Indicated Phase Angle (- degrees)	125	Loop Indication Ratio (S÷N)	.900
North Monitoring Point (mV/m)	3.7	South Monitoring Point (mV/m)	30.6

N Base Current 3.48 — N Remote Meter 3.50 — Adjusted to both 3.50 — Time 6:30P

S Base Current 2.99 — S Remote Meter 2.99 — Adjusted to --- — Time 6:30P

Additional entries, as required, are on the reverse side of this page.

Operator: John L. Doe — On 6:00P — Off 7:00P — Total Time 1 hour

Frequency check report attached (if test made) and monitor adjusted to Texas Frequency Company's measurement agreed exactly with our monitor at 710.000kc at 9:00 this morning

Quarterly Tower Light Inspection (time and result) All OK. Voltage at RF chocks = 119; calculated drops are 1.5 volts to top sidelamps and 2 volts to top beacon; see below also.

Towers repainted (show result of inspection) (no entry required this date)

Equipment in and/or out of service (state time)

Modulation Monitor	FCC Notified	Out ( )	In ( )
Frequency Monitor	FCC Notified	Out ( )	In ( )
Phase Monitor	FCC Notified	Out ( )	In ( )
Final Plate Ammeter	FCC Notified	Out ( )	In ( )
Final Plate Voltmeter	FCC Notified	Out ( )	In ( )
North Tower Base Ammeter	FCC Notified	Out ( )	In ( )
South Tower Base Ammeter	FCC Notified	Out ( )	In ( )
Common Point Ammeter	FCC Notified	Out ( )	In ( )

Tower Light Failure South tower beacon 9:40P — FAA Notified 9:45P — By JLD

Tower Light Restoration All restored 10:55P — FAA Notified 11:05P — By JLD

Additional maintenance data:

Experianced an extreme power surge-drop-surge-normal at 9:40 PM. This was caused when a highway accident caused a large truck to hit one of the power company's main line poles (see program log for remote from Car #1). While we lost no air time the surge caused the zero voltage crossing detector IC in the South Tower flasher circuit to fail -- I think I had weakened this IC while building and testing the unit 2 years ago. Replaced the IC from stock -- still have 1 left over as they are lasting better than anticipated.

After sign-off switched to the dummy antenna and checked all equipment both transmitting and studio for possible damage by the power surge. No damage found but in the course of the test the limiter started clamping again and continued long enough to locate a defective diode and capacitor. The assymetry control now works better than when the unit was new so I suppose this case of trouble came from the factory. For safety's sake, set the negative peaks at 98% and positive peaks at 115%. Verified settings on the 'scope.

The 813's came in today just 13 days after being mailed from the supplier 250 miles away. Tube stock now complete again.

The log shown here was sent to the FCC in Washington. With some minor changes, this log is adequate for this type of operation.

RADIO STATION KURV

Edinburg, Texas

TRANSMITTER LOG

Day _____ — Times shown are _____ — Date _____

OPERATOR	ON	OPERATOR	OFF

Reference monitor sample currents

TIME	FREQ. DEV. CPS	FINAL AMPLIFIER PLATE mA	FINAL AMPLIFIER PLATE kV	ANTENNA SYSTEM D.A. COM. POINT	BASE CURRENTS 1 North 83	BASE CURRENTS 2 South 82	ANTENNA SYSTEM PHASE (–°)	NOTES AND REMARKS
								CARRIER ON:
								PROGRAM ON:
								PROGRAM OFF:
								CARRIER OFF:
								TOWER LIGHTS:

COMPOSITE READINGS AND MAINTENANCE LOG

Plate Voltage (Volts)		N Base Current, Non-dir (Amps)	
Plate Current (mA)		N Base Current, Dir (Amps)	
P.A. Grid Current (mA)		S Base Current, Dir (Amps)	
Modulator Plate Current (mA)		N Loop Indication (Units)	
R.F. Driver Plate Current (mA)		S Loop Indication (Units)	
R.F. Line Current (Amps)		Common Point Current (Amps)	
Filament Voltage (Volts)		Base Current Ratio (S÷N)	
Indicated Phase Angle (- degrees)		Loop Indication Ratio (S÷N)	% per this license
North Monitoring Point (mV/m)		South Monitoring Point (mV/m)	% per this Aux License

N Base Current _____ — N Remote Meter _____ — Adjusted to _____ — Time _____

S Base Current _____ — S Remote Meter _____ — Adjusted to _____ — Time _____

Additional entries, as required, are on the reverse side of this page.

Operator: _____ — On _____ — Off _____ — Total Time _____

Frequency check report attached (if test made) and monitor adjusted to _____

Quarterly Tower Light Inspection (time and result) _____

Towers repainted (show result of inspection) _____

Equipment in and/or out of service (state time)

Modulation Monitor	FCC Notified	Out ( )	In ( )
Frequency Monitor	FCC Notified	Out ( )	In ( )
Aux Phase Monitor	FCC Notified	Out ( )	In ( )
Final Plate Ammeter	FCC Notified	Out ( )	In ( )
Final Plate Voltmeter	FCC Notified	Out ( )	In ( )
North Tower Base Ammeter	FCC Notified	Out ( )	In ( )
South Tower Base Ammeter	FCC Notified	Out ( )	In ( )
Common Point Ammeter	FCC Notified	Out ( )	In ( )

Tower Light Failure _____ — FAA Notified _____ — By _____

Tower Light Restoration _____ — FAA Notified _____ — By _____

Additional maintenance data:

As you can see, the suggested KURV log changes are minor. But in the interest of peace and tranquility, we suggest you also make the changes.

Those mod components demand special attention

By Pat Finnegan*

Miniaturization and sophistication have become predominant in our modern equipment, but we still run into old, familiar components in a new dress. We will discuss a few of these and investigate the new, mod look components from an operational and maintenance standpoint.

An old familiar standby, the bank of push button switches, is very much in evidence today. When found on a keyboard today, not only are these very mod looking but also they operate differently internally. Generally, a keyboard is designed to feed data into an automation system or a memory unit.

The first difference you will note is the fact that these switches are seldom mechanically interlocked. Each switch of the bank operates individually and is a non-locking type. For data entry purposes, the internal action of the switch must be very fast and make a positive contact and without contact bounce. To achieve this action, the switch may be double spring loaded and contain a small permanent magnet which produces a closure of sealed reed contacts.

Some keyboards connect to external circuitry through cabling, but many are now using a PC board directly as part of the switch bank. The switches mount to a frame, but they also mount directly into a PC board below the bank. This board contains its own logic circuitry so that the effective output of the board assembly is directly into BCD (Binary Coded Decimal). BCD is what is fed to the external equipment.

Thumbwheel Switch

The rotary switch is another old standby, but one very modern version of this is the thumbwheel switch. The action is somewhat similar to the rotary switch, but the thumbwheel switch is actually a PC Board. A small wiper attached to the wheel slides across the traces on the PC board to provide the switch action. The wheel is mounted at 90 degrees to the front panel, with the positions marked on its rim. Connection to external circuitry is through cabling that may attach to the end of the PC board by a ribbon connector or may be soldered directly to the board.

These switches are ordinarily used in a bank arrangement, but there is no mechanical interlocking. Low level

*BE Maintenance Editor.

Management Highlights

The author lets you see what's behind the panels of that equipment you may be thinking about buying. The maintenance problems can become your problems. But at this point, Finnegan shows that - taken individually - engineering can maintain this new equipment. However, too many breakdowns in the electro-mechanical parts can cost the station as much time and money as a major transmitter outage. This is one more reason for engineering recommendations, and knowing more about the equipment will help you both translate your needs into station profits.

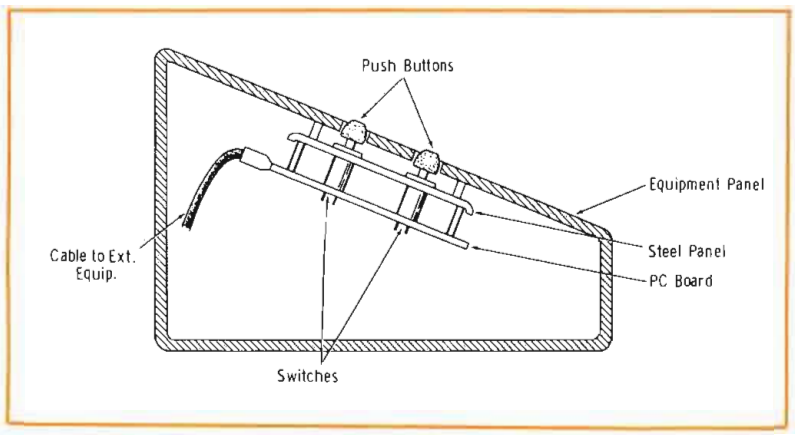


Fig. 1 (A) Many keyboard switchbanks are an integral unit and are mounted inside the equipment panel, with only the keyheads projecting. Switches are easy to replace after freeing the keyboard from the panel.

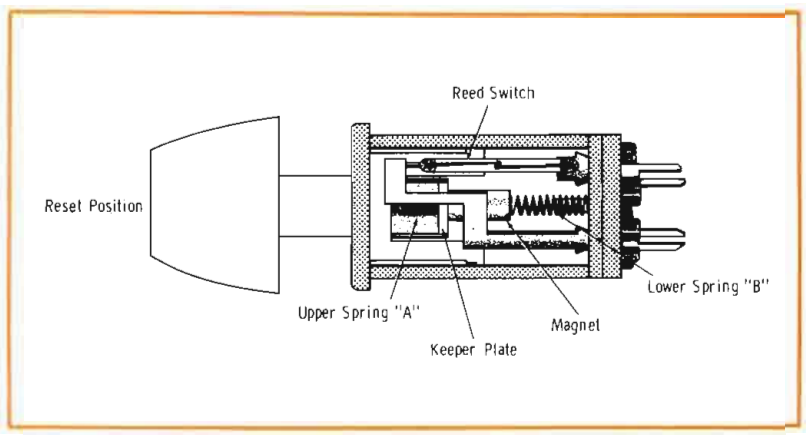


Fig. 1 (B) Typical magnetic reed switch from a Cherry Electrical Prod. keyboard.

WDBN Jumps To 75 kW

Radio station WDBN, Medina, Ohio has purchased three 25 kW transmitters (from CCA Electronics). This power boost – 75 kW – makes WDBN this nation's most powerful FM station. For that matter, it probably is the world's most powerful FM station.

Medina is centrally located in Ohio, so this additional power should enable WDBN to saturate Akron, Cleveland, Canton, Elyria/Lorain and Mansfield.

In the photo are (L to R): Gordon DuVall, CCA midwest regional sales manager; Robert M. Miller, President of WDBN; and James Beebe, Chief Engineer of WDBN.

Multiplexing Educational Material

WGBH Educational Foundation, licensee of WGBY-TV, Springfield, Mass., has been authorized by the FCC to multiplex educational aural program material from WGBH-FM, Boston, to WFCR-FM, University of Massachusetts, Amherst, using WGBH's television intercity relay system between Boston and Springfield, instead of the present off-the-air pickup system. (Multiplexing is the simultaneous transmission of two or more signals on a single carrier.)

The Commission waived Section 74.631(d) (use of TV auxiliary services) of the rules to make the authorization, and specified that WGBH must not use television intercity relay station WII-65, WII-66 and WII-67 solely to relay the signals of WGBH-FM to WFCR-FM. WGBH stated that the change from a long distance off-the-air delivery system to a television intercity relay system would substantially improve the quality of the program signal provided to WFCR-FM.

WGBH is also the licensee of WGBH-TV and WGBX-TV, Boston.

Gold Medal Award

J. Leonard Reinsch has been selected to receive the "Gold Medal" award of the International Radio and Television Society (IRTS). Reinsch is president of Cox Broadcasting Corporation and chairman of the board of an affiliate company, Cox Cable Communications, Inc., also headquartered in Atlanta.

The "Gold Medal," awarded for achievement in or contribution to broadcasting, is IRTS's highest honor.

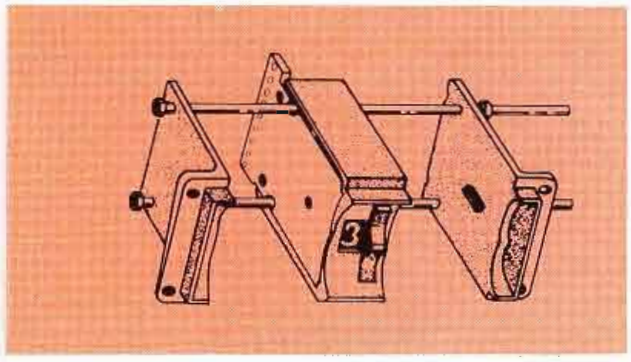
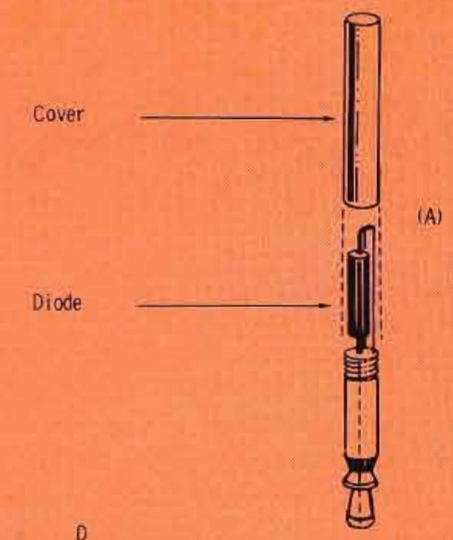
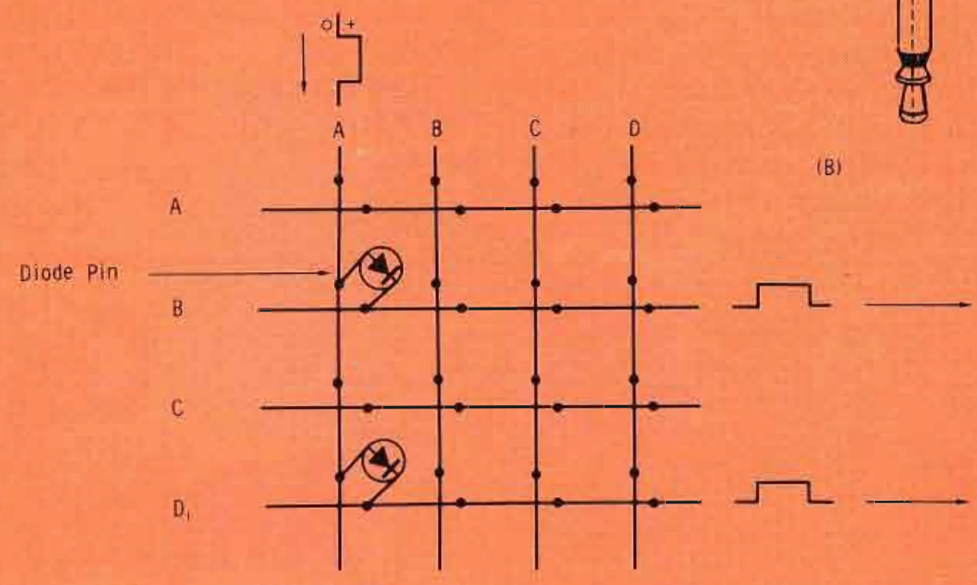


Fig. 2 Typical thumbwheel switch, showing ganging rods and end pieces. Usually, more than one switch is ganged together. With proper internal contacts and with several of these ganged together, output can be in BCD code.

Fig. 3 (A) Typical pin from a pegboard switch. Note that plug is a small version of an earphone plug with a diode inside. In **(B)** you see a simple switcher schematic. Note that pulse entering at BUS A will be routed to both BUS B1 and D1 through the diode pins inserted at those points. Pulses on these buses will not feed back into BUS A because of the diode.





logic signals are routed through these switches.

The Pegboard

Although not really that new, the pegboard is a modern version of the crosshatch switcher. Its application has not been so general as the switches we discussed earlier. In the pegboard, instead of sliding a contact to make a mechanical contact at the crosspoints, a diode pin is plugged into a hole at the cross points. Actual switching is caused by the pulse itself making the diode conduct in the correct direction. The pegs are very, very small versions of standard audio earphone plugs. A diode is mounted inside each plug.

Printer Decade

This is an electro-mechanical device used on printers of some automatic loggers. The decade is a close cousin to the stepper relay but in very modern dress and action. A coil drives a rotary switch, the switch being basically a thumbwheel type. However, instead of a thumbwheel, the small wheel at the end has raised numbers or letters on its rim. The coil steps the wheel around to the correct position where it stops. A printer bar slams the paper against the wheel and then the decades are reset to zero. A processed logic signal causes the coil to step. The originating logic signal also sends a voltage to one of the switch contacts which corresponds to that letter or number.

As soon as the switch steps to this position and picks up that voltage, it routes the voltage back to the stepper circuit and stops its action. The later reset pulse sends all decades back to zero. The stepping action is very rapid. So rapid, in fact, that the wheel spins into position.

Troubleshooting

The components discussed so far either originate information, route it, or are driven by logic information. All are electro-mechanical devices, so problems can be of either nature. But problems can also be deceptive in that symptoms can appear elsewhere than the switches, or problems elsewhere can show symptoms at the switches.

Complete failure of a switch on a keyboard often is relatively easy to discover, if there is a readout or a memory device associated with it. If a switch fails to enter data, a zero will appear in the readout. In a series of columns, however, the zero may be displaced. The data that is entered may 'close ranks' so the end column shows a zero instead of the actual column where failure is occuring.

You need to get to the underside of the keyboard PC Board. Locate the switch terminals as they come through the board. A logic probe will quickly determine if the switch is at fault. Check both sides of the switch with the probe. For example, the switch on a particular keyboard produces a logic low to its IC circuitry when the switch is closed. Check the input of the switch with the probe, the switch non-operated. It should read a low, and a check at the output of the switch will read a high. With the probe on the output side, press the switch and the probe should read a low pulse if the switch is okay.

There should be one contact closure and thus one pulse for each push of the switch. The switch may be intermittent, so try it several times. Observe the probe carefully. If for one push of the switch, there are two or more rapid pulses, contact bounce is occuring. The logic circuitry will consider each of these pulses as valid information and process it, but that is incorrect. The switch needs to be replaced in all these instances mentioned.

Thumbwheel switches normally route logic pulses from one source to a destination. The pulses may fail to get by the switches. A logic probe will determine if the pulses are not reaching the switch, not passing the switch, or are failing to cause following equipment to act correctly.

If the probe does indicate the switch, it could be contact failure at

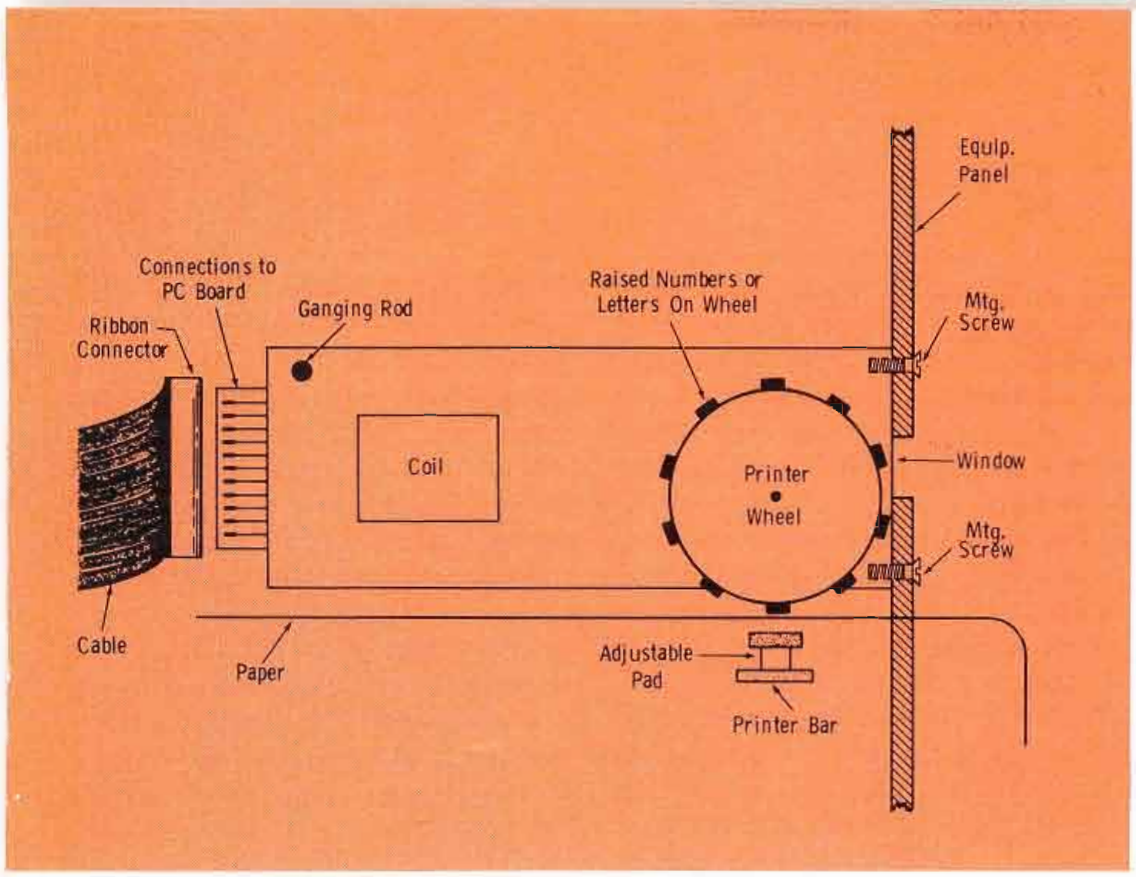


Fig. 4 Typical decade printer. Correct operation can be observed through the panel window. These are usually ganged with the ganging rod through the rear of the decade. Each one is mounted to the equipment panel with screws in the front. Electrical connections may be by ribbon plug or soldered directly to end of the decade.

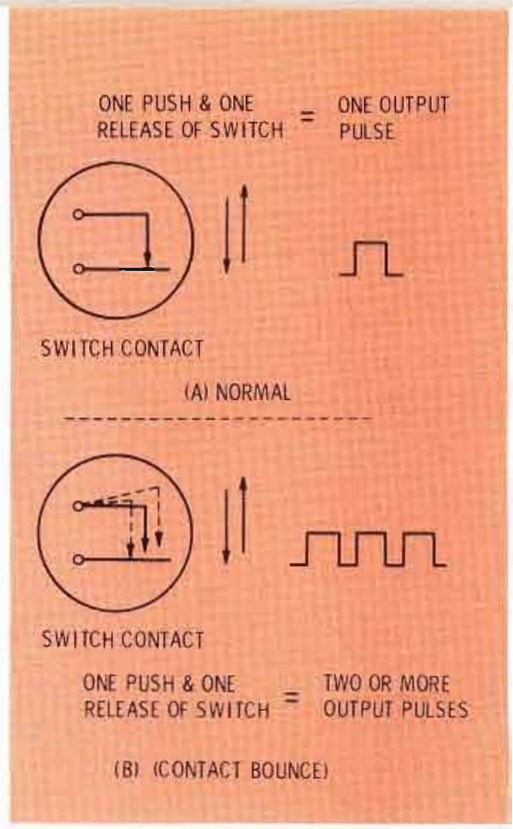


Fig. 5 In (A) you see normal switch operation. With one push of the switch and one release, only one pulse is created at the output. In (B) contact bounce is occuring. With one push of the switch, several pulses appear at the output.

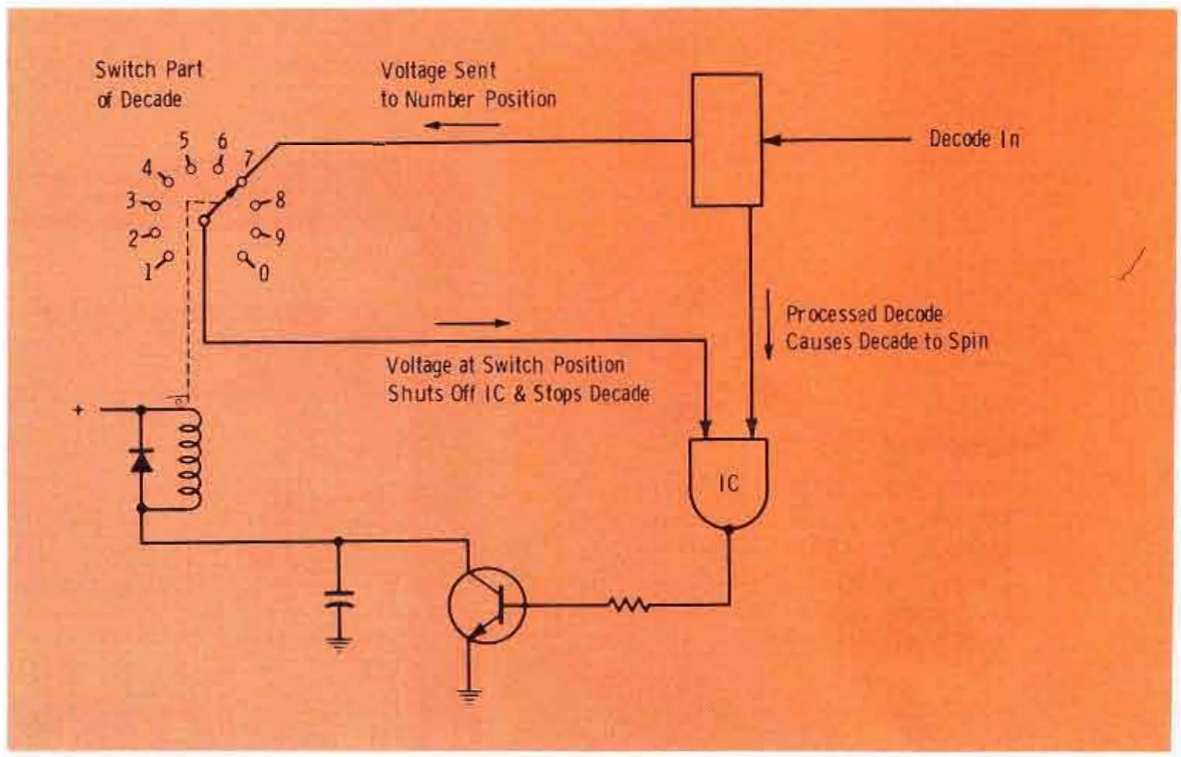


Fig. 6 Operation of the decade printer. Coil can kick up some large transients that must be surpressed. Diode, capacitor and other components may be used. A transient can short a transistor, causing the coil to remain on. The coil, IC and other components will be damaged.

the plug, if a plug is used. Disconnect the plug and with an ohmmeter check out the switch. If the cabling is soldered to the switch, you can check at the cable ends with the probe. Switch contacts can become worn and intermittent, or a trace may come loose from the board and short across several traces. You will need to replace the switch.

Pegboard Trouble

Pegboards are very simple switching devices. Aside from connections to the board itself from cabling, faults are usually in the diode of the pin. If the board is mounted horizontally, metal filings or bits of wire can fall into open holes where plugs are not used. These could short the cross point.

Checking out the diode is no problem. Substituting another plug at the failing crosspoint will quickly determine if the plug is at fault. Unscrew the cap from the plug and replace the diode, but be sure to observe the correct polarity when installing the new diode.

Decade Default

Printer decades are driven units. The coil of the decade can kick up a nasty transient which must be suppressed or it will damage the transistors and IC's driving the coil. If the transistor or IC driving the coil becomes shorted or is leaky, the coil voltage will remain on. This will overheat and damage the coil as the coil is not designed for continuous duty. The transistor and other components will also overheat and eventually burn out.

A symptom of this problem can be observed outside the equipment. If you notice a number on a decade stuck halfway between two numbers, the coil is probably stuck on. Feel the top of the decade and it will be warm. The same for the driving transistors and components. But be careful, the transistor may be very hot and you

will be burned. You will need to replace damaged components, but observe the coil bus with an oscilloscope for transients. If the transient is high, the suppressor diode and its components are faulty and need to be replaced.

The decade must operate very fast to spin the wheel up to the correct number, so the coil needs proper supply voltage to produce the kicks. If the voltage is low for some reason, the wheel will not get in place in time before the stamp occurs, and thus read out incorrectly. If the decade is getting correct input information but not printing it correctly, check the supply voltage first. If voltage is normal, the coil may be defective, particularly if previous transient problems had stuck it on too long.

To operate properly, the decade must get correct logic information, otherwise it becomes erratic. For example, if logic fails to send voltage to the contct, the decade will continue to spin until the stamp and reset pulse comes along. If the driving device has a readout on it, you can check this for correct decode information arriving at the printer. These are sometimes simply small lamps, one for each number to be decoded. You must observe these quickly, as they blink on and off very rapidly as the information is being decoded. It can be done if you are prepared for the numbers coming through. You can simply count the lamps that blink on. If the decode is supposed to provide information for six columns, but only five of the lamps blink, the one decade will spin until the reset pulse. If your decade and printer are okay, you need to look for trouble somewhere else.

Replacement

These components are not the easiest things to replace, and the first time is the most difficult.

On a keyboard problem, get the

whole keyboard away from the main equipment, if possible. The keyboard and its PC board are an integral unit which attaches to the equipment panel by screws or small standoffs. The pins of the switch may be soldered to the board, although it may be one with snap-in pins. Unsolder the pins or spring them, then push the whole switch through the front panel. Disturb as little else on the keyboard as necessary, and take as little of it apart as is necessary.

Thumbwheel switches can be tricky, depending upon how the wiring to the switch is done. It may be a ribbon plug, or switches may be wired in parallel with the common wiring as buses soldered across the back of the bank. First detach the whole bank from the equipment by the screws in the end sections. If banks are wired together, cut the buses alongside the defective switch. Remove the long ganging bolt, and unsolder the switch from the busses. Assemble the new switch into the bank before soldering. This will hold everything in place for you. Resolder the buses, and remember also to solder the buses to the switch.

Decades are mounted similar to thumbwheel switches, except they are heavier and may be a little larger. These will have two screws through the front panel into each decade, along with the ganging bolt in the rear. You may need to remove the dress skin from the front panel to get at the panel screws. It may be necessary to adjust the pad on the stamping bar slightly to make the decade print evenly with the others on the paper. Adjusting the pad is usually a cut-and-try adjustment.

Don't force anything when making replacements, there is too much bakelite and plastic used. Make sure you remove only the necessary hardware, and clean up before you close up. □

NEW PRODUCTS

(Use circle number on reader service card for further information)

Solid State Remote Pickup System

Marti Electronics introduced at the NAB convention their new Solid State Remote Pickup system, the RPT-40 and RPT-25 series transmitter and the R-30/150 and the R-50/450 receivers.

Both the new transmitter and receiver are all solid state. The RPT-40 transmitter and the R-30/150 designed to operate in the 150 MHz band while the RPT-25 and the R-50/450 is intended to operate in the 450 MHz band. The new transmitters employ the use of a direct FM modulator and has four audio mixing inputs, all self contained, while the new receivers employ the use of crystal filters in the IF section and have full metering capabilities. Both transmitter and receiver is a plug-in modular construction and employ the use of high accuracy crystals and solid state proportional ovens.

For More Details Circle (50) *on Reply Card*

30 To 1 Zoom Lens

Tele-Cine Inc. introduced a new Schneider 30 to 1 Zoom Lens for 1 1/4" and 1" Color Plumbicon Cameras. The new Tele-Cine Inc. line of camera support equipment will also be introduced. This line includes the Model 530 & 531 "lever" Head, based on a new patented head movement that perfectly balances the camera in any position of Pan and Tilt. Also included are tripods, dollies, pedestals, motorized and servo Pan Heads, lens motorization kits, & complete camera remote control systems.

Schneider Zoom Lens for 1 1/4" & 1" format color cameras will be demonstrated on live color cameras. The Schneider hand held color camera 10 to 1 Zoom Lens will also be on display.

Other products on display included the Model 5404B Video Tape Editing Programmer and Poloris Vidicon Zoom lenses.

For More Details Circle (51) *on Reply Card*

Digital Special Effects

The Broadcast Equipment Division of **Sarkes Tarzian** featured a whole new concept of electronic digital techniques and applications for local station production according to Biagio Presti, General Manager of the Sarkes Tarzian Broadcast Equipment Division, at the NAB convention.

Headliner of the Sarkes Tarzian exhibit at the convention was the Broadcast Equipment Division's "Cinematte II"—a digital video effects generator designed to provide a video production tool with rotary travelling matte production capability exceeding that of motion picture editing. Further, it has the obvious potential for computer control and programming.

Pointing out that the television industry was undergoing an increasing development of digital electronics in their systems, Presti forecast a new trend in productions capabilities based on the state of the art production tools using digital video techniques.

In addition to the Cinematte II, Sarkes Tarzian's Broadcast Equipment Division NAB exhibit also featured a new multi-system switcher, combining a number of the various digital electronic components which has been sold to station KOOL-TV, Phoenix, and Digiplex which is a digital one line machine control system.

The Digiplex system was the subject of one of the technical talks given at the NAB engineering conference by the Tarzian Director of Engineering.

For More Details Circle (52) *on Reply Card*

Alignment Test Tape

Fidelipac has a new alignment tape, the 350 STA. This cartridge test tape is suitable for alignment of monophonic or stereo reproducers employing the NAB track configuration for broadcast cartridge machines. The control track is unrecorded, thereby preventing the equalization reference tones from actuating the cue function of the machine.

The tape will establish references for standard operating level, 50 microsecond playback response, and precise azimuth alignment.

The first tone on the 7½ ips cartridge is 15 kHz, for azimuth adjustment.

The subsequent tones of 700 Hz for a minus 10 dB reference followed by 15 kHz, 12 kHz, 10 kHz, 7.5 kHz, 5 kHz, 2.5 kHz, 1 kHz, 500 Hz, 250 Hz, 100 Hz, 50 Hz are for the purpose of adjusting equalization to a curve having time constants of 50 microseconds (high frequency) and 3180 microseconds (low frequency). The last tone of 700 Hz is recorded at normal operating level. It is this reference (185 Nw/M) which represents the level used by all major U. S. manufacturers of professional tape equipment as a basic operating level.

For More Details Circle (53) *on Reply Card*

(*Continued on page 50*)

For More Details Circle (26) *on Reply Card*

NEW PRODUCTS

(Continued from page 49)

Handheld Color TV Camera

The **Robert Bosch Corporation** exhibited their KCR-40 portable camera, especially designed for remote telecasting situations.

With lens and viewfinder, the unit weighs 15 pounds and produces quality pictures. . . .with the mobility of a 16mm movie camera.

The camera head fits on the shoulder, and all controls are conveniently arranged. The head and backpack can be separated by up to 50 feet of cable. Quarter-inch cable up to 300 feet, or half-inch cable up to 2500 feet, may be used in connecting the backpack and the control unit.

For More Details Circle (54) *on Reply Card*

Tape Duplicating System

Pentagon Industries, Inc., showed a new eight-track high-speed professional duplicating system at the NAB in Washington, D.C. Sensibly priced and quality designed, this system is capable of producing professional eight-track open reel copies for loading into cartridges from either a ¼-inch or 1-inch reel master source.

For More Details Circle (55) *on Reply Card*

8-Channel Stereo Mixer

SONY Model MX-16, an 8-channel stereo mixer for the professional and tape recording enthusiast, will be shown by **Superscope, Inc.**

MX-16 is a versatile mixer with 8 mic/line inputs, plus 4 fixed and 4 variable outputs. The mic and line inputs are equipped with a switchable pad to attenuate the input when recording extremely high sound pressure levels. This produces higher recording accuracy and minimizes the chance for distortion.

A very important feature of MX-16 is the "front center" signal distribution capability, which allows a third channel of sound to be added to the stereo mix between outputs 1

and 2. This type of "mixing within the mixer" can make a soloist appear to be performing at front center of an orchestra, with the orchestra behind him in full stereophonic sound.

Each channel features, in addition to the input attenuator pad, a mic/line selector switch and a straight-line gain pot for precise level control. Other features include 4 large illuminated VU meters, master gain control, and headphone output with level control and channel selector.

MX-16 also has input and output facilities for adding a supplemental encoder to produce matrixed four-channel sound.

MX-16 is especially suited to operate with SONY's TC-854-4S professional tape deck for high quality, flexible recording in the studio or in the field.

For More Details Circle (56) *on Reply Card*

Portable Reel Handling Device

Roll-A-Reel Company, manufacturers of an original device for pay-out or take-up of anything put on reels, has introduced a new model to the product line. Known as the Style C, this newest model features complete portability and maximum versatility in accommodating reels of **any width**.

The Style C Roll-A-Reel consists of two frames or platforms fabricated from 4" structural steel. Each platform is arranged with two heavy duty ball-bearing roller assemblies. The front roller assembly is permanently mounted while the rear roller assembly is adjustable to any one of six self-locating positions. No tools are required in repositioning the rear roller to accommodate **all** various reel diameters.

Reel handling on the Style C Roll-A-Reel is a "one man operation", thereby saving labor, effort and time. Each of the two platforms are placed individually behind the reel flanges, ready for roll-on reel loading. With separate units for each of the reel flanges, reels of **any width** are accommodated.

Safety was also a major consideration in the development of the Style C. The reel itself is never more than 4" from the floor and is easily rolled onto the device without need for jacks, cranes or other hazardous lifting equipment. The built-in steel loading ramp and spring loaded front roller lock facilitates safe reel loading and unloading.

For More Details Circle (57) *on Reply Card*

NEW PRODUCTS

(Continued from page 51)

Reel-to-Reel Tape Deck

A new reel-to-reel tape deck by **Sparta Electronic Corporation**, the CORINTHIAN series, carries reels up to 15" in diameter, yet is priced competitively with machines capable only of handling 10½" reels.

The CORINTHIAN'S two speeds are standard 3 3/4 and 7 1/2 ips. Both monaural and stereo models are available. Performance meets or exceeds NAB standards.

CORINTHIAN features include direct capstan drive, three motors, foil reversing, front panel level controls, and Dashpot®air-damped tape tension arms for smooth tape handling.

For More Details Circle (58) *on Reply Card*

Recorder-Reproducer

A new tape recorder/reproducer developed for the professional recording industry has been announced by **Tape-Athon Corp.** and was shown for the first time at the National Association of Broadcasters Convention.

The new recorder, designated Model 1000, is equipped with a number of significant features including a drive system consisting of three motors and two solenoid controlled capstans. This configuration provides separate movement of each capstan, reducing wow and flutter to minimum regardless of reel loading or torque. The tone quality produced by such a tape drive is far superior to standard single drive systems.

Also featured on the new machine is a tape lift mechanism that moves the tape towards the pickup heads or away from the heads, completely out of the field. This tape lift movement may be activated either manually or automatically. An illuminated "CUE" button, on the front panel of the recorder is used to control the tape lift motion.

All controls for the Model 1000 are illuminated push-button types, and include CUE, PLAY, STOP, FAST REWIND, REEL SIZE and SPEED controls. The latter two are used to adjust for 10" reels or smaller sizes and to select tape speeds of 7½/15 ips or 3-3/4/7½ ips.

For More Details Circle (59) *on Reply Card*

book review

Television Maintenance

Television Broadcasting: Systems Maintenance, First Edition, written by Harold E. Ennes has been published to fill the long-existing need to television broadcast technicians, both those established in the field and those just entering it, for a single, comprehensive source of information on the maintenance of television broadcast systems.

The latest techniques for maintaining equipment—from the switcher inputs to the transmitter outputs—are described, with special emphasis given to modern solid-state circuits. Both the visual and aural portions of the system are included.

Some of the subjects covered are television-system waveforms, analog and digital language, video switching and special effects, picture and waveform monitoring, studio measurements and maintenance, microwave systems, transmitting facilities, and proof of performance. Discussions of the theory of systems operation have been included where they will be helpful in understanding maintenance.

In addition, illustrations have been used liberally to clarify the text explanations. Questions at the end of each chapter allow the reader to check his comprehension of the material, and answers to the questions are given in an appendix.

This book is available through Howard W. Sams & Co., Inc, Indianapolis, Ind.

For More Details Circle (65) *on Reply Card*

Computer Handbook

Computer Technician's Handbook, written by Brice Ward, is an encyclopedic volume on computer technology that goes the whole route. Anyone with a working knowledge of semiconductors will find in this brand-new, up-to-date volume all the basic information needed to understand, operate, and maintain computer systems.

This comprehensive volume—comparable to a 1000-hour course on computer technology—contains vital data on number systems, encoding and decoding, basic circuits, circuit blocks, counters, registers, memories, etc. It is complete in every detail, including system and component checkout procedures used by professional computer technicians.

To simplify presentation, the author has divided the material into three parts: Techniques & Circuitry; Analysis of a Small Typical Computer; and Maintenance. Part 1 begins with a brief introduction to computer systems, generally, and explains the similarities in concept and implementation common to all computers from the smallest $10,000 machines to the most complex. Part 2 analyzes the overall operation of a typical small computer, beginning with a general description and presenting detailed information on

(*Continued on page 54*)

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Book Review

(*Continued from page 53*)

processor instructions, the input-output section, and I-O interface references. Part 3 begins with an introduction to maintenance techniques, using the typical small computer operation.

The book contains 480 pages, 19 chapters and over 400 illustrations.

The **Computer Technician's Handbook** is available through Tab Books, Blue Ridge Summit, Pa.

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CATV Maintenance And Design

Designing & Maintaining The CATV & Small TV Studio, written by Kenneth B. Knecht, is a simplified, yet detailed guide on the installation and maintenance of production facilities for CATV, CCTV, ITV, and small broadcast TV studios. This all-in-one handbook is written specifically to help those who need expert, in-depth guidance on setting up a small to medium size TV studio. The level of presentation can be easily understood, yet provides the technical details needed by those who have a knowledge of electronics. Moreover, the information provided is sufficient to serve the needs of CATV systems and educational or industrial closed-circuit systems, as well as TV broadcast stations.

Everything is included, from pulse distribution and switching systems and camera, film and video tape equipment, to the creation of special effects such as supers, dissolves, wipes, keys, etc. The author discusses cameras lighting, together with color TV equipment, monitoring, and studio and control area signal distribution. Also covered are video distribution amplifiers, video test generators, processing amplifiers, patching networks, etc. Due consideration is also given to audio equipment—mixing consoles, audio sources, recorders, turntables, microphones, audio distribution and monitoring, test generators, tally lights, and intercom systems. Plenty of information is provided on total studio design construction practices and equipment lists, and an entire Chapter is devoted to maintenance and test equipment. The final Chapter describes three system examples—a small studio, a larger studio, and a studio with complete color facilities.

This book is available from Tab Books, Blue Ridge Summit, Pa.

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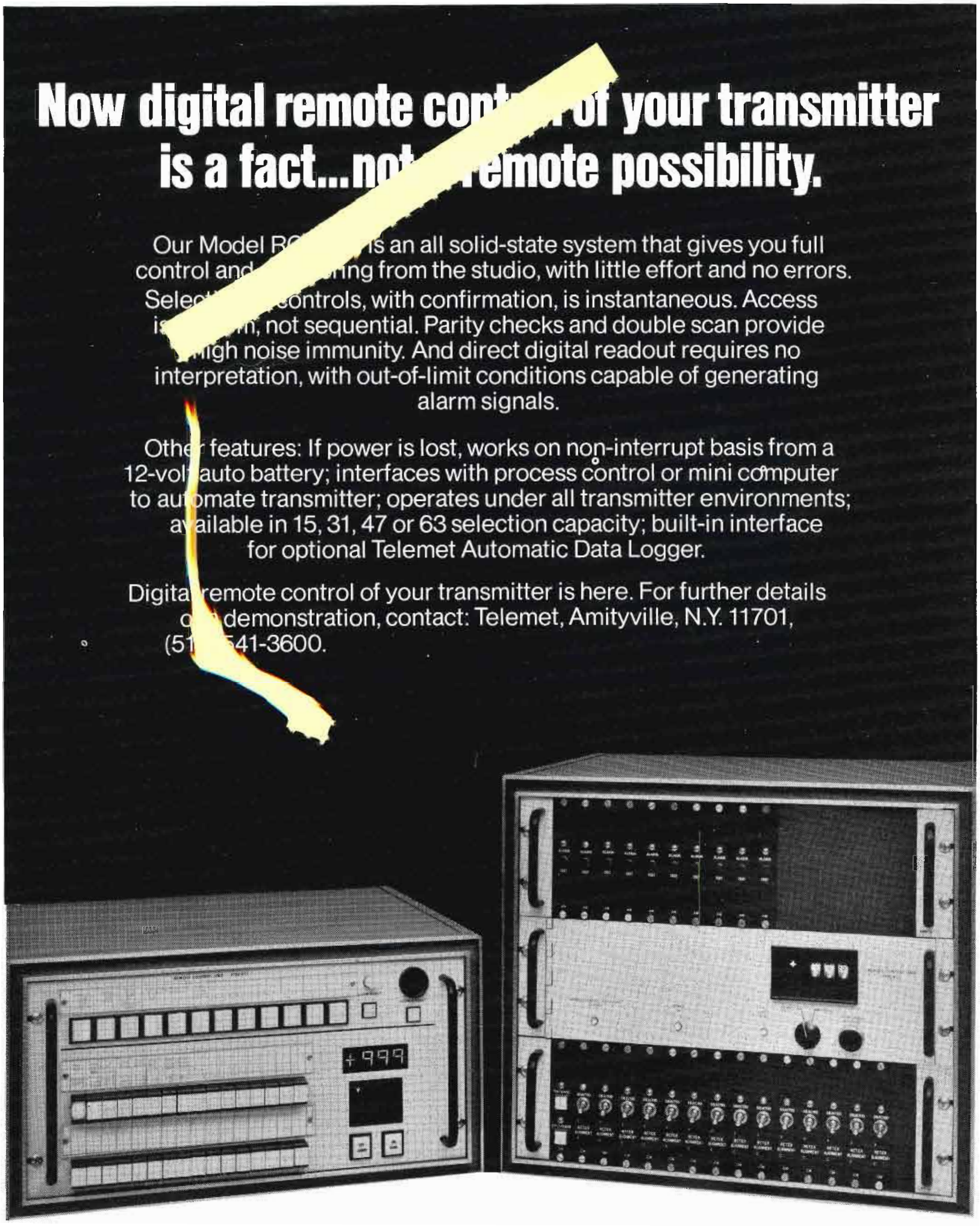

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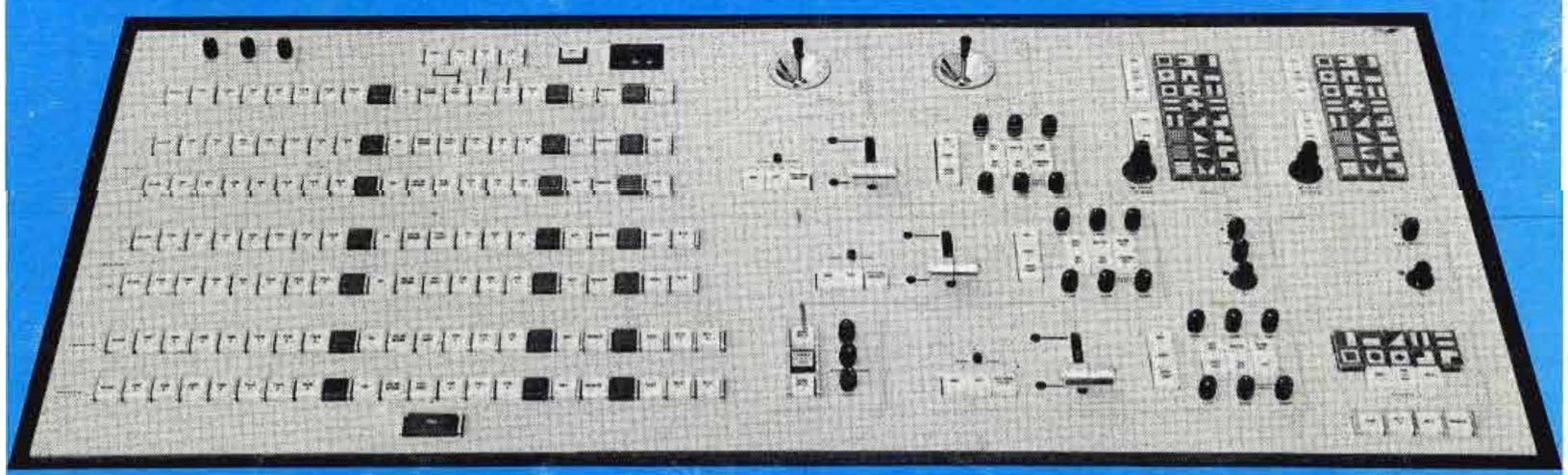

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