

BROADCAST **engineering**

October, 1975/75 cents



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Trendsetting technology blends with timeless elegance in every Ward-Beck console.

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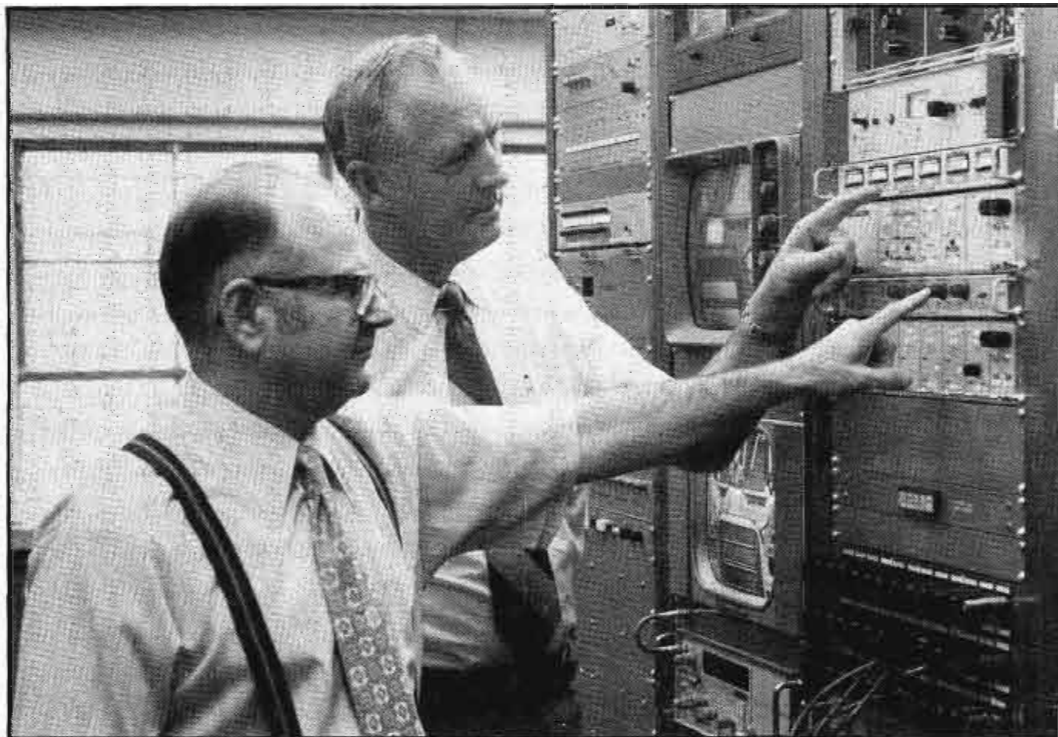
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Our customers get results from the 1440 Automatic Video Corrector.



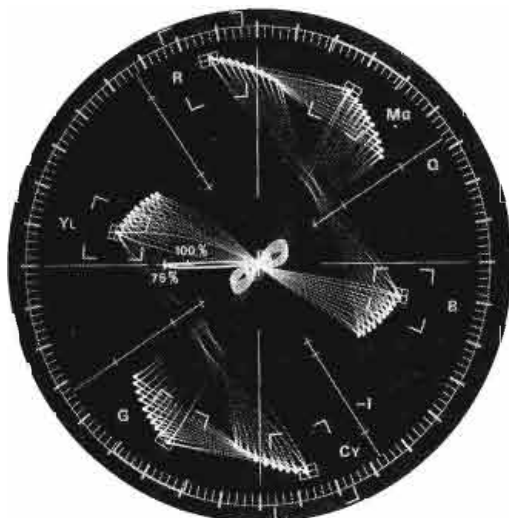
The 1440 Automatic Video Corrector takes the work and worry out of video signal quality control ... with fully automatic correction of overall video gain, black level, color saturation, burst phase and gain, and sync level. *You can take our customers' word for it.*

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"The most remarkable device for video control to appear on the market in the last decade is, without challenge, the TEKTRONIX 1440 Automatic Video Corrector.

"Together with all of its bonus features, this instrument is a must for every transmitter installation."

*William Vandermay,
Chief Engineer
KATU Channel 2,
Portland OR*



"A most convenient way to automate modulation levels and signal parameters."

"We have found that a most convenient way to automate modulation levels and signal parameters is to use a TEKTRONIX 1440 Automatic Video Corrector in a closed loop mode around a transmitter such as an RCA TT-30FL or TT-50H."

*T. M. Gulyas, Staff Engineer
RCA Broadcast News, Oct. 74*

"The 1440 has revolutionized our transmitter operation."

"To be able to adjust power with no apparent sync or video level changes is something I am not used to yet.

"Our Hartford transmitting operation has become precise and nearly automatic. The power output stability exceeds FCC standards by a factor of ten to one. The VIR operated signal corrector is the major reason."

*John Kean, Vice President
Connecticut Educational
Television Corporation*

"Our transmitter is about nineteen years old. The TEKTRONIX 1440 automatic color corrector has stabilized our output signal to a degree never before attainable."

"The one most noticeable improvement is the maintenance of proper sync-video ratio during line voltage variations and changes in transmitter excitation.

"Our transmitter has some differential phase, but having the 1440 match burst to VIR phase results in a very acceptable picture. In fact, a comparison of transmitter output and microwave receiver output does not indicate any difference in the two pictures.

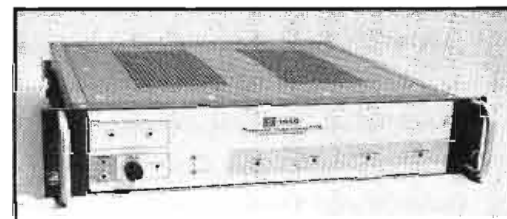
"When the show on VTR is a network playback, the VIR will control the six parameters available. The most impressive thing here is that the VTR operator can vary the color phase control on the VTR with no noticeable change of color phase being observed on the air picture.

*John Hitt, Chief Engineer
KSLA-TV, Shreveport LA*

"I just wanted to let you know how pleased we are with the 1440 Automatic Video Corrector."

"This unit will be the key to allowing us to have automatic power control of our UHF transmitter. As we automatically control the 110 KW output with a computer control system, the 1440 will maintain the correct percentage of modulation."

*Robert F. Schlieman,
Engineering Manager
KMHT-TV, Schenectady NY*



Call your Tektronix Television Field Engineer for a special packet of information about automatic video correction. He can demonstrate how the 1440 and other correction products will work for you at incoming network feed, remote feeds, master switcher output, transmitter input, and other key points. Tektronix, Inc., Box 500-A, Beaverton, Oregon 97077.



18 Quadraphonic Processing Techniques. In the SQ format, the author tells how to get it on the air, how to enhance stereo material, mono material, and tells how to locally originate quad broadcasts. Includes list of record sources. **Gerald Budelman.**

24 Anatomy of a Sound Studio. Descriptions and details on how to eliminate noise sources and problems that haunt many sound studios, regardless of their product application. **Ron Whittaker.**

36 The New AM Rules. An explanation and interpretation of Docket Number 20265. This should lead to an increased flow of applications for new or augmental facilities. Includes new power level comments. **Robert A. Jones.**

42 KSLA-TV Updates Their Cue-Out System. KSLA engineers designed a simple system that worked. Then they moved into new studios and they took another look at the system. This article tells why and how they updated their cue-out system. **John Hitt.**

About the Cover

With audio on our minds this month, we selected a shot of Howard Zuckerman at the audio console of Mobile Television Services' van. Zuckerman is Executive VP for MTS. Photo supplied courtesy of RCA.

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EDITORIAL

Ronald N. Merrell, *Director*
Carl Babcoke, *Technical*
Pat Finnegan, *Maintenance*
Howard T. Head, *FCC Rules*
Robert A. Jones, *Facilities*
Walter Jung, *Solid State*

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Dennis Ciapura, *Audio Editor*

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Jean Cornwell, *Production*
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Advertisers' Index page

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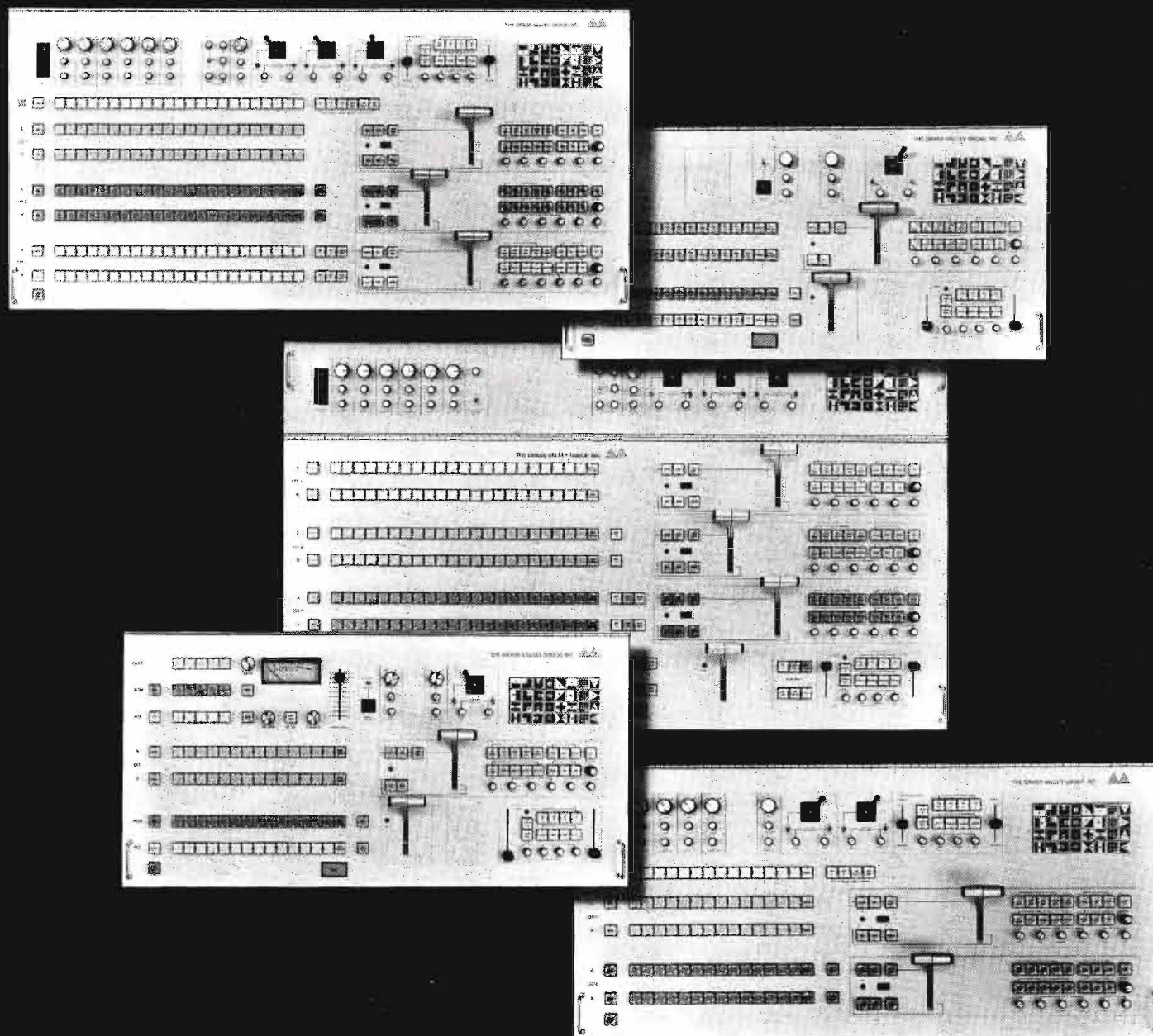


Robert E. Hertel, *Publisher*

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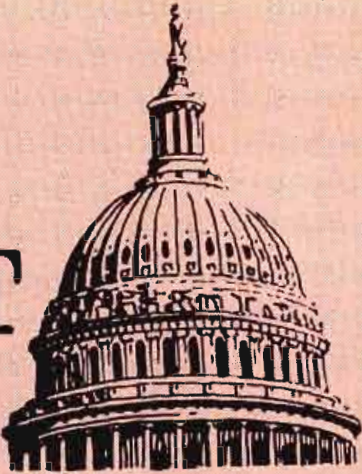
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October, 1975/By Howard T. Head and Harold L. Kassens

AM Stereo To Be Standardized

A Committee has been organized at the Commission's request to make a detailed study of various systems for producing AM broadcasts in stereophonic sound. It is expected that the Committee's recommendations will lead to eventual Commission standardization of a single system for the purpose.

The Committee, known as the National AM Stereophonic Radio Committee, is being sponsored by the National Association of Broadcasters (NAB), the Electronic Industries Association (EIA), and the Broadcasting Group of the Institute of Electrical and Electronics Engineers (IEEE). The organization will include a Steering Committee and a number of working groups to study transmitters, receivers, and systems, and to conduct field tests.

The Committee has invited any persons interested in proposing systems to do so. Systems already under consideration include modulating the right and left channel signals on the upper and lower sidebands, respectively; and the use of frequency modulation of the carrier to convey R-L while modulating the main carrier with R+L.

Commercial Operator Licenses Suspended

The FCC Field Operations Bureau has suspended the commercial operator licenses of three persons working for broadcast stations. In one case, the first-class ticket was lifted for 30 days because, according to the Commission, the operator got into an argument with management, and used the station to vent his criticism. He then purportedly left the premises with the AM and FM transmitters operating unattended.

In another case, a third-class ticket was lifted for two weeks and a first-class for 30 days. According to the FCC, the 3rd class operator correctly logged over-power operation, but the chief destroyed these logs and had the 3rd class operator prepare new fictitious ones.

Commission Analyzes DST Impact

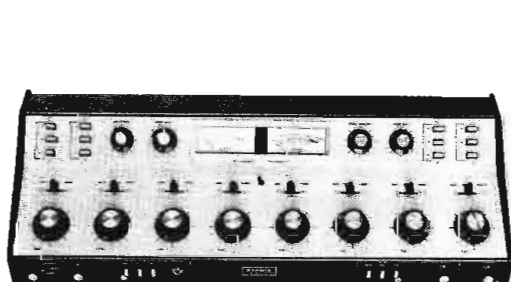
Remember year-around Daylight Saving Time and the energy crisis?

(Continued on page 6)

And now

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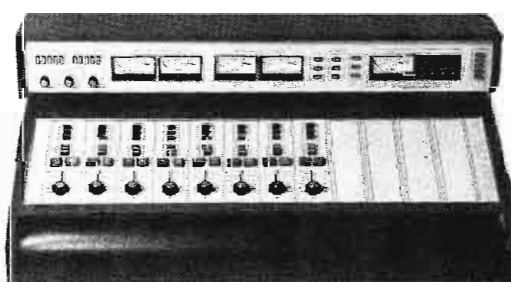
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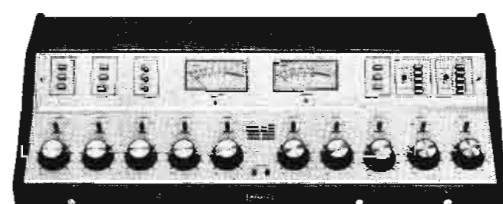
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The FCC has analyzed its impact and estimates the audience loss to daytime stations under year-around DST conditions as: October 1%, November 2%, December 3%, January 4%, February 3%, March 2%, and April 1%. For the 500 daytimers on U.S., Canadian and Mexican clear channels, the calculated DST revenue loss in 1974 was in the order of \$750,000 or \$1500 per station. But the Commission went on to say: "(W)e are not as much concerned with station revenue losses per se as with the known curtailment of early morning AM service to the public which occurs when stations engineered separately for daytime and fulltime operation are compelled to operate on the same frequencies under essentially nighttime conditions."

Commission Struggles With New FM and TV Propagation Curves

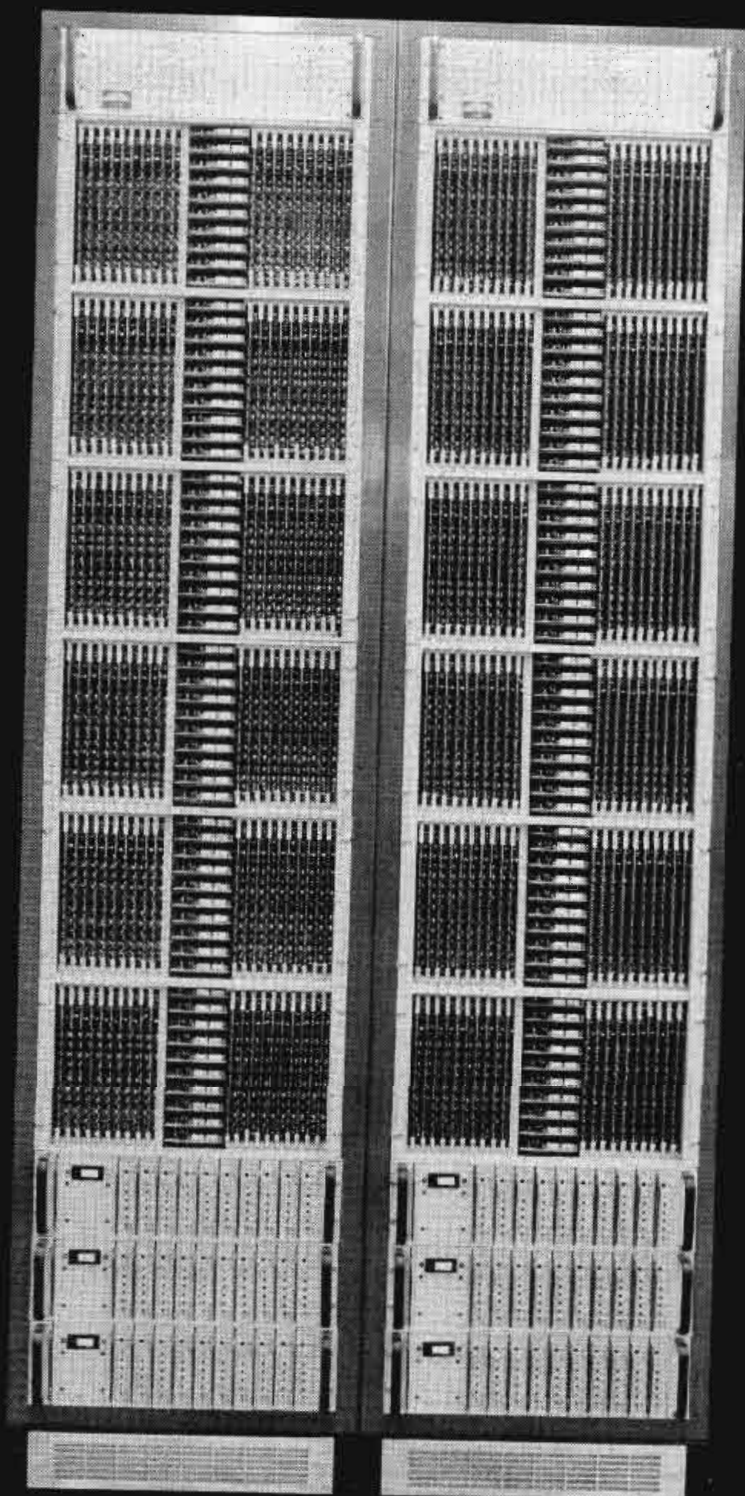
Last July, the Commission adopted new field strength vs. distance curves and prediction methods for use in the FM and TV broadcast bands (see July, 1975 D.C.). In addition, the Commission ordered all TV stations (not FM) to submit new coverage contour maps at the next license renewal time.

Although experience with the new procedures is still limited, it is becoming apparent that the effort involved in calculating predicted contours is substantially greater than the Commission had expected. The principal reason for this is that a procedure for taking terrain roughness into account is required to be followed, and the determination of terrain roughness in the various directions is a rather tedious process.

Commission licensees who would otherwise have been required to submit new coverage maps previously have now been given until December 1, 1975 to do so. In the meantime, the Commission's staff and a group of consulting engineers are taking a close look at the suitability of simplified methods for determining terrain roughness which would still provide the desired result without sacrificing accuracy.

Short Circuits:

The Commission has amended its table of allocations to make it perfectly clear that all existing TV translators on Channels 70 to 83 are on a secondary basis to the land mobile services; the first land mobile authorizations have been granted in this band, to the Chicago police....The EBS rules have been amended to exempt 10-watt educational FM stations from having to use the new two-tone alerting system in view of their limited power and coverage.



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NAB predicts continued economic growth

The president of the National Association of Broadcasters said recently that radio and television stations have come through the current unsettled economic period "in astoundingly good fashion" and predicted that the trend will continue.

Vincent T. Wasilewski told the annual meeting of the Michigan Broadcasters Association that in 1974 revenues increased for both media and "business seems to be holding up well this year."

Last year, he said, radio experienced about a 7.6 percent increase in revenues, about a 7.8 percent increase in costs, and an average profit margin of 5.4 percent.

Television was even better, he said, noting that revenues were up about 8.3 percent, operating costs 7.8 percent, and the average profit margin was 17 percent. Both figures are before Federal Income Taxes.

Wasilewski said FM stations did

spectacularly well with sales increasing more than 22 percent on the average, while operating costs increased 18 percent.

He attributed the higher operating costs to the fact that FM stations no longer are specializing in programming and sales, but are competing across the board with all types of programming and seeking sales support from all kinds of advertising.

The NAB president speculated that this growth came about because many industries had heavy inventories and used advertising—particularly radio and television—to move their products.

He also said that "rather than a generalized depression, we have gone through a depression which has affected parts of the economy, and left others in relatively good shape—of which broadcasting is, fortunately, a part."

Wasilewski also noted that dur-

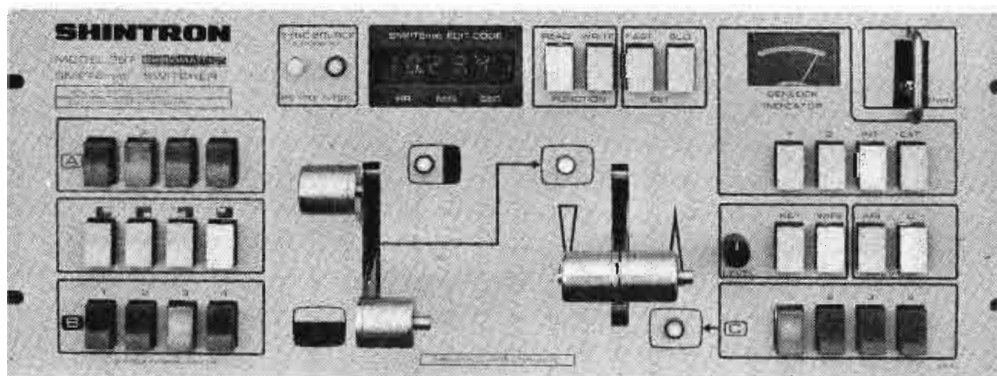
ing the 1970-71 recession, the company that did not cut its advertising expenditures "maintained its sales at a better level and, perhaps more importantly, when the upturn in the economy came, those companies got well quicker."

"There is evidence that advertisers learned something from that experience—particularly automobile companies—and they determined that they would be better off to continue advertising expenditures."

Another reason, he said, is that businessmen remembered that during the depression of the 1930's, low-priced entertainment, particularly movies, prospered. Therefore, they put their advertising dollars into radio and TV.

He said broadcasters are very optimistic about the future, and they have estimated that in 1975, increases will amount to 8.5 percent for AM, 22 percent for FM and 12 percent for TV.

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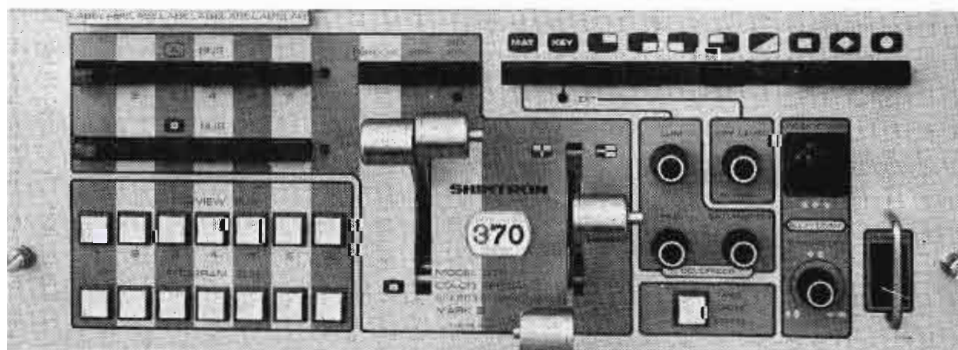
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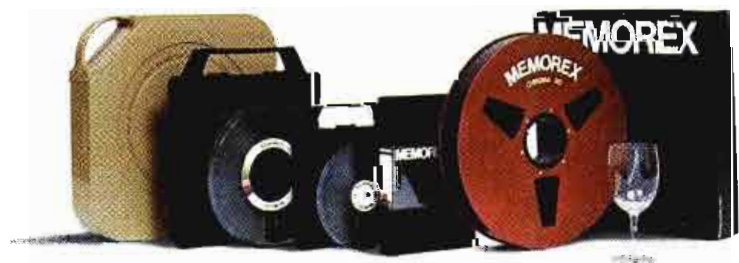
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NAB asks for EEO relief

The Small Market Radio Committee of the NAB has passed a resolution calling for the FCC to exempt stations having 15 or fewer employees from the filing of an equal employment plan.

The committee observed that exempt stations would not be relieved of any responsibilities under the law, but only from the filing of such a plan. The committee stated that small market broadcasting reflects few employment openings and that there is a general reluctance by qualified women and minorities to relocate into these areas.

In further action, the committee narrowly passed a resolution regarding the new Arbitron audience measurement formula called "Area of Dominant Influence" (ADI). The

resolution, passed by a 4-3 margin states:

"The Small Market Radio Committee of the National Association of Broadcasters would like to thank Mr. McClenaghan and Mr. Engel of Arbitron Radio for taking the time to appear before the committee to present the reasoning behind the ADI concept.

While the Small Market Radio Committee continued to have considerable reservations about the ADI concept, we recognize that it has potential benefit to the radio industry in general, even though some individual small market radio stations may not benefit.

"The Committee applauds Arbitron's efforts to assist the radio industry and encourages them to continue to search for ways to

improve radio's visibility."

This new radio concept has been described as a means of relating radio buys to newspaper and television surveys that already use the ADI claiming that it would increase national and regional business.

Members of the committee are: Wayne C. Cornils, president and general manager, KFXD/AM & KFXD/FM, Nampa, Ida., (chairman); Edward O. Fritts, president and general manager, WNLA Radio, Indianola, Miss.; Dick Painter, general manager, KYSM/AM & KYSM/FM, Mankato, Minn.; Sherwood R. Parks, president and general manager, KINA Radio, Salina, Kans.; David E. Parnigoni, president and general manager, WKVT Radio, Brattleboro, Vermont; William R. Rollins, vice president and general manager, WSVM Radio, Valdese, N.C.; Robert W. Tobey, general manager, KOTS Radio, Deming, N.M. and Jack S. Younts, president and general manager, WEEB Radio, Southern Pines, N.C.

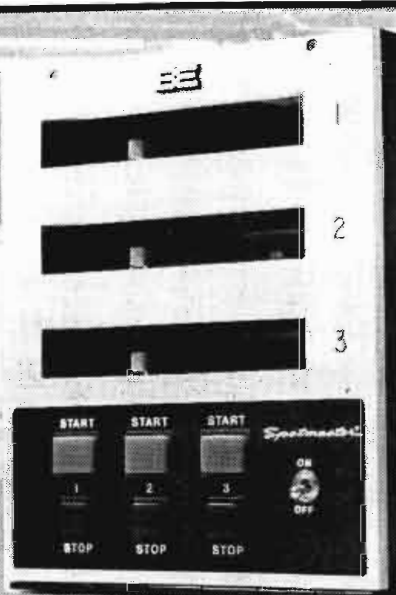
WRTV wins Editorial award

WRTV has been named winner of the 1975 International Radio Television News Directors Association Award for excellence in editorials. Channel 6 was chosen by judges over all other entries from the United States and Canada.

The station was recognized for six editorials indicating its willingness to support just, but unpopular causes. The editorials dealt with opposition to state anti-obscenity legislation; the constitutional justification for school busing; administrative incompetence tolerated by local government; rationing or other controls to limit oil imports; shield legislation for journalists; and criticism of the state for refusing Indianapolis a property tax for a city bus system.

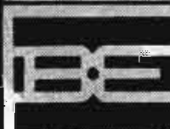
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Versatile, accessible and reliable describes the new 5000 Series multi-deck cartridge reproducer from SPOTMASTER. **Versatility** in design lets you choose from a three or five deck model in either mono or stereo, with or without cue tones, record and other options. **Accessibility** from fold down front panel and slide out deck plates for easy cleaning and adjustment of the PHASE LOK III head bracket, plus a completely removable electronics package with modular components and easy trouble shooting with LED indicators of front panel functions. **Reliability** means the use of the best switches and components available including ribbon cable to replace bulky multiple wire harnesses, massive machined deck plates, a direct drive hysteresis synchronous motor and a super silent air-damped solenoid.

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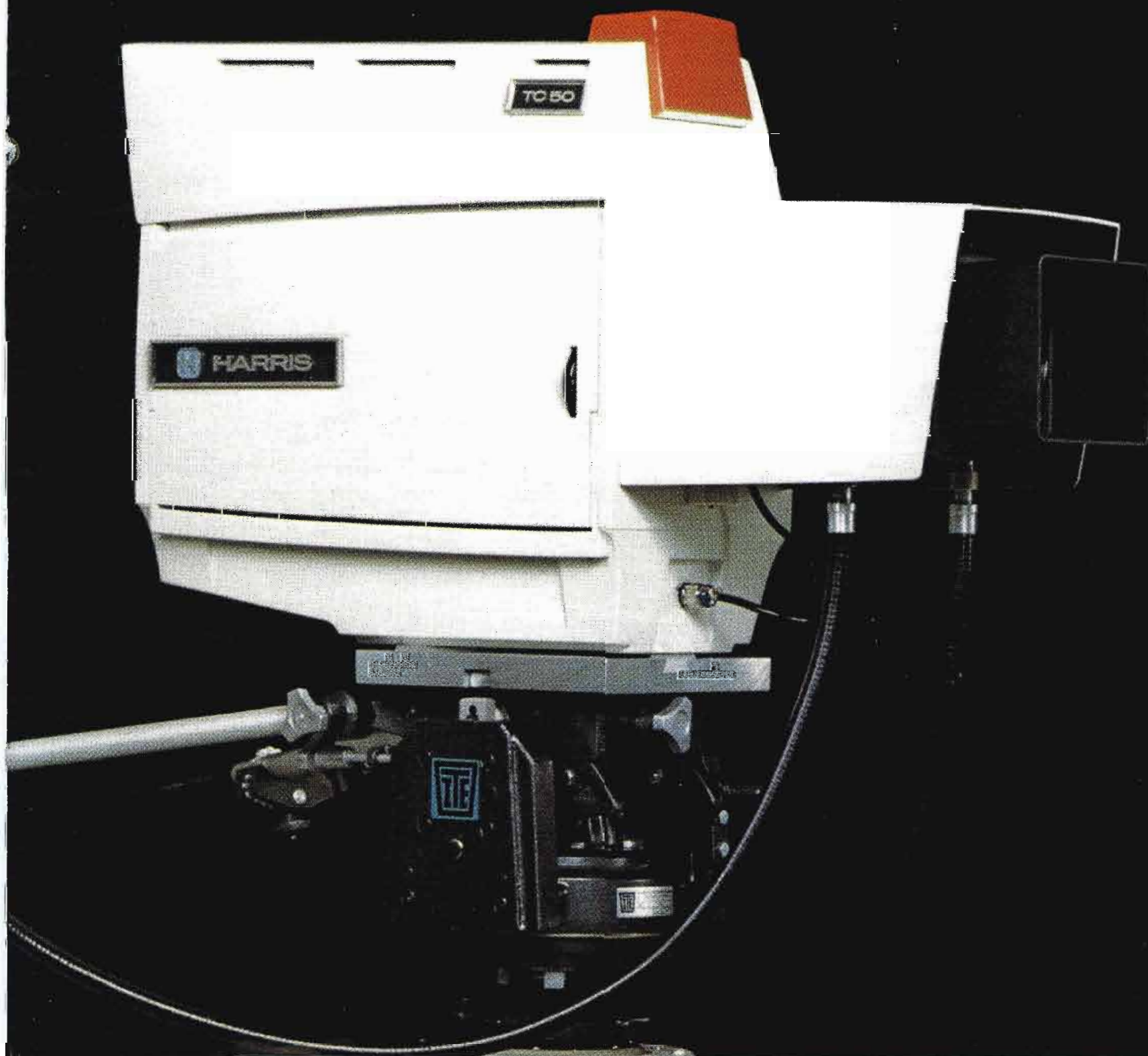
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SBE Spotlights Bob Flanders

This month's SBE Fellow to be profiled is Bob Flanders of Indiana's Chapter 25. When he takes time off from SBE, he sits in as vice president and director of engineering for McGraw-Hill Broadcasting Company, Inc., and WRTV's director of engineering. He joined the staff of WFBM, predecessor of WRTV, in 1942 after serving in the radio-communications section of the Indiana State Police. He became assistant chief engineer of Channel 6 in 1951, chief engineer in 1957, and director of engineering in 1960. His McGraw-Hill position became effective on December 1, 1972.

A graduate of the Naval Research Laboratory in Washington, D.C., Bob served in the United States Navy during World War II, aboard the USS Gillette, with the rank of Chief Radio Technician.

(Continued on page 14)

Four new chapters join SBE

Vincent Flanders, Assistant Secretary at SBE National, reminds all members to check their membership cards. Anyone whose membership fee is four months overdue should send in his check right away. Suspension notices have already gone out, and deletion of names from the computer list begins in November. In order to continue receiving **The Signal**, etc., please act soon and avoid the confusion of resubmitting your name to a computer!

Congratulations

SBE would like to officially welcome four new chartered Chap-

ters. They are CHAPTER 36 - SAN DIEGO, Bob Boulio, Chairman, 6841 Convoy Court, San Diego, Calif., 92111; CHAPTER 37 - Washington D.C./Alexandria, Va., Charles F. Riley, Chairman, TeleColor Productions, Inc., 708 N. West Street, Alexandria, Va., 22314; CHAPTER 38 - El Paso, Frank Jordan, Chairman, c/o KDBC-TV, P.O. Box 1799, El Paso, Texas, 79999; and CHAPTER 39 - Tampa, Raymond Murphy, Chairman, 12112 N. Edison Avenue, Tampa, Fla., 33612.

We're happy to have these four new groups!

Flexible, solid-state audio switching

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Starting with a single 8 $\frac{3}{4}$ -inch by 19-inch rack frame assembly, the user can build to a 20-input by 20-output configuration through selection of plug-in switching and amplifier boards.

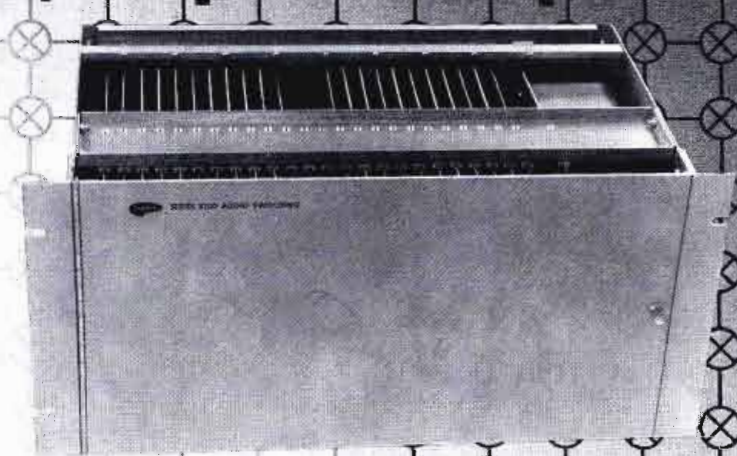
Still using the same basic frame assembly, other configurations such as 20 by 5, 10 by 20 or combinations in between can be assembled. Greater capacities, including dual inputs or outputs, are just as easy . . . just add.

Control? . . . a snap! pushbuttons, thumbwheels, dials, touch pads . . . even a computer.

Performance is outstanding. Using field effect transistor switching and integrated amplifiers, the Series 8100 handles -6 to +8 dBm levels through its balanced transformerless inputs. Flat within ± 0.15 dB (20 Hz to 20 kHz) ± 1.0 dB (1 Hz to 50 kHz), crosstalk (better than 70 dB below output), harmonic distortion (less than 0.15%) and hum and noise (85 dB below maximum output) the 8100 compromises nothing for its flexibility.

Best of all, users will really appreciate the economy. By specifying the initial capability for any remotely-controlled, switched audio distri-

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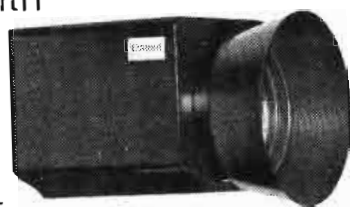
bution network, the buyer saves now and isn't penalized later. High reliability solid-state audio switching costs can be cut to as little as \$10 per crosspoint . . . significantly less than competitive switching systems.

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Lowest-priced
10:1 for major
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We've been changing, too. While quietly supplying the broadcast industry with high-quality optics for the last two decades, we've been hard at work, developing a family of lenses to expand the capabilities of broadcast TV equipment...while keeping the economics under control.

You are our requirements. More than any other factor, Canon products are the result of user inputs. So it's no coincidence that we offer the widest, most customized range of optical products for the broadcast field—in terms of function *and* price. From the lightest-weight, most compact (and by the way, most popular) 10-120mm on the market to an enormously-versatile 32-1070mm with



PV25 x 16B-DZ.
Longest low-cost lens
for 1" plumbicons.*

continuous zoom and 1.8 meter minimum object distance. Your requirements also inspired our new budget-stretching Versatility Packages—

a family of two-lens systems that give one camera the versatility of two at substantial savings. (And we're always listening for new ideas.)

We've invested in you. Because major optical advances don't happen without a lot of expensive thinking and heavy experimentation. While the dividends are visible in every Canon product (for example, for some

years now, we've been pioneers in super spectral coating), they've also won us acclaim in the process. Like a special award from the Motion Picture Academy of Arts and Sciences. No less important, our sizeable investment in manufacture and quality control insures that the advances in our labs aren't diminished on the production line.

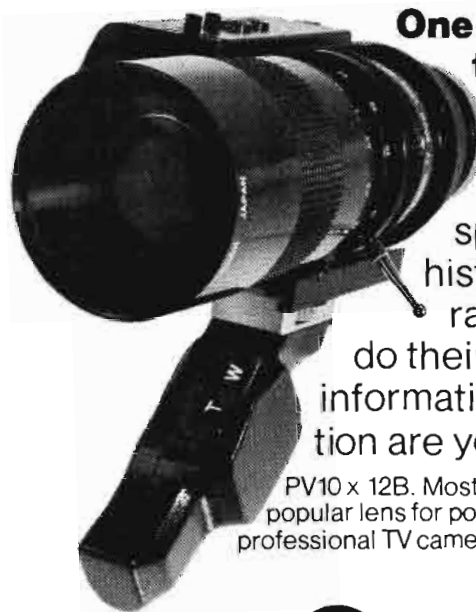
You make us look good. Service isn't just a matter of goodwill—it's good business. So we support what we sell with an extensive staff of factory-trained technicians, headquartered in New York, Chicago and Costa Mesa, California. Equipped with the finest, latest test equipment—much of it of our own design. To help insure the consistency of our standards...and facilitate the fastest possible turn-around time.



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For More Details Circle (11) on Reply Card



(Continued from page 12)

After the war, Bob developed and built television equipment with which Channel 6 started broadcasting in 1949. Channel 6 has transmitted color since the days of the flying wheel and has been a full-color station since 1955.

In addition to this busy professional life, he still has time to take part in many other activities. He has served on the 1967 NAB Engineering Conference Committee and was chairman of the 1969 Committee. He is currently chairman of the NAB Engineering Advisory Committee and a member of the following organizations: Association of Maximum Service Telecasters' Engineering Committee; Industry Advisory Committee of the National Electronics Association, Inc.; and, the Publicity Subcommittee for Career Education, Action Committee for Indianapolis Public Schools.

What's more, he has been past president of the Downtown Optimist Club of Indianapolis, the International Planned Music Association, and of course, of our own Society of Broadcast Engineers. He's been a charter member since SBE was organized, and has served as a board member, vice president, and president for two terms. He was elected to the grade of SBE Fellow in 1973.

SBE CHAPTER IN PROFILE

Chapter 28: Milwaukee, Wisconsin

Chapter 28 of the Society of Broadcast Engineers was formally organized in Milwaukee, Wisconsin, and, after many months of planning, spearheaded by Jake Segraves (WTMJ, Milwaukee), it held its first meeting in September, 1970. Jim Wulliman, manager of engineering, WTMJ, was appointed Chairman Pro Tem and was subsequently elected to the chapter chairmanship for two years. The current Chairman, Bob Truscott, chief engineer,

WITI-TV, Milwaukee, has also served SBE as National Secretary-Treasurer.

Chapter 28 feels their membership is among the largest and most active in the Society. At their second meeting in October, 1970, they had 87 members. By March, 1971, when SBE published its revised membership list, the total had climbed to 93. Eight months later (November, 1971), the membership hit the magic 100 level. The peak was reached in August, 1972, with 118 members, and the current plateau stands at 101.

Meetings are usually held (September through June) at the WTMJ Auditorium on the second Tuesday of each month. They are preceded by a dutch-treat dinner at a nearby restaurant. Business meetings start at 7:30 p.m. and are followed by the main event of the evening, which is usually a lecture/demonstrated by a manufacturer or field service representative. Afterwards there follow informal discussions and refreshments on stage.

The local membership has also been actively involved in presenting programs to the group. These programs have included the design of directional antenna systems, NAB Convention reports presented by a panel (each panel member reporting on a different area of interest), acoustical room equalization, television remotes, FM automation, and music recording techniques.

It seems that if the level of activity within this Chapter is a reliable indicator, then the outlook for the entire Society is definitely healthy.

CHAPTER MEETINGS

Chapter 9: Phoenix, Arizona

The August meeting for Chapter 9 was held at the KOOL studios in Phoenix. The program was presented by Data-Disc, one of the pioneers of disc recording, who introduced their current slow motion video recorder.

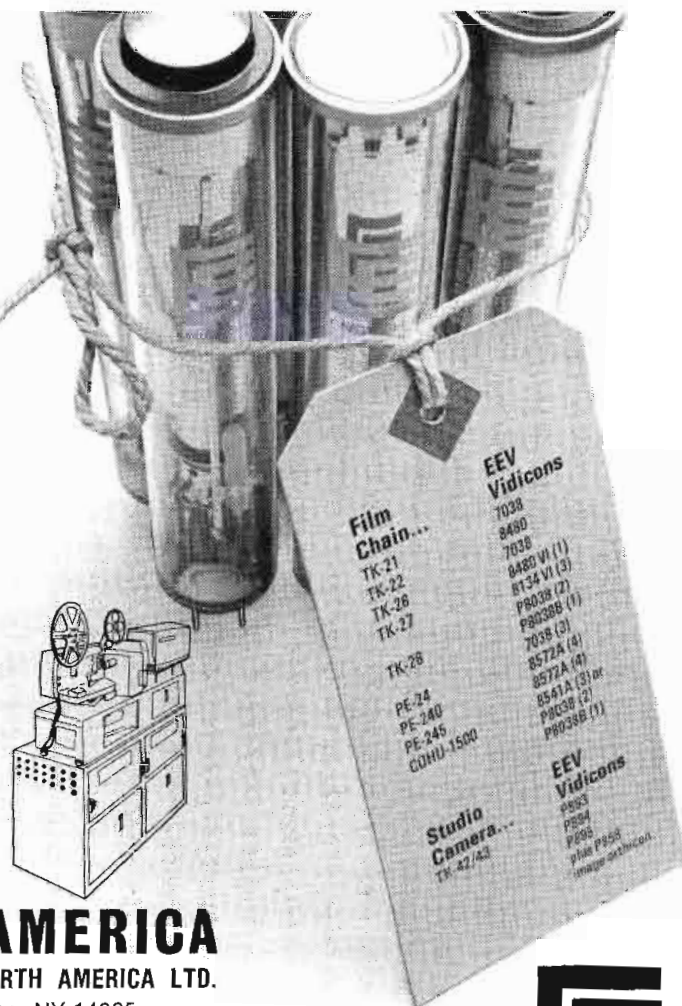
Chapter 15: New York, N.Y.

Chapter 15 changed their fall program from what was reported last month in BROADCAST ENGINEERING. Ed Karl, previously scheduled for October, spoke instead at the

(Continued on page 16)

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- High gain switch. (6dB)
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To find another color studio camera as good as our FP1212, you'd have to go into a much higher price class.

We know that's a big claim. But who else offers you a professional color camera with three 1" Plumbicon tubes for **less than \$20,000?**

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For More Details Circle (13) on Reply Card

SBE

(Continued from page 14)

September meeting on "Solid State Design Consideration for High Power RF." Mr. Karl is district manager of radio sales for the Harris Corporation.

October was unscheduled at the time of this printing, but the November meeting will feature RCA reporting on its new AM stereo.

Chapter 16: Seattle, Wash.

The SBE Chapter in Seattle

toured the University of Washington's CCTV setup on September 17. On October 15, they will be taking another tour, this time through the KOMO studios with Mr. Bill Pickering hosting the program. The months of November and December tentatively include a presentation by Shure Bros. on using the right microphone, and at another session, the topic will be the two-tone EBS equipment requirement.

Chapter 26: Chicago, Illinois

The Chicago Chapter was ad-

dressed by several people from Tektronix, introduced by Bob Seaburg and Dave Sprague, its local representatives, at their August meeting. First, however, Warren Schulz of WFYR talked about "proofs," from the station's point of view, and reviewed some of the traps which are encountered, then compared the spectrum-analyzer approach to the more traditional methods. This was followed by Mr. Cliff Schrock, from Tektronix at Beaverton and author of the new "cookbook" on the spectrum analyzer, showing just how the spectrum displays the various signals, what should be looked for, and why it is such a time saver. The program concluded with tours to the Sears A/V studios and the WFYR and WLS-TV transmitters on the 102nd floor of the building.

Chapter 32: Tuscon, Arizona

Chapter 32 had a chance to visit the KGUN-TV transmitter building atop Mt. Bigelow (8,600 feet) on August 23 for a picnic dinner and a tour of the facilities.

Mr. Ben Jacobs, a local board member, was the speaker for the September program. A teacher at the Willcox High School, he is a media specialist in charge of an elaborate closed-circuit and cable system.

Chapter 36: San Diego, Calif.

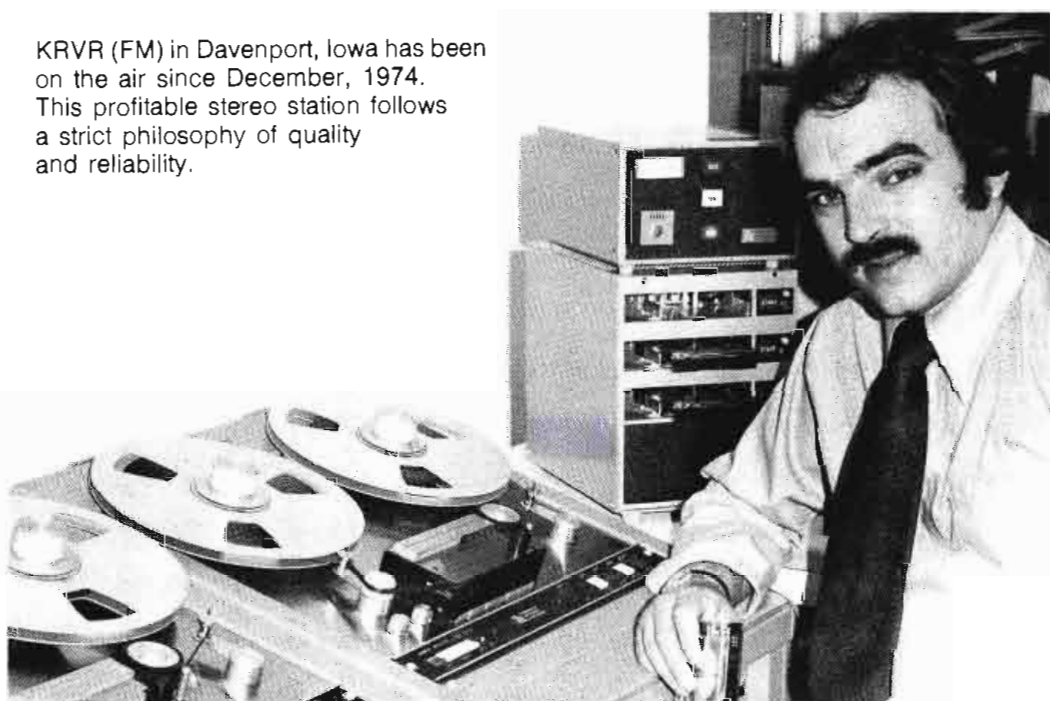
The San Diego chapter meeting was held on August 27 at the San Diego Gas and Electric Company. The program of the evening was "Energy Conservation for the Commercial Broadcaster" with guest speaker Mr. Hodiack, the utility's commercial sales manager.

Chapter 37: Washington, D.C.— Alexandria, Va.

The August meeting for this Chapter was held on Wednesday, August 27, at the new Xerox television facility at Leesburg, Virginia. The group was very impressed and extends its appreciation to Mr. Bob Jackson who was in charge of the tour.

September offered another tour, this time at the Capitol Center, which included an inspection of the color-television installation and, afterwards, a discussion of the system.

KRVR (FM) in Davenport, Iowa has been on the air since December, 1974. This profitable stereo station follows a strict philosophy of quality and reliability.



Peter Burk, Chief Engineer for WQUA and KRVR (FM), chose to use six ITC Open Reel Units in KRVR's Automation System. Why?

"The decision to use reel-to-reel was dictated by the Stereo Radio Productions (Schulke) format. It was then a matter of narrowing down the available machines to the one that would perform the best in both production and automation uses. We found that ITC's 850 would satisfy all our requirements. Everything went together into a machine that has virtually all the features we could ask for. The Micro-Marker is a classic example. Editing has been made easier and more accurate. It is just one of the things that makes the 850 a superior production machine.

"Virtually every feature in the edit mode is used at one time or another. The interesting thing is that the features don't interfere with each other. Start Memory and Motion Sensing are assets, especially in

automation. We can avoid tape spillage and tape breakage, and reduce the amount of time spent cueing-up.

"The phase stability from one end of the tape to the other is excellent. That's a prime consideration for stereo operations. The front-panel limited-range level controls have been invaluable. We can be sure our stereo balance is always correct and that the level between tapes is very consistent.

"As Michael Moore, KRVR's engineer, said, 'The serviceability, the simplicity, the cleanliness of how everything is placed on the 850, has to be one of its best features. You don't have to look through the forest to find the trees.' I'd certainly agree with him."



Find out more. Call us collect (309/828-1381) and ask us your questions about the 850 Series.



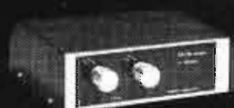
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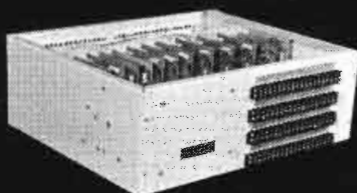
**TURNTABLE
PREAMPS**



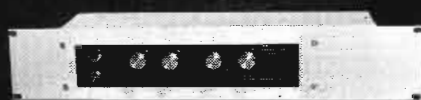
**MIC & LINE
AMPLIFIERS**



AUDIO DISTRIBUTION AMPLIFIERS



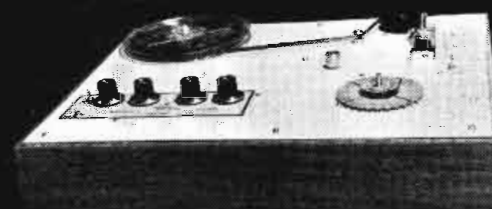
AUDIO CONSOLES & CONTROLLERS



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AMPLIFIERS**



**REMOTE POWER
CONTROLLERS**



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MP-8E Mono \$86 SP-8E Stereo \$137

MIC & LINE AMPLIFIERS

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

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

AUDIO DISTRIBUTION AMPLIFIERS

From 1 in/6 out to 20 in/80 out in one small package. Whatever your distribution requirements we have an answer. All units meet or exceed the following specifications: Balanced bridging/matching inputs, balanced 600ohm outputs, $\pm 0.5\text{db}$ response 10Hz-20KHz, $\pm 3\text{db}$ 5Hz-40KHz, 26db gain, $+21\text{dbm}$ out. max. capability, 0.1% or less distortion, outputs isolated by 80db, hum and noise 90db down referenced to $+21\text{dbm}$ out. Internal power supplies.

DA-6/E	Table top. 1 in/6 out.	\$131
DA-6R/E	Rack mount. 1 in/6 out.	\$149
DA-6BR/E	Rack mount. 1 in/6 out. Individual level controls for each output.	\$165
DA-6RS/E	Rack mount. 1 in/6 out stereo or 2 in/12 out mono.	\$229
DA-16BR/E	Rack mount. 1 in/8 out stereo or 2 in/16 out mono. Individual output level controls, selectable metering & headphone monitoring.	\$287
DA-2080/E	Rack mount main frame with protected	

power supply, metering & headphone monitor. Will accept up to 10 slide in modules. Each module has 2 inputs & 8 outputs. Individual output level controls & selectable meter switch. Up to 20 in/80 out.

DA-2080/E	Main Frame	\$150
DA-2080/E	Modules 2 in/8 out	\$135 ea.

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Our new series 35 audio controller introduces a new concept in audio mixing. Allows separation of controls from the audio functions. Controls can be placed in any convenient location in the studio, while electronics may be mounted anywhere for easy maintenance & hookup. Remote DC control for completely unaffected audio.

This versatility gives you a custom designed console at a standard production model cost.

Features include; 8 channels, mono, dual channel mono, stereo, dual channel stereo, or combinations; paralleling 2 units for quad, fail safe power supply & plug in interchangeable cards.

Performance specifications are; 0.3% or less distortion, 124dbm equivalent noise on low level channels, approximately 25w power consumption, -70db crosstalk, balanced bridging/matching inputs & response within $\pm 2\text{db}$ 20Hz-20KHz. Series 35 audio controllers start at \$1200.

AUTOMATIC TAPE CARTRIDGE AND CASSETTE LOADERS

So easy to use & accurate that our largest winder competitor has been using one of these to load their own carts.

Eliminates guesswork. Set the dials to the length desired. The exact amount of tape is fed onto the cart or cassette hub and then shuts off automatically. Also has exclusive torque control for proper tape pack on different size hubs. Winds at 30 IPS.

ACL-25/E	\$185
----------	-------

Winders also come in higher speed models (ACL-60 series). Same operation as above but winds at 60 IPS. Accepts 14" pancakes.

ACL-60T/E	(tone stop only)	\$266
ACL-60B/E	(Blank tape loader)	\$331
ACL-60BT/E	(for both prerecorded and blank tape)	\$375

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Distortion less than 0.25% at less than 20w out, 1% or less at 20w. Works into 4-16ohms. Balanced bridging inputs, variable bass contour, internal overload & short circuit protection.

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SMA-500/E	Rack mount (mono)	\$142
SMA-1000/E	Rack mount (stereo-40w)	\$196

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RAMKO RESEARCH

QUADRAPHONIC PROCESSING TECHNIQUES

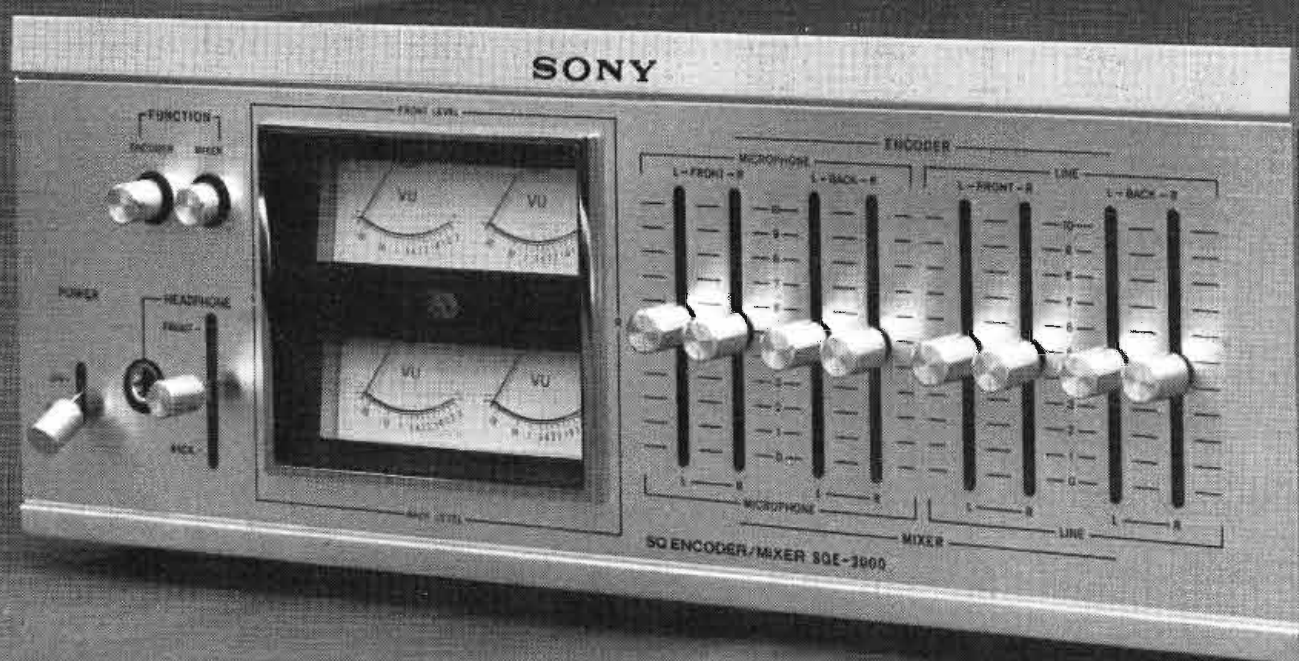


Figure 1. This is the Sony SQ encoder/mixer SQE-2000.

By Gerald A. Budelman/Associate Manager, Audio Systems Technology, CBS Technology Center, Stamford, Conn.

Toward the end of the 1960's, Columbia Records and others became aware of a desire on the part of the creative musical community for a mass market quadraphonic, or four-channel, medium. Prior to that time, multichannel audio had been common in the recording studio and even had a very early start in motion pictures, as with Walt Disney's "Fantasia." Those early techniques were expensive and could be enjoyed only by a few. Thus, the search for a high quality quadraphonic medium suitable for mass marketing was begun. The ensuing years of research have resulted in three approaches to the problem.

The first commercial approach introduced jointly by RCA and Motorola in 1970 was to place four channels on alternate tracks of an eight-track tape cartridge which is

replayed with a special player equipped with a four-track head to produce four output signals. The second, introduced by the Japan Victor Company in 1971, is the CD-4, or "Quadradisc," system, which involves the addition of compressed and modulated ultrasonic signals to the audio baseband of the stereo disc. The third alternative is the matrix approach represented by the CBS SQ™ system, also introduced in 1971.

Currently, the Electronic Industries Association (EIA) is studying proposals offered by five manufacturers for special FM systems which are capable of transmitting discrete four channels in a manner compatible with existing stereophonic and monophonic receivers. This inquiry will be followed by many months or years of study and

*SQ is a trademark of CBS Inc.

lengthy arguments as to which system has the least multipath problems and least loss of signal-to-noise ratio, and other factors.

All of the proposed discrete systems mandate a loss in signal-to-noise ratio up to 7 dB which represents an 80 percent loss in coverage for the broadcaster. An unfortunate by-product of most of the proposed discrete four-channel schemes would be the obsolescence of the present day SCA service. Additionally, the entire audio chain would have to be converted from a two-channel to a four-channel medium including phonograph cartridges, tape decks, control consoles, limiters, compressors, and studio transmitter links, whether they are telephone lines or microwave relays. The station transmitter, of course, would require a new quadraphonic signal generator

capable of producing the additional subcarrier modulations. All of these factors, both economic and technical, must be considered when evaluating what advantage quadraphonic broadcasting has for each individual station.

Getting On The Air In Four-Channel

The easiest road to quadraphony for the FM stereo broadcaster is to acquire a library of SQ records from manufacturers such as Columbia, Epic, Capitol, EMI, Vanguard, A&M, Project 3, and others. These are played on the existing turntable as any stereo record. The listener hears the program in conventional manner, and if he is equipped with an SQ decoder, then he enjoys quadraphonic reception.

Currently, more than 400 domes-

obtained at very reasonable cost by writing on station letterhead to the various companies, requesting titles by catalog number. Some addresses for this service are given elsewhere in this article.

Converting Formats For Additional Material

If you have exhausted your supply of quadraphonic records, what then? You can convert your quadraphonic tapes into a format suitable for broadcasting using a Sony SQ Encoder/Mixer SQE-2000, shown in Figure 1. CD-4 records can also be encoded in this manner. Several manufacturers, such as RCA and the Warner-Elektra-Atlantic Group, have adopted the CD-4 system for their quadraphonic disc offerings. There are more than 100 domestic records in this format. The CD-4 format by itself is not

with a special cartridge suitable for reproducing the high-frequency carrier information present on CD-4 records. The cartridge output is then fed to a CD-4 demodulator via low capacitance cables. The output of the demodulator is then encoded using the SQE-2000. Appropriate hardware for reproduction of CD-4 material is available from several manufacturers such as Panasonic and JVC.

CD-4 records must be kept scrupulously clean to avoid excessive surface noise and should be played only with the recommended cartridge and styli. Failure to observe these rules results in distortion and accelerated wear which eventually will destroy the quadraphonic separation.

Because of the carrier frequencies on the CD-4 discs, care must be exercised to prevent these frequen-

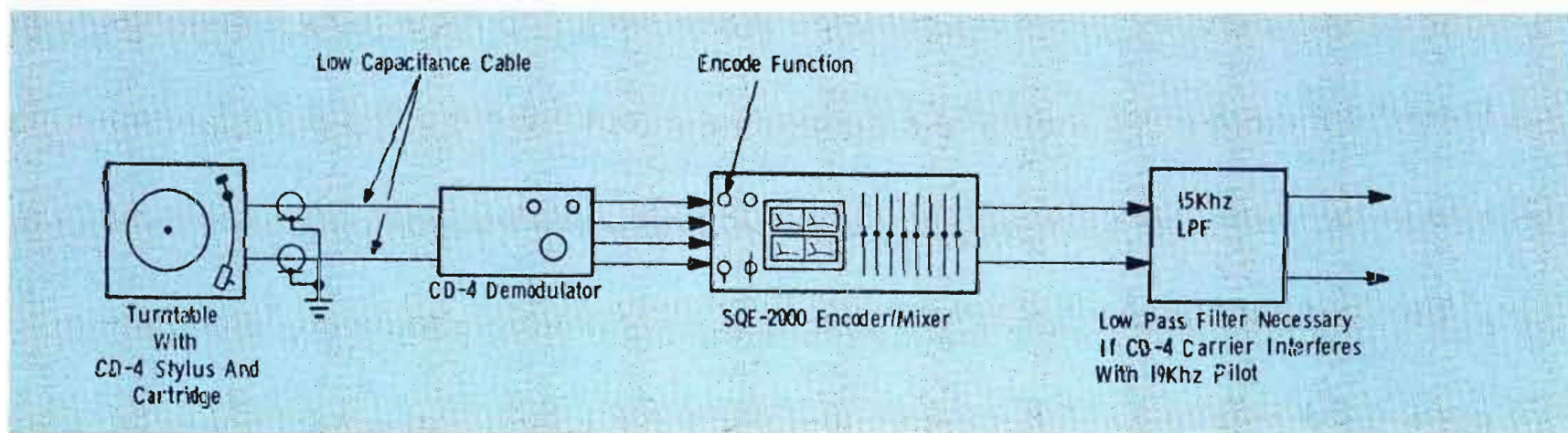


Figure 2. Converting CD-4 to SQ for broadcast.

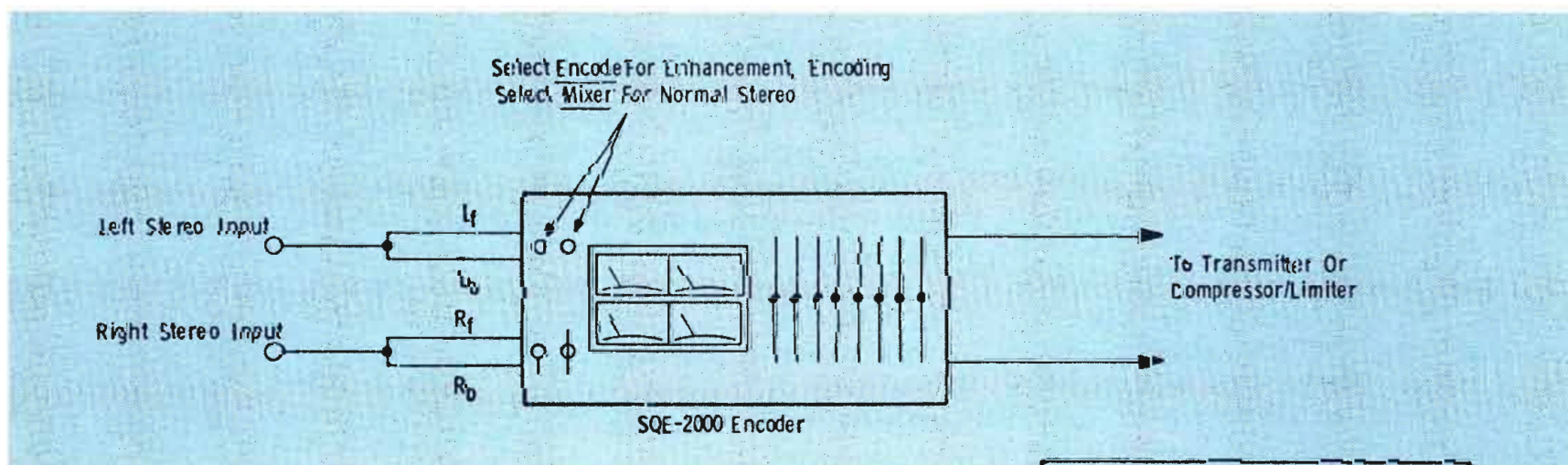


Figure 3. Enhancement of stereophonic and monophonic material.

tic records in this format are available. Most record companies are anxious to cooperate, particularly if the broadcaster schedules significant blocks of four-channel programming. Multiple or additional copies of discs can usually be

suitable for quadraphonic broadcasting, however, these records can first be demodulated and subsequently SQ encoded. A block diagram for such a system is shown in Figure 2. It will be necessary to install a separate turntable fitted

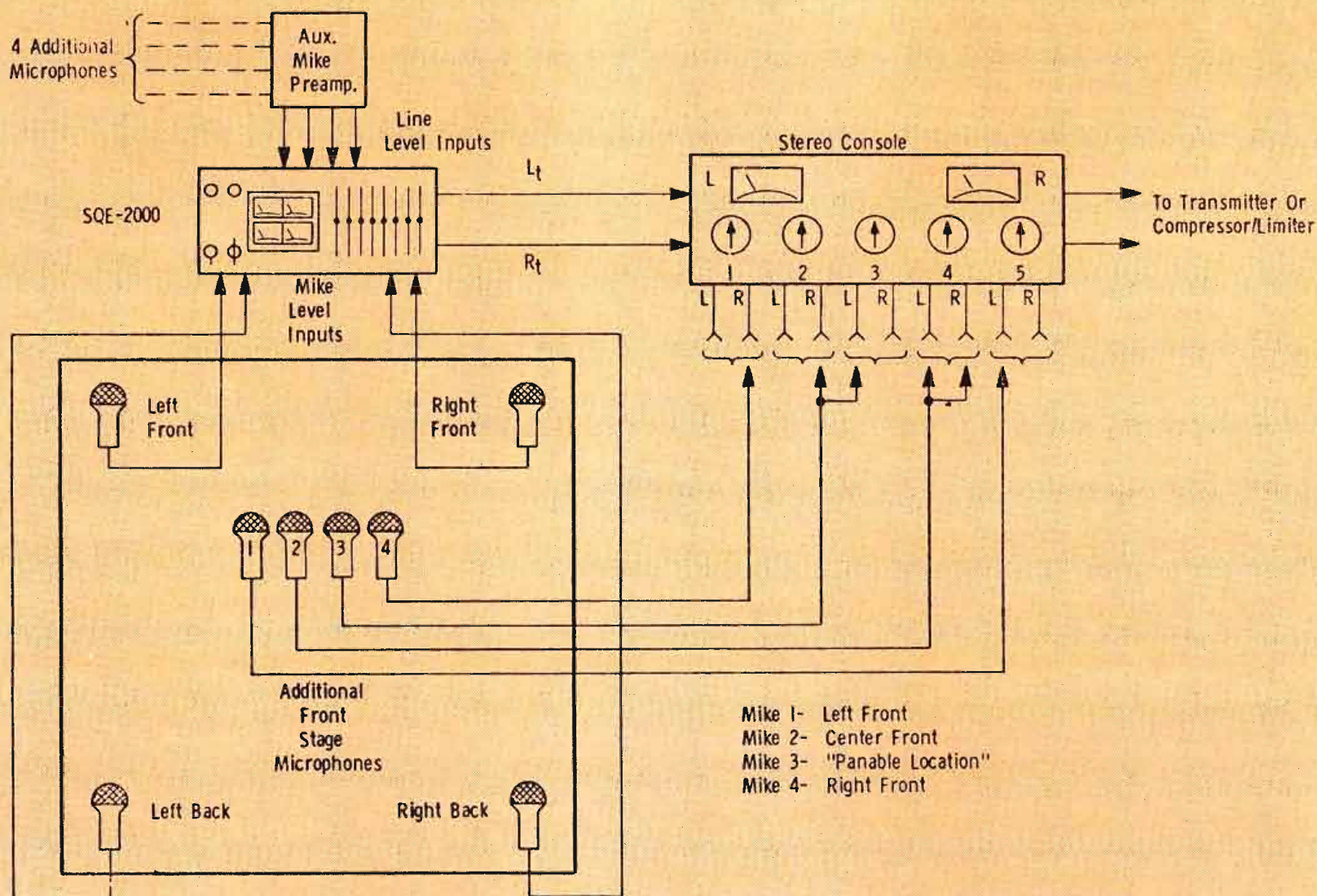


Figure 4. An advanced quadraphonic broadcast arrangement.

Listing Of Record Sources

A & M Records
1416 N. LaBrea
Hollywood, California 90028
Gil Friesen

Atlantic Records
75 Rockefeller Plaza
New York, N.Y. 10019
Dave Glew

Capitol/EMI Records
1750 Vine Street
Hollywood, California 90028
Don Zimmerman

Columbia Records
51 West 52nd Street
New York, N.Y. 10019
Ron Braswell

Connoisseur Society
2211 Broadway
New York, N.Y. 10024
Alan Silver

Elektra Records
962 N. Cienega
Los Angeles, Calif. 90069
Mel Posner

Project 3 Records
1133 Avenue of Americas
New York, N.Y. 10036
Enoch Light

RCA Records
1133 Avenue of Americas
New York, N.Y., 10036
Jack Kiernan

Vanguard Records
71 West 23rd Street
New York, N.Y. 10010
Herb Cousack

Warner Bros. Records
3300 Warner Blvd.
Burbank, California 91505
Stan Cornyn

cies from entering the transmitter exciter, heterodyning with the second harmonic of the 19 kHz pilot, thus producing annoying whistles at the receiver. If the transmitter is fed via telephone lines, this typically is not a problem. However, if the transmitter is nearby or fed by a wideband STL, 15 kHz low-pass filters may be necessary to attenuate high-frequency energy.

Some record makers who are not yet committed to a four-channel disc system are offering quadraphonic material either in eight-track or reel-to-reel configurations. These selections as well can be encoded for quadraphonic broadcasting. The reel-to-reel format is preferred, but in either case head alignment should be checked to insure proper phase coherency for phantom image locations, like center front. Serious phase errors can produce some rather unorthodox encoding.

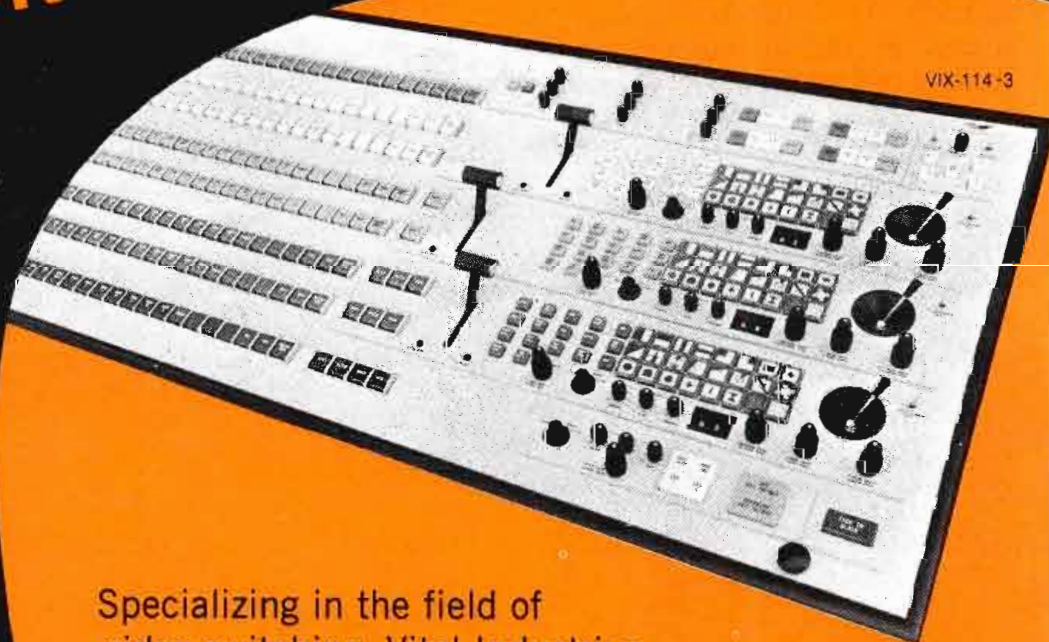
Incidentally, the broadcaster can increase availability of quadraphonic material by requesting such

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Specializing in the field of video switching, Vital Industries offers the broadcast industry a new electronic approach to match film production techniques with graphics-generating capabilities at your fingertips. The VIX-114 series production switching systems are human-engineered for ease of operation of the control panel without interpolation of functions. Digital electronics is used throughout for superb linearity, stability and reliability.

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ROBERT McALL Northeast
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Hicksville, N.Y. 11801
Phone 516/735-0055

GORDON PETERS Southwest
P. O. Box 912
Arlington, Texas 76010
Phone 817/261-6855

ERIC KING
Fox Hill Road
Lynchburg, Va. 24503
Phone 804/384-7001

RICHARD RODGERS West Coast
7960 West Beverly Blvd.
Los Angeles, California 90048
Phone 213/653-9438

material from the various record companies recorded in a format suitable for broadcasting.

Quad Enhancement Of Stereo Material

If the broadcaster wishes to present a more significant four-channel profile, quadrasonic enhancement of an existing stereo library can be achieved. The phase and amplitude relationships of normal stereo signals can be altered to produce a pleasant quadrasonic effect without materially affecting the service to normal stereo and monophonic listeners.

Figure 3 shows a quadrasonic enhancement scheme using the SONY SQE-2000 Encoder/Mixer. The Left stereo channel is fed simultaneously to the Left Front and Left Back encoder inputs while the Right stereo channel is fed to the Right Front and Right Back channel inputs. The ratio of front-to-back signal levels, adjusted by means of the attenuators on the front panel, determines how much enhancement occurs. With equal strength in front and rear, the stereo program source will decode in a horseshoe pattern from Left Center through Center Front to

Figure 5. SQ phasor diagrams.

Right Center corresponding to the Left, Center and Right of a stereo input.

The stereo listener will be hard pressed to detect the slight changes this technique introduces; the mono reception does not change at all. In addition, the sum and the difference signal modulations remain

nearly identical to that existing in the stereo record, so broadcast coverage is unaltered².

The ratio of front-to-back input² Other systems of quadrasonic enhancement also have been offered. Some of them grossly alter the sum/difference ratio resulting in transmitter malfunction or loss of coverage.

(Continued on page 50)

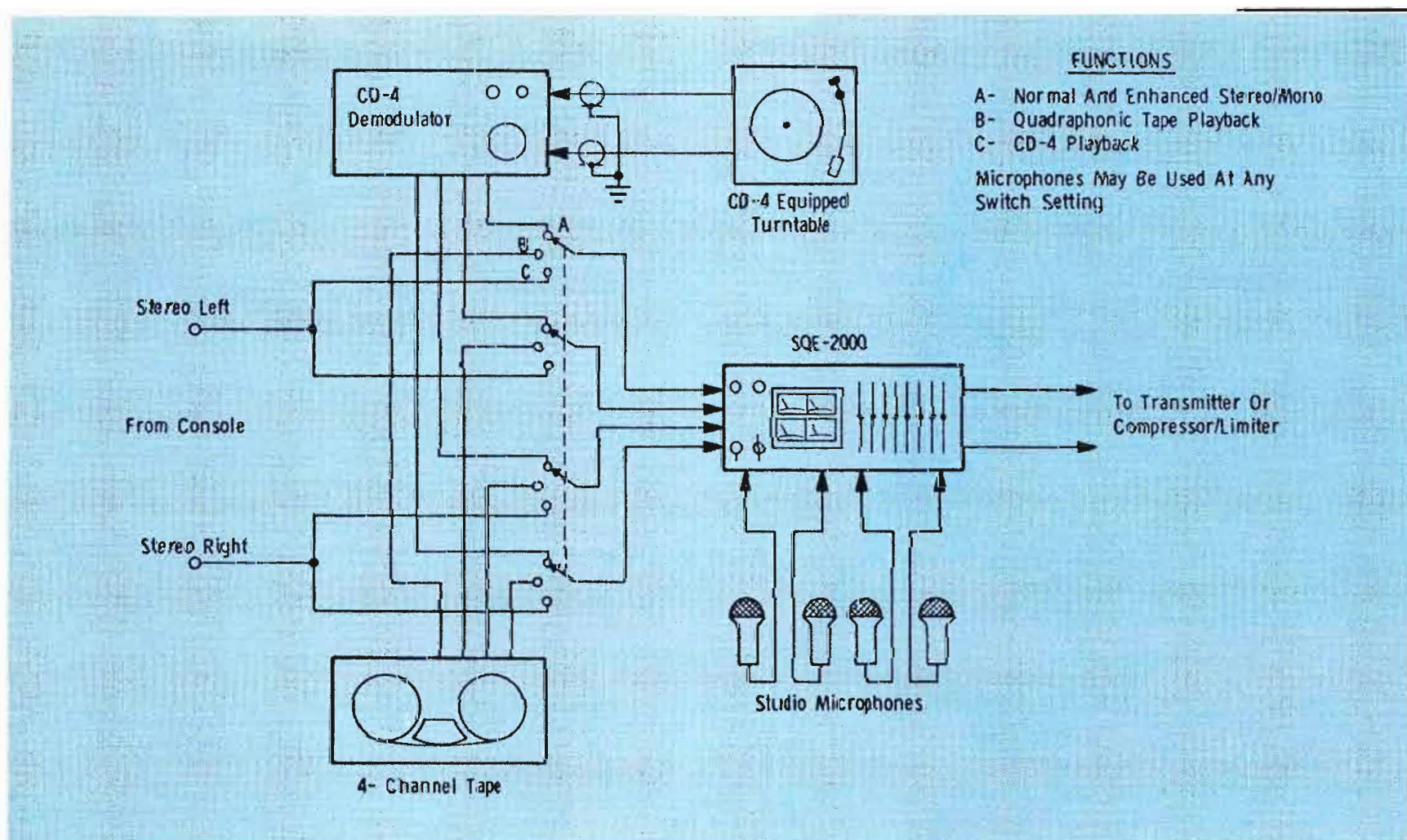
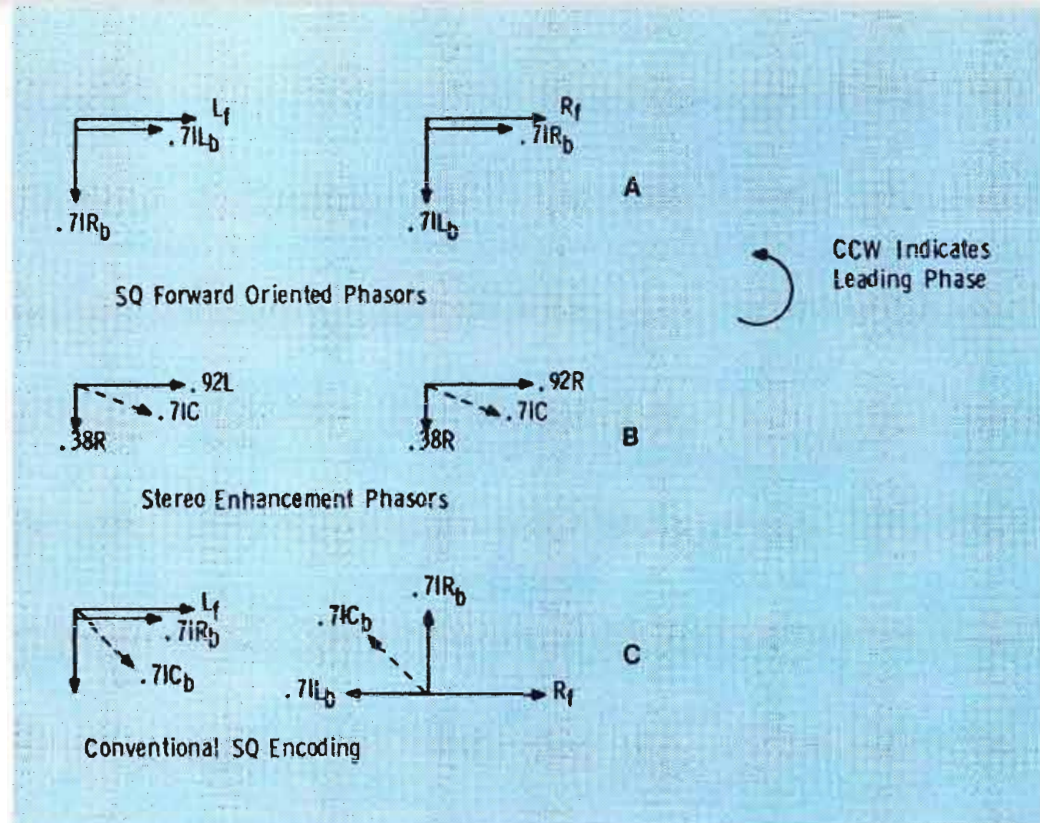


Figure 6. A quadrasonic broadcast control center.

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Anatomy of a SOUND STUDIO

By Ron Whittaker,
Ph.D., University of Florida



Two sets of double glass windows provide an effective sound barrier between studio and control room. Without this type of protection, control room sounds enter the studio. In recording studios, and studios where live mikes are on, noise protection is good insurance.

Sound studios cover a broad range from the very elaborate studios used for recording albums and motion picture sound tracks to the small converted storage room types which are serving as temporary "announce booths" for CATV systems experimenting with local origination. Regardless of your specific needs within this broad range, if you are designing or remodeling a permanent audio studio, certain common characteristics and requirements should be kept in mind to insure maximum quality, reliability and overall efficiency of operation.

Depending upon need, audio studios can be virtually any size. But regardless of size, they are all intended to control sound—control the entrance of undesirable sound from outside the studio, and control (and often enhance) sound within the studio. To accomplish this various types of special construction and "sound proofing" are used. (Although the term "sound proofing" is commonly used, it should be noted that, except for a perfect vacuum, nothing is literally sound proof. Instead, these sound materials are designed to partially absorb or deflect sound.)



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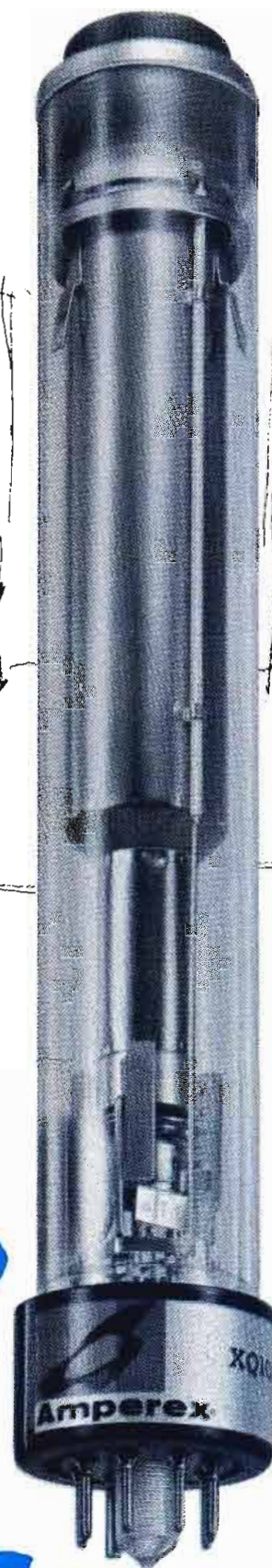
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Restricting Exterior Noise

If the studio is located away from such high noise areas as airports or highways, you generally need only to be concerned with controlling relatively low-level exterior noise. But even for this purpose special construction techniques will have to be used in studio walls to reduce the exterior-to-interior sound conduction to below detectable levels. Very low frequency vibrations, caused by motors, machinery or forced-air heating and air conditioning equipment often escape

notice until they show up on a VU meter when a mike is switched on in a "silent" studio.

To control exterior noise problems, studios are typically constructed so that their inner and outer walls are completely insulated from each other. Any inflexible (solid) material attached to both the inner and outer walls will serve to conduct sound between the walls. Figure 1 shows how the inner and outer walls are often constructed for sound insulation purposes. Note that the vertical 2 X 4 studs are not common to both the inner and

outer walls as they are in most construction applications. Instead, they are separate for each wall and are staggered so they will not touch. In the dead air space between the walls a soft insulating material such as spun glass is often used to further reduce sound transfer.

It must be remembered that any solid connection between the walls, such as conduits for audio or electric cables or for ventilation, will establish a sound-conducting path. Flexible canvas conduits are typically used with forced-air heating and air conditioning systems. Although this should solve the problem of direct sound conduction along the surface of the conduits, there can be another problem. Air that is moving too rapidly through a narrow path will often generate a "rushing" sound. Solving this noise problem will require the redesigning of conduits and air ducts into the studio.

The same insulation concepts used in the studio walls should be applied to the studio ceiling. Here, however, the "outer wall" will vary considerably, depending upon the general construction of the building housing the studio.

The floor represents the last area of sound shielding for the studio. Here, holding to the theory of no direct, solid connection between inner and outer surfaces becomes a bit more difficult due to structural problems in supporting the weight of the studio. For this, two general solutions are used.

In relatively low-noise environments, sub-floor joists can be insulated from supporting materials by "pads." This, together with the use of rugs and rug pads on the floor, will screen out a moderate amount of exterior noise.

Floored By Floor Noise?

However, when conditions demand a better method of sound control, studios are "floated" on springs. This is a much better, albeit much more expensive solution. The author worked in a television studio a number of years back which was located directly above a printing press for a daily newspaper! Using the various sound control approaches outlined, including the floating of the entire studio on springs, the presses were

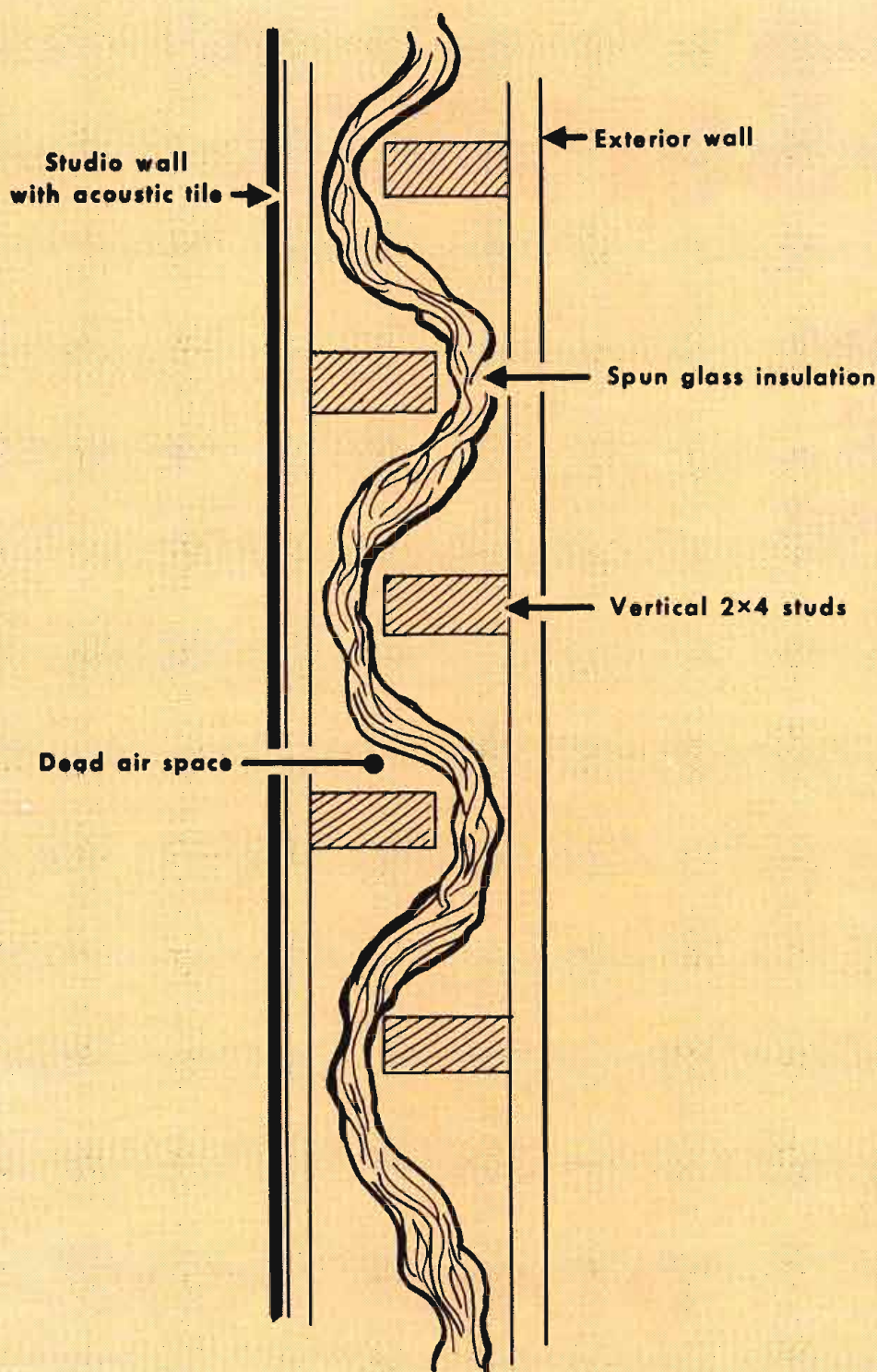


Figure 1. This drawing shows how the inner and outer walls can be constructed for sound insulation.

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not detectable with studio mikes. When the studio was originally being designed, there were quite a number of skeptics who said "it couldn't be done," since no practical design could cope with such a great noise level. However, through the very careful insulation of the studio in every way from the rest of the building, the studio ended up being a room "floating" within a room, with no detectable sound being conducted between the two.

Studio windows are a potential weak spot in the control of sound because a normal piece of glass will allow a significant percentage of sound to be transferred through it. It has been found that the use of thick, double glass windows in

studios greatly reduces sound transference. Commonly, two sheets of glass of different thickness are mounted about three inches apart. It is also desirable to tilt the entire window assembly about twenty degrees toward the ceiling or floor to reflect sound waves within the studio into sound absorbing materials, and to control undesirable reverberation and echo effects.

In high noise areas, or where very high standards of silence must be maintained, the window assembly illustrated in Figure 2 should be used. Here, two double windows with a dead air space between are used. Each set of double glass windows comes factory assembled and completely sealed. When two

sets are mounted together at a twenty degree angle, a very substantial barrier against relatively high-levels of sound can be created.

Constructing the frames to hold these windows can be tricky, since the previously-discussed principles of no direct conduction between the walls should be followed while at the same time remembering that (1) these window assemblies are quite heavy, and (2) the dead air space between the double sets of windows will have to be sealed from dirt. (It would be impractical to have to regularly tear out one window to clean the interior surfaces!)

Another possible problem area in a studio is the door or entrance way. Normal commercial doors, depending upon their construction and thickness, are generally not very effective in blocking out sound. If a single door is used for the control of low levels of exterior noise, the sound insulating qualities of the door can be "beefed up" by attaching acoustic fiberboard squares to both the inside and the outside of the door. This generally doesn't do very much for the looks of the door, but it will make it into a more effective sound barrier, especially if precautions are made to see that the door seals completely around all four sides when closed.

A much better solution is to use a double door sound lock, such as illustrated in Figure 3. In low exterior noise conditions this design will allow someone to enter or leave a "live" studio, and in high noise situations, when both doors remain closed, the design again provides an effective "dead air space," which, of course, represents a highly effective sound barrier.

Sound Control Within a Studio

Assuming that the studio is adequately shielded from unwanted outside sound, the next consideration is sound control within the studio. In the early days of radio, studios were generally constructed to be acoustically "dead." Almost every surface within the studio was either sound absorbent, or designed to reflect sound into some nearby absorbent material. Speaking in one of these studios was equivalent to talking to yourself in a deserted, open field on a very quiet night.

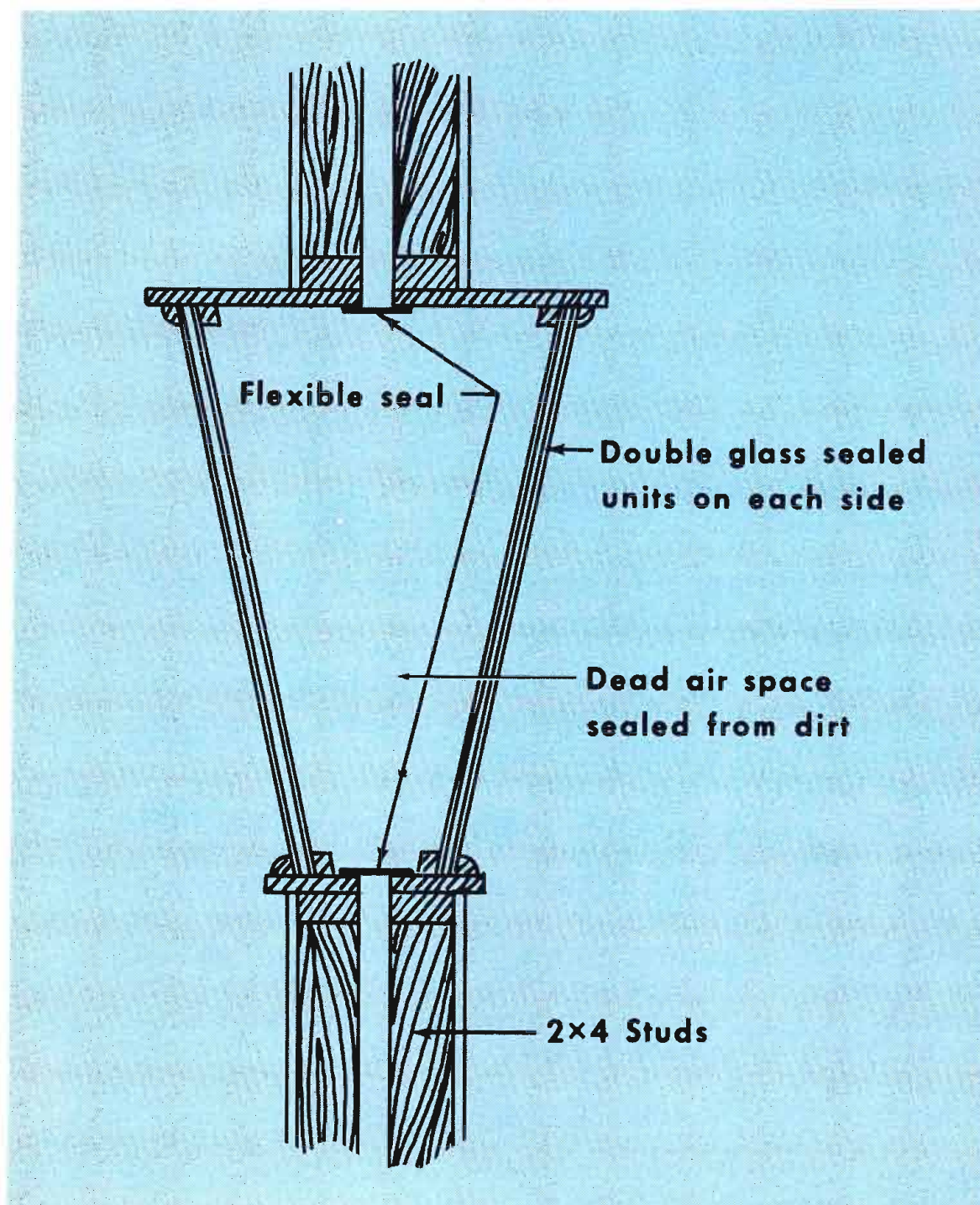


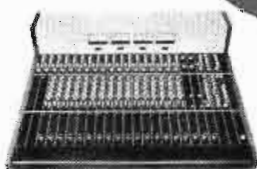
Figure 2. This is a detail drawing of the double glass separation between studios. It's designed for noise isolation in high noise areas.



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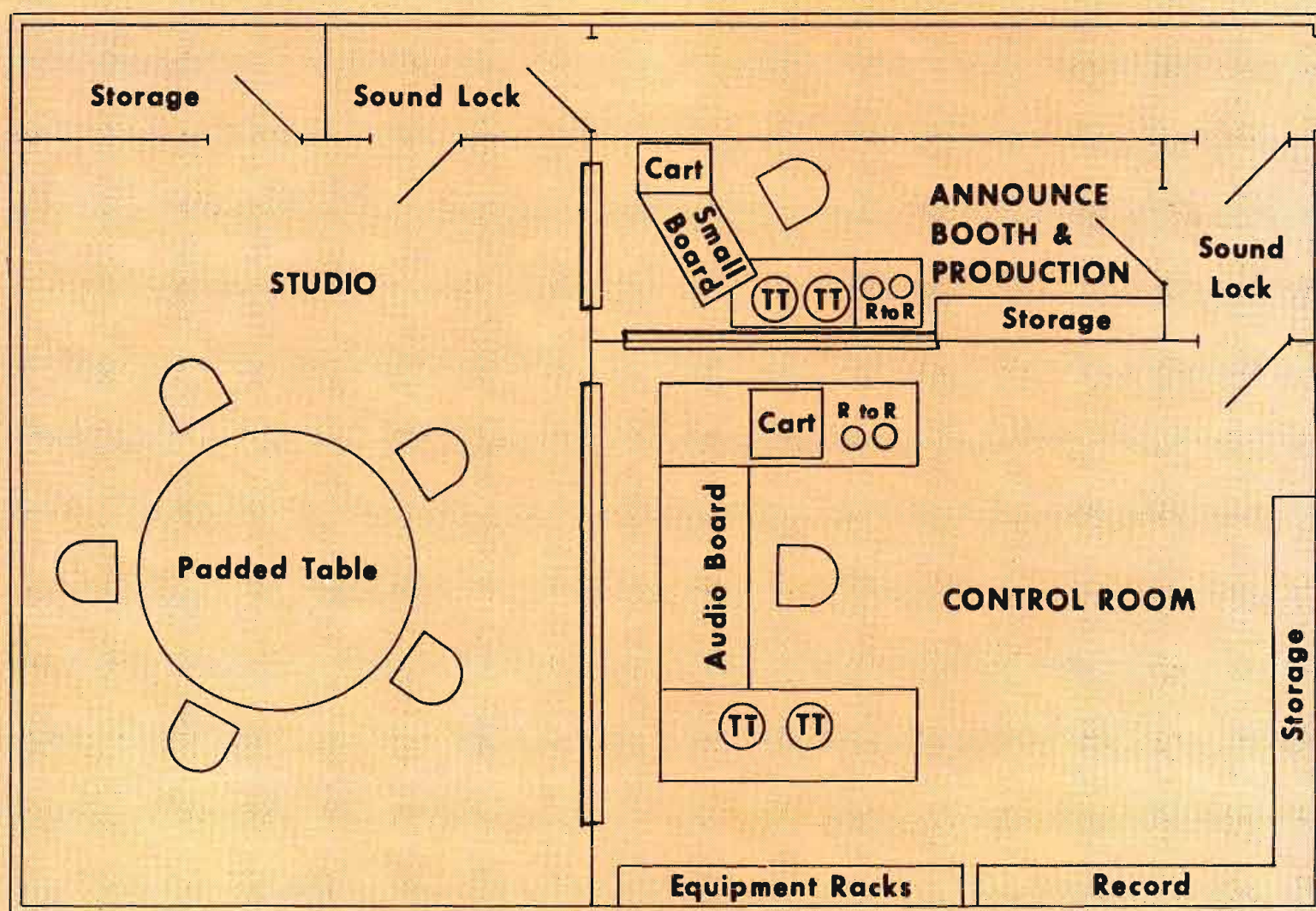


Figure 3. This is typical of a small station facility. Note how sound locks work to allow someone to enter a studio without letting in outside noise.

The effect was most unnatural and, as later studies on listener's preferences proved, undesirable. Radio listeners used to normal room acoustics for conversational speech prefer a slight bit of acoustic "life" in audio. This is especially important with most music.

This slight reverberation or "life" can be added in two ways. Probably the easiest way is through the use of reflective surfaces within the studio. To find a good example of balance between "life" and "dead" acoustics, you generally don't need to go any further than the nearest living room. This assumes the particular living room does not have an undue amount of absorbing materials present (such as heavy drapes, etc.) or that it doesn't contain a bare tile floor or uncovered, smooth, hard wood walls. A sharp hand clap can be used as a rough test of acoustics. If the sound is dull and lifeless, the room is probably too "dead." If the sound has a "ring" to it, it is too "alive."

Often, audio engineers prefer to

use a relatively dead studio and add the desired amount of reverberation electro-mechanically. In the case of a musical group, a dead studio will reduce the amount of interference between instruments during the original recording session. Each instrument is recorded on a separate audio track, and later the instruments can be balanced through audio mixing, and the proper reverberation added. This procedure is followed much more with popular music than with classical.

"Dead" studios are also preferred in television and film production. Because the mikes are commonly used at greater distances (somewhat reducing the "dead" effect), ambient production noise is always a problem within the studio. The more acoustically "dead" the studio is, the fewer problems there will be with unwanted, behind-the-scenes noise.

Even Suspect Lights

Fluorescent lights also are a problem. Studios have found that

the 60 Hz noise from the lights can be picked up as directly-induced interference, or as an audible "buzz." Special fluorescent light fixtures are available which will eliminate this problem. Recently, one studio which had not foreseen the fluorescent light problem in the original design of the studio, had to convert all their lights to regular incandescent lights to solve a noise problem in their recordings.

Most other types of unwanted studio noises are easier to eliminate. Rugs should control the sound of moving feet. For performers who have not learned to quietly shuffle scripts or music pages while "on mike," paper noise can be a problem. Sometimes things which would go totally unnoticed in normal situations, will be a problem in the "super quiet" conditions necessary for a studio. In one instance an electric clock contributed unwelcome noise to a significant "pregnant silence" in a dramatic production.

(Continued on page 34)



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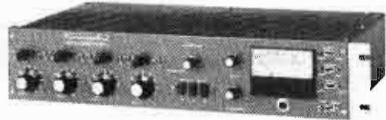
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Sound studio

(Continued from page 32)

Table tops should be covered with a sound absorbent material such as felt. This will eliminate both the reflected sounds and surface noise caused by setting down a stop watch or pencil, or the accidental "clunk" of a bracelet or wristwatch.

Equipment Noise

In the majority of radio stations, the announcer serves in a "combo" capacity (a combination announcer and operating engineer). In these situations all the necessary audio equipment should be silent in its operation so that it can be close to the announcer without being picked up by the mike. Most broadcast audio cart machines and turntables are silent in their operation. Problems with noisy equipment can be helped by removing it from the region of microphone sensitivity. This can be done by using a directional mike and putting the offending equipment in a "dead" area, or by removing the equipment from the immediate area of the mike and operating it by remote control.

A Typical Small Studio Facility

Figure 3 illustrates a typical studio which would be appropriate for a small to medium-sized radio station or audio production facility. The basic production and operations area is represented by the Control Room. In a radio station situation, about 80-90 percent of the hour-by-hour operations would be produced here. Commercial production could take place in the Announce Booth and Production area. Typically, "second voice" live inserts, such as news or sports, would come from this second area. The basic announcer-operator on duty in the Control Room would just switch to the mike and board in this area for such programming.

The area marked "Studio" would be reserved for round table discussions and the production of multi-voice commercials, etc. This would undoubtedly be the least used area in most situations; and, in fact, some would probably

consider this area a bit of a "luxury" for a small radio station.

Note that each of the three "microphone areas" is protected by a double door sound lock. The three specially-designed windows provide a view between the three areas so that hand signals, etc. can be easily observed.

Note that both the Control Room and the Announce Booth and Production area have complete production facilities which can work independent of each other. In an "on air" situation, the Announce Booth and Production area could be used to produce commercials and special program materials without in any way disturbing the ongoing operations from the Control Room. The mikes in the Studio could be controlled in either of these areas. Also, in the unlikely event of a board or equipment failure in the Control Room, the "on-air" operations could be completely shifted to the Announce Booth and Production area.

Basic Production Equipment

You will note from Figure 3 that both of the production areas have two turntables (a minimum for each), a reel-to-reel tape machine, record and playback cart (audio cartridge) machines and an audio board. For complex production requirements, the equipment in the two areas can be used together, if necessary, in a single production. This might be necessary, for example, if one reel-to-reel program were immediately followed by another. For this purpose the machines should have remote controls in each of the production areas to avoid the need for a second operator.

To sum up, it should be remembered that entire books have been written on construction techniques for sound insulation and acoustics, not to mention the topics of studio equipment and facilities. The information which has been presented in this article is intended only to provide a general familiarity with studio design and facilities. Interestingly enough, however, even these very basic concepts have regrettably been overlooked in the design of many studios. A little time, money and consideration of these basic principles can go a long way toward improving quality in an audio studio.

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In many ways the new AM Allocation Rules as set forth in FCC Docket 20265 remind me of a Monopoly Game. In effect we go back to 1964 and try again.

Docket Number 20265 contains some 27 pages of text plus two lengthy Appendixes. But what delights me the most is the response that resulted from the Broadcasting Industry on this sensitive issue of new and modified AM allocations. A total of 273 pleadings were filed bearing directly or peripherally on the matter under consideration. In addition in excess of one hundred letters were written to, and replied to by, the FCC in regard to these new AM Rules. This Docket must set a record both in the volume of replies and comments, as well as the swiftness with which it was concluded.

Past Allocation History

Prior to 1962 when the FCC applied its first AM freeze, allocations were handled much the same for some thirty years. New night-times were granted if they provided a "first" local service to any city not having its own licensed local service. Daytime stations were granted, regardless of how many stations might already be licensed to a given city so long as they did not cause **much** interference to an existing station, and so long as they did not receive more than 10 percent population loss to their own 0.5 MV/M service area. Surprising-

*Consulting Engineer, La Grange, Ill., and consulting editor for Broadcast Engineering.

ly this method worked very, very well.

The outcome of the 1962-64 freeze on AM applications was formulation of the new "go, no-go" rules. Surprisingly the FCC has stuck to this concept. The first local concept was taken out of the rules for nighttime. One could only have nighttime if they were proposing service to a white area in population.

In 1968 a second freeze was implemented by the FCC against AM applications. The outcome of this 1968-1973 freeze was the development of equality between AM and FM. Plus the instance that applicants had to apply for new FM channels in a given community, if

an FM channel was available. AM could only be applied for when there was no FM and when there was less than two aural series of city grade service to the community. This second lifting of the freeze continued the policy of no nighttime grants to "first" local service, but restricted them to white area or population only. The 1968-73 freeze also put a virtual lid on any change by existing stations, unless demonstratively they served less than 80 percent of their principal city.

Comments Received

The majority of comments received by the FCC favored a relaxation in the former restrictions on applications. Most cited problems such as urban expansion, population growth, increased viability of FM, as well as non-availability of transmitter sites as reasons for need to improve their facilities. Still others talked about "sub-suburbanization", i.e. a community, previously considered a suburb of a major urban center, which has now become its own major population center independent of the urban center, surrounded by its own sub-suburban communities.

Several parties suggested that new AM assignments, power increases and frequency changes authorized by other North American countries warranted similar action by the United States, in order to prevent the possible de-

Reviewing the new AM Rules

TABLE I

Type Application	Requirements of New Rules
New Daytimer	Must be 1st or 2nd aural service to community.
New Fulltimer	Must be 1st or 2nd aural service at night, regardless of number of daytime aural services.
Existing Power Increase	Can be done if no new objectionable interference results.
Existing Changes in Freq.	Can be done if 1st or 2nd aural service to community

terioration of our own AM service as a result of the increase in foreign signals.

Approximately 108 comments were submitted in connection with the subject of new AM assignments, and particularly, new nighttime assignments for existing daytime-only stations. The general need for broader full time service in various parts of the country was one of the factors most often mentioned. And that a "local" nighttime service is necessary, and regardless of technical considerations, **some** nighttime coverage is better than none at all. Some parties pointed out that the needs and problems sought to be answered by daytime programming do not go away at sunset.

It was suggested by several parties that to relax the rules governing power increases without equivalent treatment for frequency changes would be illogical. Still others asked for a "post sunset" authorization, modeled after the existing pre-sunrise rules.

307(B) Policy

Approximately 67 parties dis-

cussed the revision of the "Suburban Communities" policy. Many concurred with the FCC's notice in that: "Continuation of the present policy would appear to countervail the more liberal allocation policy which is the heart of this proceeding." Most of the parties suggested that this 307(B) policy is not a beneficial rule.

It was submitted that the nature of many suburban areas is such that the problems and needs of city and suburb often merge, and to set up a barrier to service to the whole area is an unrealistic, inefficient use of the AM Band, and it frustrates the goal of maximum utilization of the spectrum. It was also pointed out that the 307(B) policy unreasonably discriminates against AM broadcasters in favor of FM and TV licenses.

Finally, abandonment or relaxation of the policy was seen by many as a way to increase competition among broadcasters while easing the administrative burden on the Commission. A small number of parties, suggested that the 307(B) policy should be applied only in

hearing cases, "as originally intended."

Other Matters

Several comments, some of which proposed generally that the FCC's allocation rules should take into account the need for unique, specialized or minority program formats. Some suggested specific exemptions to the present rules and sought codification of these exemptions as sub-sections of Section 73.37(e). Others were less specific, and would apparently approve of consideration of "need" as a basis for a case-by-case waiver of the rules.

Discussion

This FCC proceeding was intended to be quite limited in scope, concerning itself primarily with possible amendments of Section 73.37, that portion of the AM Rules which establishes the criteria governing the acceptance of applications for new and changed broadcast facilities. In addition to standards either set forth in or referred to, which prescribe the permissible limits of inter-station interference, this section establishes various other



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requirements aimed at controlling the direction and pattern of station growth.

The FCC Rules contained in 73.37 were formulated in 1973 on the basis of an assumption that, at the rate of growth in the number of stations then current, the AM band was approaching saturation, without a sufficient attendant improvement in the provision of service to areas and communities without adequate service. Accordingly, these rules were designed to restrict the assignment of new stations, and increases in power of existing stations, to situations where the addition of new facilities or the augmentation of existing facilities would result in the improvement of clearly inadequate service. The rules also, for the first time, fully equated AM and FM as a single aural service, and accorded priority to FM where channels were available on which new services could be established.

The FCC reviewed the rate and pattern of station growth during the period of the last two years, which has elapsed since the present rules

were adopted. The FCC said, it seems reasonable to consider the ways in which the present rules may be relaxed, so that while station growth will still be held within reasonable limits, service objectives of somewhat lower priority may be attained.

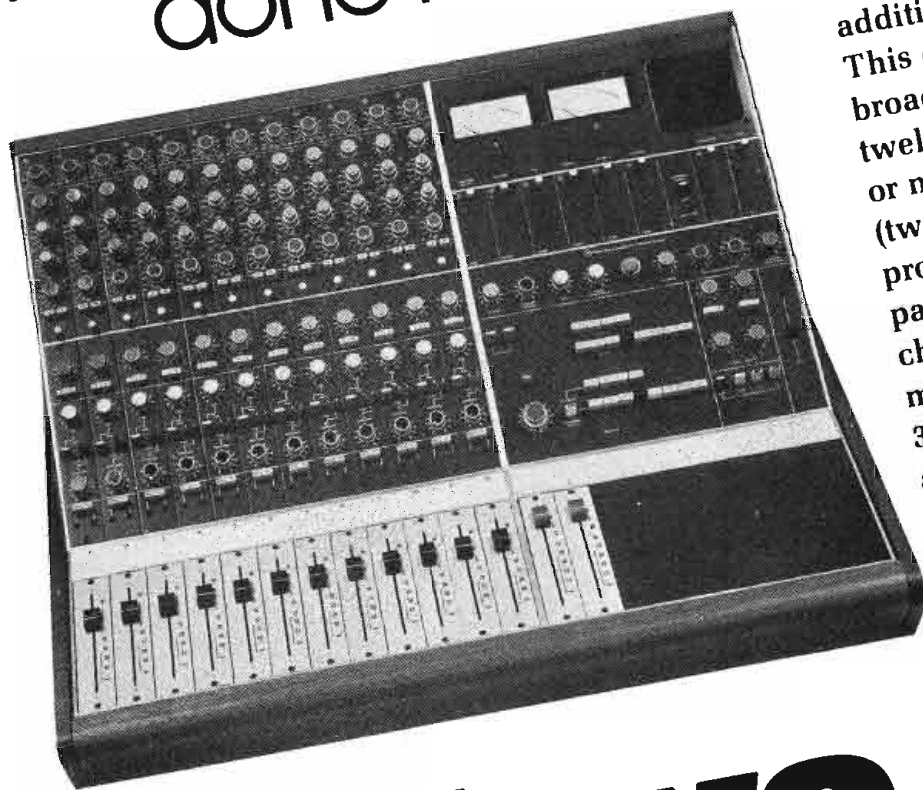
For about 21 months, since the 1973 rules went into effect, a total of 113 applications for new or augmented facilities were accepted, with 59 being granted. Of these 59, 31 were for new daytime service, while 17 provided new nighttime. The FCC said that while they were encouraged to see this many facilities had been able to meet the service objectives set forth in the present rules, it was evident that these rules were so restrictive as to have slowed the rate of station growth to an unnecessarily low level. And that a considerably higher rate of growth may be accommodated without an immediate or even distant danger of AM saturation. This fact most engineers could have told the FCC years ago.

The FCC proposed to remove certain of the present restrictions

on increases in power of existing stations. This was because the FCC believes it would be a relaxation which would promote an early improvement in broadcast service.

The FCC noted that those proposals which were filed that contemplate some compromise in their present rules controlling interstation interferences should be tolerated, in the interest of facilitating power increases, they rejected. They stated that the Commission has no intention of reverting either wholly or partially to the kind of situation which existed prior to 1964 when the rules permitted the imposition of interference to existing stations on the basis of a showing "that the need for the new service outweighs the need for the service which will be lost by reason of such interference." Under the pre-1964 rules, the erosion of the service of existing stations to out-lying areas proceeded apace, until brought to a halt by the 1964 adoption of the "go, no-go" rules. As most readers know, these were the rules which prohibit the overlap of service and

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interference contours.

New Power Level: 2.5 Kilowatts

Many parties offered proposals that would result in increased power, across-the-band for all AM stations. One unique proposal would allow nighttime power increases for all Class IV stations by implementing the installation of "tall" towers—approximately 5/8 wavelength in height—which could be expected to afford an improved ratio of groundwave to skywave signal. If this were employed by all Class IV stations, it would result in an actual increase in the nighttime interference-free area served by each station. The FCC rejected this appeal, and technically sound proposal, on the grounds of interference to foreign AM stations.

There are problems with respect to the NARBA Treaty, if a number of intermediate power levels were to be established. However, while the FCC did not undertake to adopt additional intermediate power classifications on any general basis, they did create a single new classification at 2.5 kilowatts. The ratio between the powers presently specified immediately above and below this level, 5 kilowatts and 1 kilowatt, respectively, is considerably greater than that which exists between adjacent values in other portions of the table in 73.41 of the rules. The provision of an intermediate step between 1 kilowatt and 5 kilowatts is not only logical, but useful. It will facilitate the maximum employment of facilities in instances where power greater than 1 kilowatt is feasible, but operation at the much higher power of 5 kilowatts is not. Furthermore, the adoption of the 2.5 kilowatt classification presents no treaty problem, since NARBA presently provides for this power step.

The FCC generally rejected, at this time, all those proposals which looked toward major changes in fundamental rules and policies regarding AM stations, and are adhering to their original intention of making only such amendments in 73.37, as will lower or remove certain of the barriers which it presents to the orderly expansion of AM service. The only exception is with respect to 73.41 of the Rules as noted earlier...and, as discussed subsequently, limitations in the

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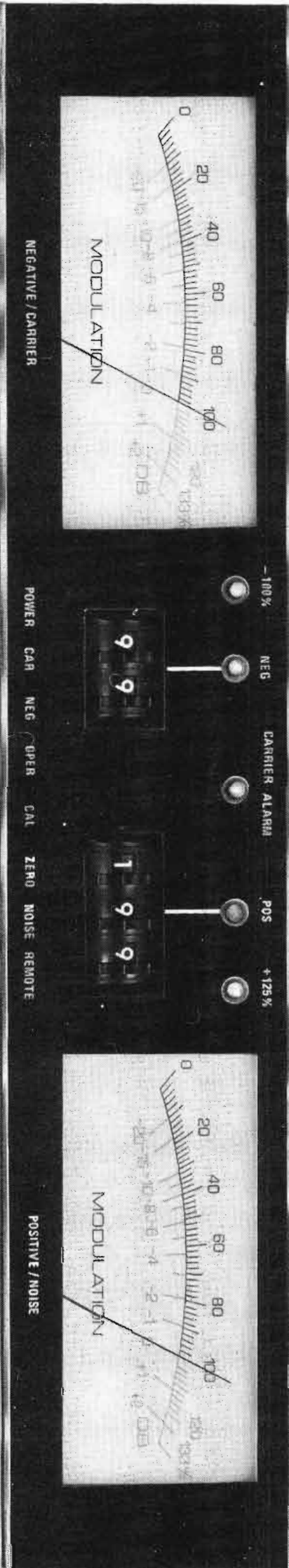
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sweep for the "suburban policy" as it applies to uncontested applications for new and augmented facilities.

A study of all the comments convinced the FCC of the wisdom of proceeding with the amendment of 73.37 so as to remove the special showings presently required by applicants seeking power increases for existing stations.

To accommodate, to the extent possible, the need for new daytime and nighttime transmission facilities for developing suburban centers of population, and to facilitate the provisions of truly community-oriented services to as many separate towns and cities as possible, the FCC altered its basic acceptability criteria to permit new nighttime or daytime assignments to communities which have fewer than two aural transmission facilities during the relevant portion of the broadcast day.

When the FCC last considered this matter, it determined that each community was entitled to two (but not necessarily more than two) competing aural "voices" and decided at that time (1973) that this complement of services would be considered to be attained if such services were provided by stations which were located outside, but sufficiently close to the community that technically good service would be provided, and that the program service could be expected to be oriented, to a considerable extent, to serve the needs of the community. This the FCC adopted even though they recognized that service provided to a community from stations not assigned to the community is not a fully adequate substitute for service provided by community assigned stations. The FCC accordingly raised its sights to permit such new assignments as are necessary to provide each community with two independent aural transmission facilities.

Thus, under the new rules, as revised, any application for a new daytime or unlimited time standard broadcast station, or for nighttime facilities for an existing daytime station will be accepted on the basis of a satisfactory showing that the community for which the station is proposed presently has fewer than two independent aural transmission facilities during the portion of the day for which the new service is

proposed.

As the new rules are being applied, a proposal for a new unlimited time station would be accepted, if it will provide a first or a second nighttime transmission facility for a given city, even though, during daytime hours, its operation might result in the provision of more than two transmission services to the community.

As an alternative, the FCC is continuing to maintain, as an alternative showing to the above, a demonstration that at least 25 percent of the area or population served by the new station will, for the first time, receive primary aural service.

It should be emphasized that the FCC did not abandon its policy established in 1973, of considering both AM and FM in determining existing aural service. The FCC is still favoring FM, where channels are available, for providing new aural service. Certainly the promotion and extension of FM service to the greatest possible degree, the FCC says, is necessary if any substantial improvement is to be made in the extent of presently inadequate nighttime aural service, and that the public interest require policies directed toward this end. However, the amended rules continue to treat commonly owned FM and AM stations, assigned to the same community, as a single local source of aural service.

An application seeking authority to change an existing station to a new frequency, besides being subject to the same limitations on interference caused and received as would a new station applying for that frequency, must also meet those criteria designed to restrict the number of services available to the community to which the station is assigned. At first glance an existing AM station in a city having two aural services would not be eligible to change frequency, because there would theoretically make for one more than the number permitted of aural services. The new rules were not intended to support this kind of occurrence. Accordingly, the FCC amended the rules so that henceforth the acceptability criteria applying to applications by existing stations for changes in frequency will be the same as those applicable to power increases. Namely they must

demonstrate compliance with the "go, no-go" rules, and, for nighttime operation, demonstrate that objectionable interference will not result as determined pursuant to 73.182(o) of the rules.

The adoption of rule amendments which contemplate the provisions of two aural transmission facilities for each community should create opportunities heretofore unavailable for daytime stations wanting to qualify for nighttime operations. Undoubtedly many station owners were disappointed that the FCC did not relax its technical rules to make it easier and less expensive to engage in such operations.

The rules the FCC adopted in 73.37, particularly regarding nighttime operation, are less restrictive than any which have been obtained in the past 13 years. The FCC stated that to some degree they were concerned that the adoption of the rules may result in a too rapid proliferation of new nighttime assignments leading to an undue concentration of such facilities, with an adverse effect on overall service. The FCC further pointed out that they did not believe this will occur, but should such a trend develop, it may be necessary to reconsider its decision in Docket Number 20,265. In any event, the FCC will, on a continuing basis, review the rate and pattern of station growth under these rules. And should it appear that assignments of new stations and the augmentation of the facilities of existing stations are contributing too little to needed improvements in service to the public, in view of the attendant depletion of the resources of the AM band, they will institute further proceedings looking to an adoption of "corrective measures." Whatever that means?

Policy On 307(B) Considerations

As noted earlier, the continued application of the FCC policy on 307(B) considerations for standard broadcast facilities involving suburban communities would tend to countervail more liberal allocations policy which formed the basis for these rule revisions. However, for those uncontested applications swept within the broad reach of the presumption, it often resulted in unnecessary complications which

had served only to hinder the initiation or expansion of service.

However, over the past ten years, the FCC's experience has shown that any attempted abuses by uncontested applicants may be readily detected during review of the application. Nothing will be gained by retaining such applications within the presumption's scope. Although the FCC will not invoke the presumption, the factors underlying the original policy statement will continue to be of concern with respect to all AM applications. The essential element will continue to be the **intent** of the applicant with respect to service to the community of license. The FCC will focus on those facts and circumstances in each application which may bear on this question of intent. Applicants should be on notice (the FCC points out) that applications proposing power clearly in excess of that necessary to serve the proposed community of license and its immediately surrounding areas will be examined with care. The FCC will continue to accept the filing of objections by other parties who may seek to raise such an issue. Of course, the procedural requirements set out in those sections will be applicable to all parties.

Amendment Of The Rules

The FCC has, among other things, adopted and expanded the substance of the rule change proposed in its original notice. They did somewhat alter the organization of Paragraph 73.37 so that it established the basic interference standards which all applications for new facilities, or for major changes in existing facilities must meet. Since increases in power of existing stations and changes in frequency of existing stations are major changes (which henceforth will be subject only to these standards) applications for increased power or changes in frequency will be acceptable if they meet the requirements of 73.37.

The FCC revised the language of Paragraph (e) and succeeding Subparagraphs of 73.37 to eliminate the employment of the phrase "other than Class IV stations", which, it appears, has been a source of misunderstanding in the past.

(Continued on page 58)

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Automatic Tape Switching

By John Hitt/Chief Engineer, KSLA, Shreveport, La.

A large part of the material that is used on our local newscasts is recorded on video tape from our network newscasts. We found a need for having a cue tone on the tape that would cause our production switcher to switch out of

the tape and back to a preset shot, usually a newsman in the studio, without any effort from our director.

We first devised a very simple circuit consisting of a transistor and a relay that would close, switching

a preset picture on the air when there was a tone on the cue track. This worked fairly well and we used this system for several years. But when we built our new studios two years ago, we decided to update our cue-out system.

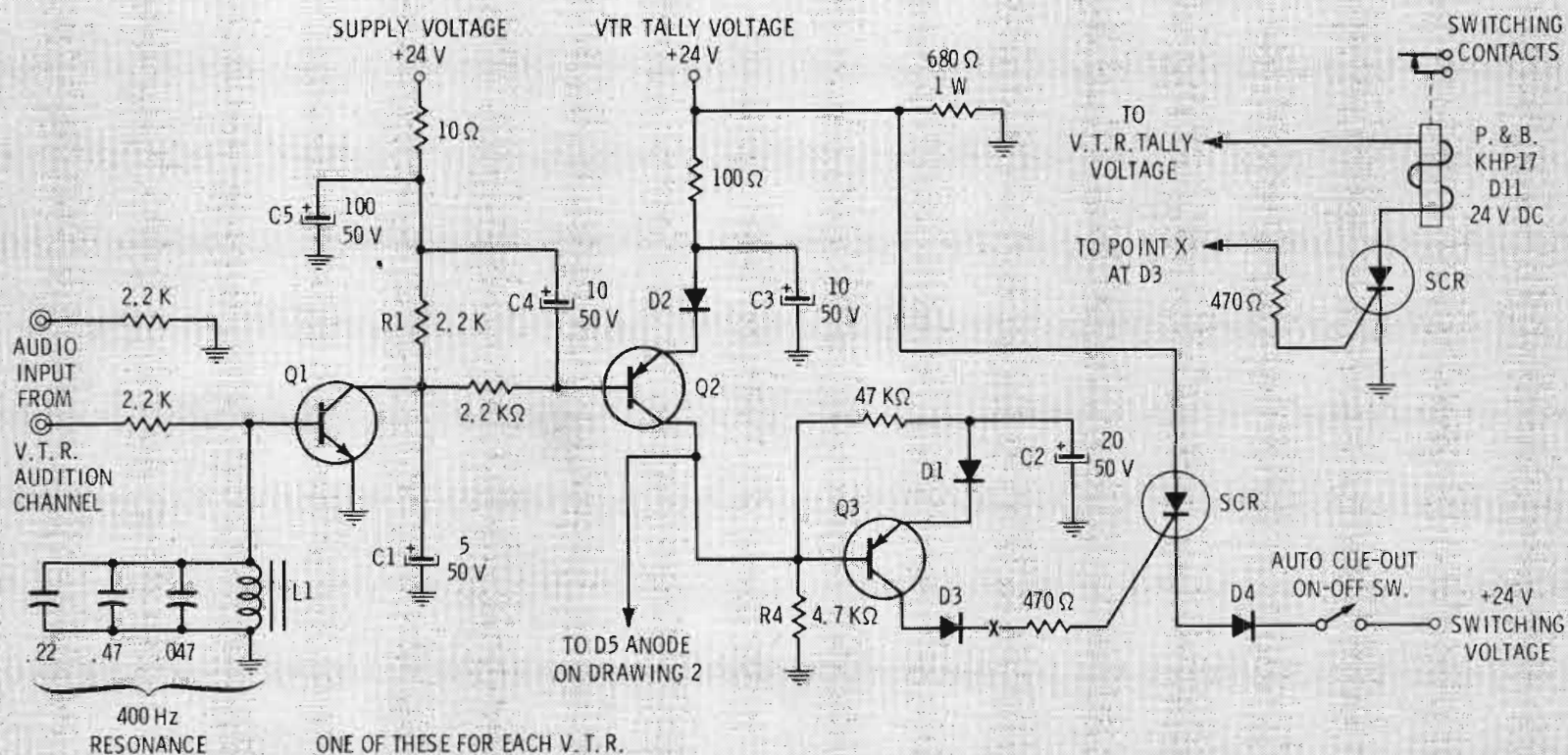


Figure 1. This is the schematic for the KSLA system. Note that connections are called for between Figure 1 and Figure 2.

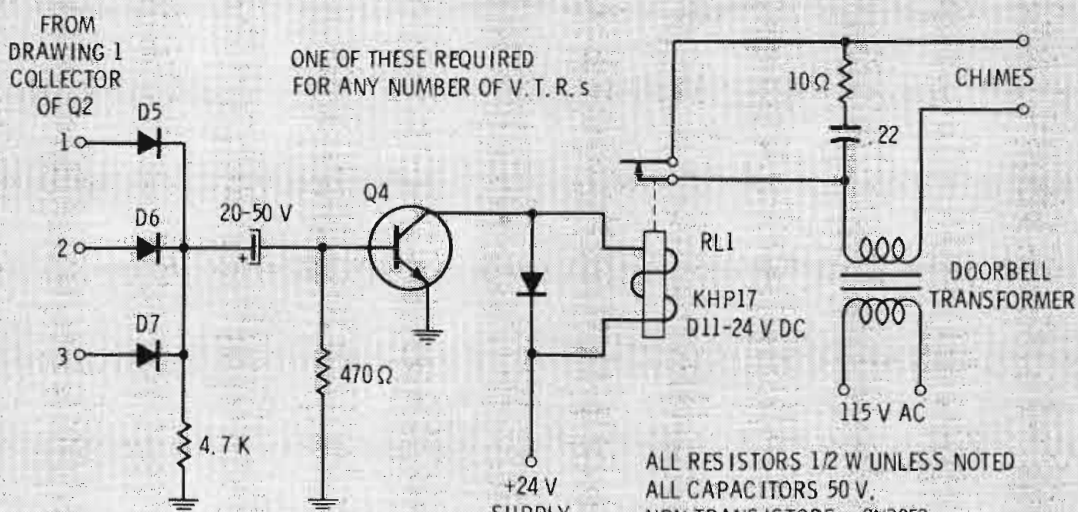


Figure 2. Warning chimes schematic.

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We felt that an automatic standby signal would be desirable, as occasionally a newsmen would not get a standby and his camera would come on without him being prepared. Our new system gives the crew a five second standby using avon chimes located at the VTR area, production control room and studio. And, yes, the studio chime is interlocked with the microphone relays.

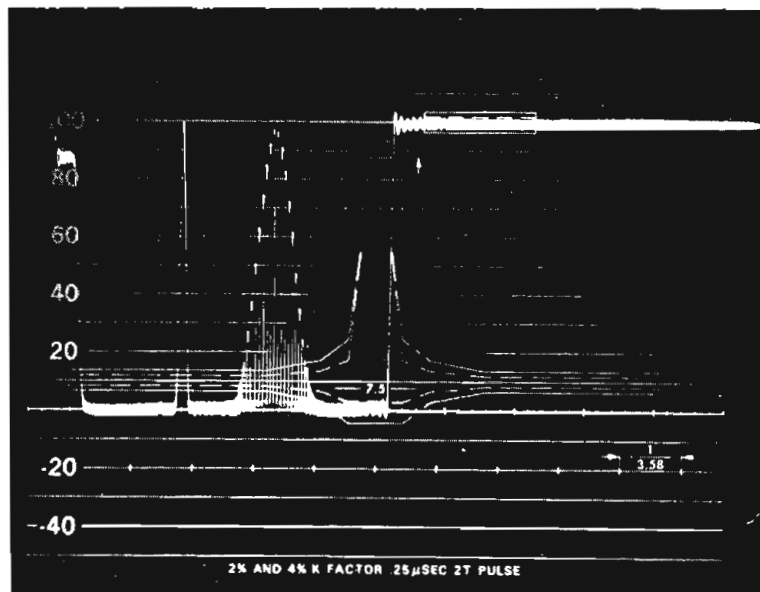
We wanted to make the system all solid state and as reliable as possible. With our old system a momentary high amplitude noise pulse would sometimes cause the cue-out relay to close. Our new system requires at least a two second 400 Hz tone of at least -5VU amplitude and then the cue occurs at the end of cue tone. We put cue-out tones on all of our local interview and insert tapes as well as network material. The start of the tone is used to sound the chimes. This system has been in use for two years and has been extremely reliable.

Slow Switching

Before we started using our automatic cue system Walter Cronkite would occasionally show up on a local newscast due to a director being a bit slow in switching out of a news story. Our News Director is very sold on our auto cue system as the above never happens. Cueing out the news tapes does not take very long after becoming accustomed to doing it. A five second tone is recorded on cue track at the end of each news tape.

We do some news tape dubbing and editing, but this is time consuming and due to a heavy production tape load we usually run the original news tapes on the air. An ON-OFF pushbutton for each VTR is on the production switcher panel for enabling the cue-out system. Our switcher has a cut-bar so the +24 Volts from the cue-out system is routed through the ON-OFF switches to the cut-bar.

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with any video switcher which has momentary type push-button switches for switching. If +24V will not switch other switchers, a relay can be inserted in series with the anode of SCR and its contacts used to parallel those of any pushbutton switch that is desired to be switched "on" at the end of news tape. This is shown in the drawing at the upper right of the schematic. Our system is used with RCA TR22, TR70B and TR70C recorders and our video switcher is a Vital VIX100.

System Description

A description of the system follows: With no signal (400 Hz tone) at base of Q1, Q1 is not conducting. This allows R-1 to charge C-1 to 24V. This +24V appears at base of Q2. Since Q2's emitter is +24V, Q2 is not conducting and its collector is zero voltage. Since there is no voltage at Q3, SCR1 does not conduct. So much for no signal. With a 400 Hz tone at base of Q1 (other frequencies are rejected by the 400 Hz parallel resonant filter) Q1 conducts causing C-1 to discharge to approximately ground potential and C4 to charge



John Brewer hits the cue tone button on the VTR. He's cueing tapes for KSLA-TV news.

to 24V. With +24 Volts on the emitter of Q2 and Q2's base going to ground through a 2.2K resistor base current will flow. This causes Q2 to conduct and put approximately +24V on the collector of Q2. This voltage appears at the base of Q3 but no current flows at Q3 because the emitter is always less negative than the base (PNP transistor).

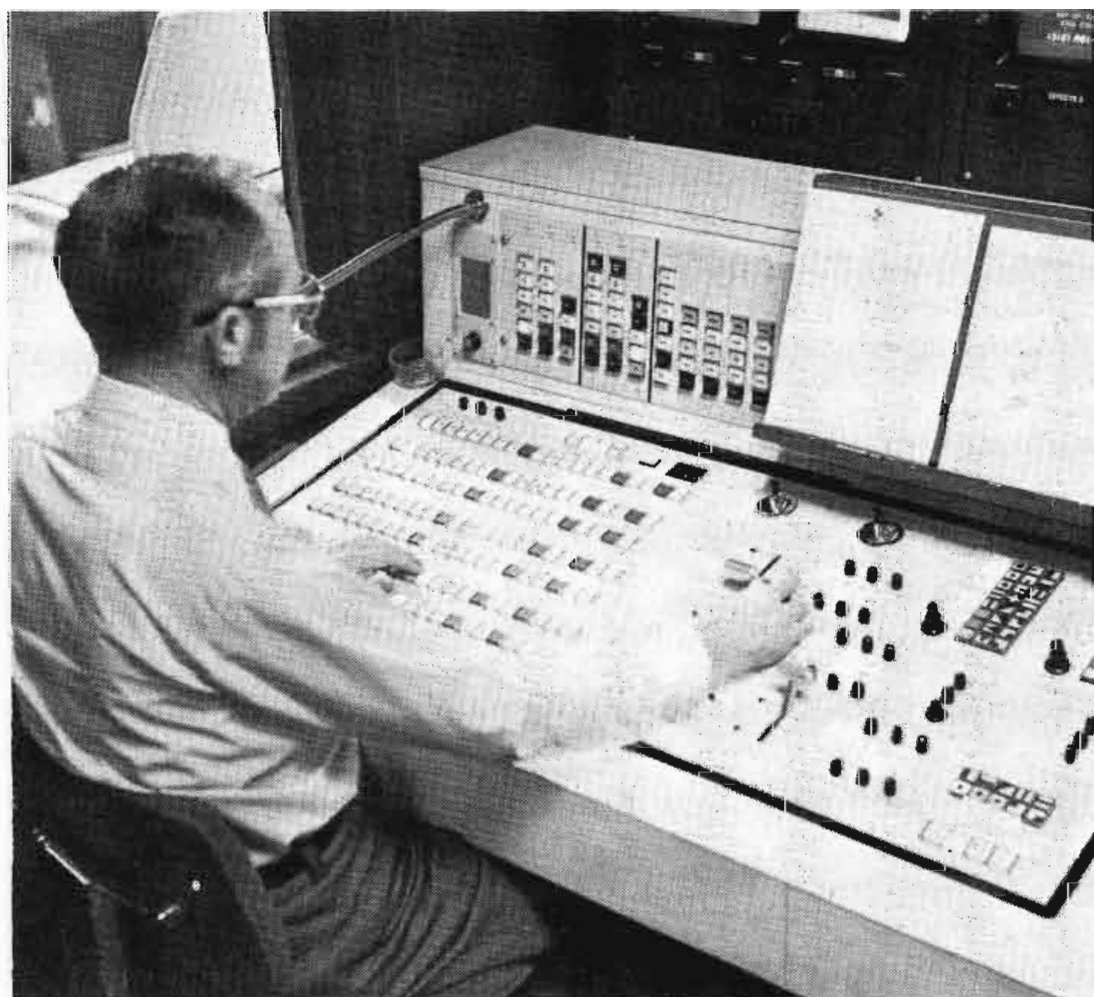
With +24V at the junction of R3 and R4, C2 begins to charge. After two to five seconds C2 is charged to near +24V. We use a five second cue tone so at the end of a five second tone (no signal condition as described above) the +24V suddenly drops to zero at the base of Q3.

With forward bias on Q3 (+24V at emitter and ground on base through 4.7K base to ground resistor), Q3 conducts and connects C2 with its +24V charge, to the trigger terminal of SCR1. This fires SCR1, causing it to put the 24V tally voltage supplied by the production switcher on the cue pulse line. This + voltage causes the switcher to switch from PRV to take.

Having preset a camera source on preview, the camera source is

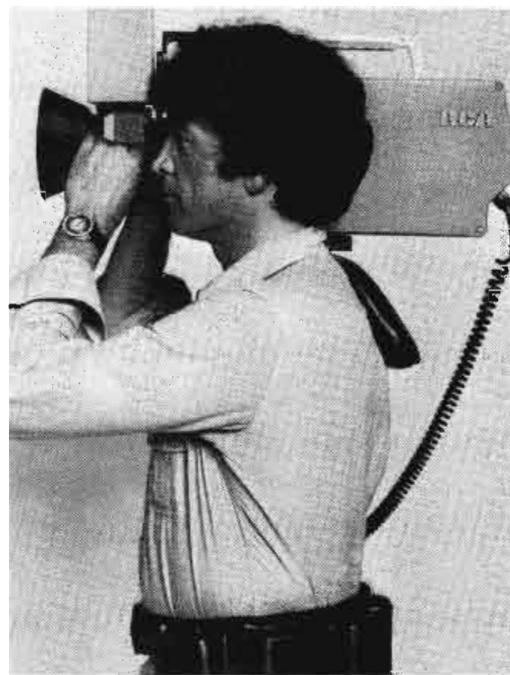
now on the air. Since the video tape is no longer "on air" the tally voltage no longer appears at the anode of SCR-1. This causes SCR1 to turn off, and it will remain off until: (1) tally voltage again appears at SCR1's anode and collector of Q2; (2) a 400 Hz tone appears at base of Q1 for at least two seconds, and (3) this tone has to then go off. At this point the cue-out voltage appears at cathode of SCR-1. C-1 filters out the 400 Hz signal at Q1's collector. Without C-4 even an extremely short dropout on the cue track to tape could dump C-2 charge into SCR's trigger anode causing premature cue out.

Chimes sound at the beginning of a five second tone, giving a five second standby to all operating crew. Chimes are sounded at the beginning of the five second cue tone. That circuit operates as follows: diodes D5-D6-D7 supply +24V from each VTR cue-out system as above. Q4 conducts momentarily while C3 is charging and closes RL-1 which is connected to chimes located in Production Control, Master Control and Studio. The studio chime is, of course, interlocked with our microphones.



Cue On-Off buttons are on the main console on the top row.

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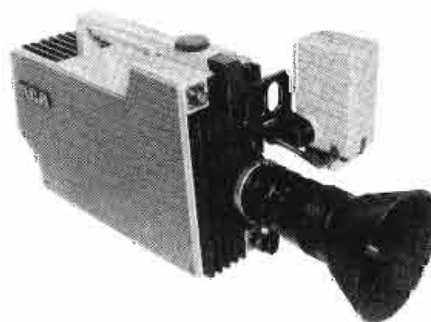
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Sal Raia, formerly with Visual and CBS Labs, has joined Pelco Sales, Inc., an old line closed circuit manufacturer. Raia will be their new national sales manager, operating out of Englewood, N.J.

Arthur H. Bernstone has been appointed Chief of the FCC Broadcast Bureau's Rules and Standards Division replacing **Neal K. McNaughten** who was named Assistant Chief of the Broadcast Bureau.

Attorneys **Gary S. Smithwick** and **Clifford J. Bond III**, formerly with the FCC in Washington, have formed a partnership, Smithwick & Bond which will practice general law and before the FCC. Offices will be in the National Press Building in Washington, D.C. Smithwick will maintain a branch office in the First Center Building in Winston-Salem, North Carolina.

Named as Director of Promotion for WMUK(FM), Western Michigan University, Kalamazoo, Michigan is **Richard Atwell...Walter E. Bartlett**, senior Vice President, television, of the AVCO Broadcasting Co., Cincinnati, Ohio, was elected as Chairman of the Television Board of Directors of the NAB and **Robert D. Gordon**, Vice President and general manager of station WCPO-TV, Cincinnati, was elected Vice Chairman.

Robert W. Sarnoff, Chairman of the Board of RCA Corporation, has been awarded the Medal of Commander of the Order of Letters and Arts from the Government of France, because of his outstanding and unique contributions to French-American cultural relations in the fields of music and television.

The following changes have occurred at GBC Closed Circuit TV Corp: **Stephen M. Lefkowitz** to president of the company...**Vincent Formicola** to executive vice-president...**Edward "Ike" Ickowski** to vice-president, engineering...**James P. Lisanti** to vice-president, finance....Due to the resignation of Michael A. Moscarello as president of International Video Corporation, **Donald F. Eldridge**, chairman of the board, has been appointed also as president and chief executive officer....Also at IVC, **Ronald H. Fried** has been elected executive vice president and chief operating officer.

Robert L. Schmidt, Washington attorney, has been named President of the National Cable Television Association....Capitol Magnetic Products has added **Larry C. Hockemeyer** as National Sales Manager, Professional Products....**Warren Happel**, formerly with RCA Broadcast Equipment Division joined John F.X. Browne & Associates, Inc., Bloomfield Hills, Michigan in their consulting engineering firm.

Receiving the EIA Distinguished Service Award at the EIA Annual Membership and Awards Luncheon October 8 in San Francisco will be **Wilfred L. Larson**, President of Switchcraft, Inc....**James Dow** has been appointed Vice President of Marketing for Pentagon Industries and its subsidiary, Universal Audio, Inc....**Thomas G. Schoonover** has been promoted to Manager, Television Sales, Harris Corporation, Broadcast Products Division.

NAFMB changes association Name to NRBA

The name of the National Association of FM Broadcasters has been changed to the National Radio Broadcasters Association, according to a statement made by Board Chairman Robert Herpe at the annual Membership Meeting of the Association today.

Herpe informed the membership that at the NAFMB Board Meeting on September 17th in Atlanta, Georgia, it was voted to change the name of the organization to the National Radio Broadcasters Association. "It is the consensus of the Board that our Association no longer should concern itself with just FM broadcasting, which has achieved parity with AM broadcasting," said Herpe. "We recognized that we as broadcasters share a mutuality of problems and concerns with broadcasters across the entire radio spectrum and that there is a need for an organization to give exclusive representation to radio."

He further stated, "The Board stressed that it is not our intention to compete with other broadcast organizations or duplicate their efforts. Moreover, we will continue to support further exploration of a proposed federation of broadcast organizations..."

"In the meantime," he continued, "we must act to protect the welfare of our radio industry and I have appointed a committee to recommend a new set of goals to be incorporated in the Articles and By-Laws of the Association. This committee is to complete its work within the next ninety days. High on the priority list of these goals is the support of a meaningful and acceptable license renewal bill."

Response to Herpe's statement by Association members who attended the meeting was unanimously favorable. Following discussion of the Board's action, a show of hands revealed no opposition.

Commission issues listings For drop-in proceeding

In response to a request for clarification, the FCC has issued a listing of the top 100 television markets for purposes of its VHF-TV drop-in proceeding.

The Commission said it would use the 1974 American Research Bureau Television Market Audience Rankings by Prime Time Households. The 1974 list, the FCC noted, contains 102 entries, three of which are tied for the 100th market.

The FCC said it would be appropriate in the rulemaking proceeding to use a unified approach as to what constituted the basis for determining the top 100 markets and that the identities of those markets should not change during the course of the proceeding.

On April 15, in response to a petition by the Office of Communication of the United Church of Christ, the FCC released a notice of inquiry instituting the VHF drop-in

proceeding. UCC had suggested addition to the Commission's Television Table of Assignments (Section 73.606(b) of the rules) of as many new VHF (very high frequency) television channels as technologically practical. It proposed for consideration the 62 channels the Office of Telecommunications Policy said could be inserted into the 100 major markets in the continental U.S.

On May 20, Clay Broadcasting Corp., licensee of WWAY-TV, Wilmington, N.C., requested that the FCC immediately issue a statement clarifying what markets would in fact constitute the top 100 markets for purposes of the proceeding.

Clay suggested it would be appropriate to continue the use of a unified approach as to what constituted the basis for the top 100 markets, that is, ARB's prime time households rankings.

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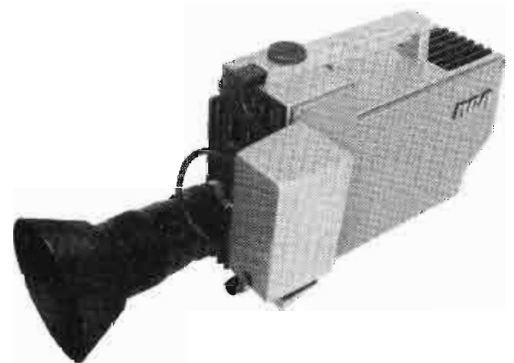
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bookreview

Television Measurement Techniques, by L. E. Weaver, is the one of a series of monographs on subjects of developing interest to electrical, electronics and control engineers. The aim of the series is to help engineers and teachers to keep up to date with advances in technology and to provide a compact introduction to each subject for graduate students.

The techniques and equipment employed for measuring and testing the signal chain are reviewed in this volume. Distortion, a discussion of the standards of picture quality are just some of the topics included.

The book is available from Pater Peregrinus Ltd., London, England.

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Lightning Protection, by J. L. Marshall, provides a lucid examination of lightning—its nature, effects, and principles of protection.

Its nine chapters discuss losses resulting from lightning, magnitude of the lightning discharge and the earth as a discharge terminal for the dissipation of lightning energy. General types of protective grounding systems and methods for measuring their effectiveness are also covered. Discussions about grounding communications towers and systems, protection systems for buildings and protection of power transmission systems are also included.

The book is a valuable resource for structural, electrical, communication, and broadcasting engineers and architects. In addition, it is also suited for supplementary reading in junior- and senior-level courses in civil safety and industrial safety.

Lightning Protection is available from John Wiley & Sons, New York, New York.

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The **FM Proof of Performance Manual** offered by Broadcast Engineering magazine is unique. It not only covers details of how to pull a mono or stereo Proof, it also includes pull-out forms that can be used to log and file the results.

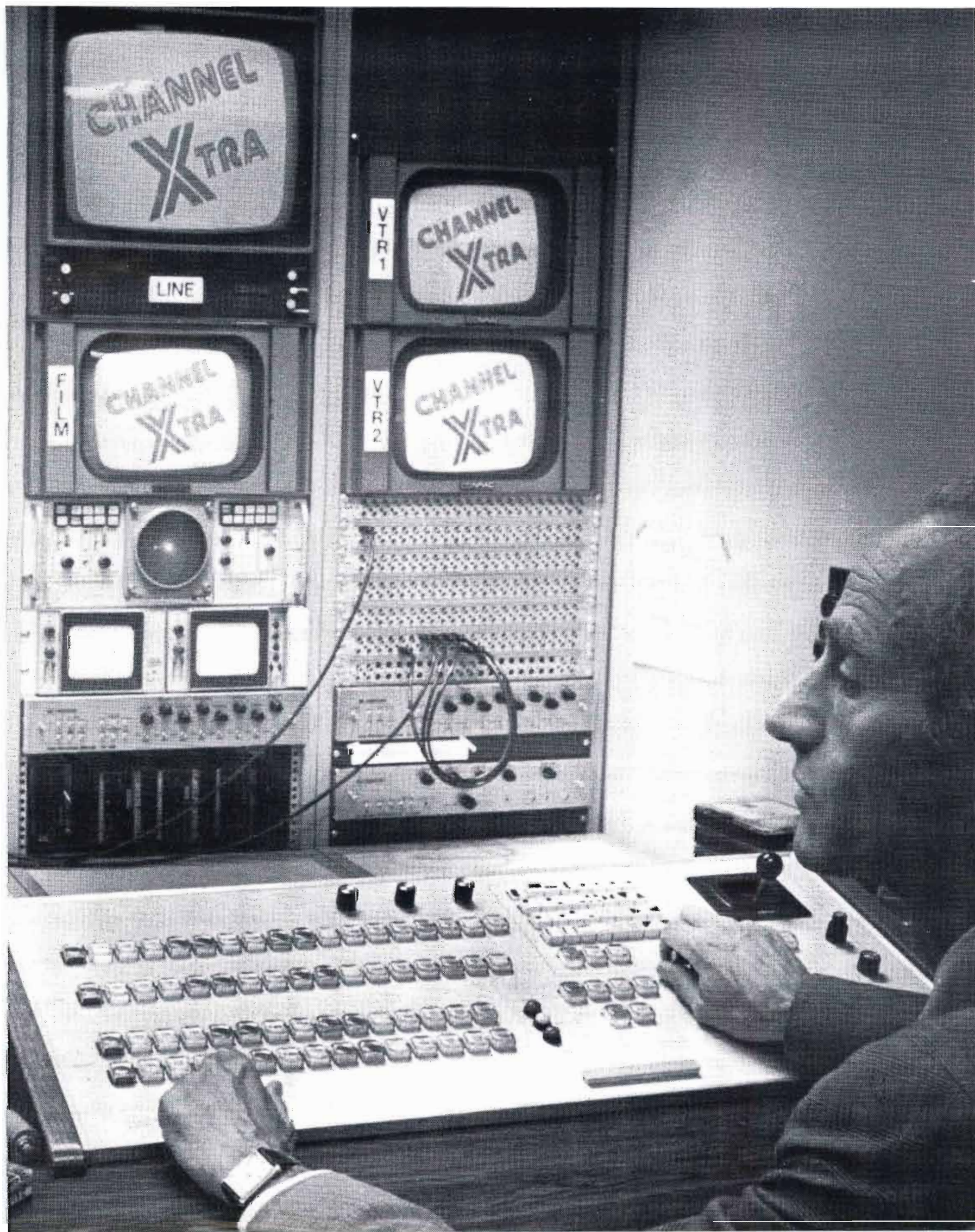
The manual includes ideas on how to pretest the station, and it goes into how to solve problems found in the station pretest.

The manual is designed to give the user a thorough understanding of the Proof procedures, provide a meaningful and time-saving method of pulling the Proof, and to help establish a standard for completing and logging the Proof.

The Manual is available through Intertec Publishing Corp., 1014 Wyandotte, Kansas City, Mo. 64105.

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CABLE engineering



A New Xtra For Chicago

Chicago's first broadcast Pay-TV channel, called Channel Xtra, will fill evening Prime Time with unedited, current movies—with a conspicuous lack of commercials. The announcement was made by William P. Rosensohn, president of Video Entertainment, Inc., the Chicago company which inaugurated Pay-TV operations there in August.

Initially, Channel Xtra will reach residents of high-rise apartment buildings, condominiums and hotels located within a 25-mile radius of the John Hancock building where the new channel's transmitter is located. To receive Channel Xtra, a building's management must arrange with Video Entertainment for rooftop placement of a microwave receiving antenna which is joined to the building's master antenna. First transmittal will be to residents of McClurg Court Center.

Subscribers pay \$10 per month for rental of a small decoding box which attaches simply to the TV set. Reception begins when the subscriber inserts a special key and adjusts the VHF band to the designated channel, which will vary from building to building.

12 Movies Per Month

At the outset, Channel Xtra will offer 12 movies per month, six of which will be new each month—and will attempt to balance movie ratings in relationship to audience demographics. Movie ratings will appear on a program advanced to viewers monthly. The decoding box's lock feature will permit parental control of movie viewing.

Rosensohn said programming will soon expand to include blacked out major sporting events, such as prize fights, ball games and tournaments, for which negotiations are already underway. Additionally, Channel Xtra's studio and remote facilities will one day include live and taped

special events, such as concerts and theatrical events.

Among the first movies to be offered locally—which an entire family and their friends can view for about 82 cents per film—may be such films as Shampoo, Alice Doesn't Live Here Anymore, The Gambler, The Conversation, Tommy, The Towering Inferno, The Exorcist, The Sting, The Stepford Wives. Others, such as movies like Nashville and Jaws, distributors may make available for Pay-TV programming soon after their initial movie-house runs.

Rosensohn said Video Entertainment expects to sign up 20,000 subscribers within the first year of operation, with a five-year projection of 100,000 subscribers.

"These figures are based on Pay-TV's success stories from across the country," Rosensohn said. "A movie-going couple could save about \$100 per month in ticket costs, taxis, concession stand items—more if babysitters are involved. Viewing at home, subscribers needn't be concerned with inclement weather, parking problems, noisy theatre patrons, or uncomfortable seats."

Pay-TV has, in its five year history, entered more than 50 U.S. markets, including most major metropolitan areas. The local ban on Cable-TV has prevented broad based Pay-TV systems here, since most rely solely on cable facilities.

Channel Xtra, a broadcasting company, became possible through a recent FCC ruling recognizing the need for a specialized channel not designed for the public. The new channel utilizes the license and broadcast capabilities of Multi-Point Communication Corp., and the studio facilities of Fred Niles Studios.

Improvements Across The Board

Rosensohn, a proponent of Pay-TV since its fledgling years, the early 50's, said subscription television "is emerging as a new and important television industry watchdog. By offering a first-class viewing alternative, Pay-TV keeps commercial channels alert to the tastes of its viewers, and improves programming across the board."

How It Works

Video Entertainment's Channel Xtra will beam current movies using a rather simple system. Movies (or other programming) will be transmitted via microwave from a local studio control center to a John Hancock building transmitter, then broadcast to high-rise buildings and hotels. Subscriber buildings will be equipped with a parabolic antenna. Signals will be relayed to apartments, passing through a decoding box affixed to each subscriber's TV set, and will appear on a designated VHF channel (which may vary from building to building).

Studio Control Center—A professional technician will monitor all programming, keeping picture quality stable. Many programs, such as feature films, shows and plays, video taped from remote locations, will be transmitted from video tape recorders. Live programs, such as sporting events, will be televised by Channel Xtra production crews. (Multi-Point Communication Corp., holder of the FCC license governing Channel Xtra, operates the control center located in Fred Niles Studios.)

Transmitter—As with most other channels, Channel Xtra will be transmitted from atop the John Hancock Building. Clear signals can be received anywhere within a

radius of 25 miles from this origination point.

Antenna—A special parabolic antenna, a saucer-shaped dish,—graded according to distance from the transmitter—is mounted on the rooftop of each apartment building, condominium, or hotel receiving Channel Xtra. Building management must arrange with Video Entertainment for placement of the antenna, which is then keyed into the building's master television antenna system.

NCTA calls Leapfrogging Restriction "counterproductive"

Leapfrogging restrictions, which limit the choices of signals that cable TV systems can import, are unfair and counterproductive, according to the National Cable Television Association. In its comments on the Federal Communications Commission proposal to review its leapfrogging policies, NCTA said that the "rationale for the leapfrogging rules is erroneous" and that "the rules should be eliminated entirely."

NCTA said that the leapfrogging rules now in effect "do not provide the public with the full benefits of CATV, but rather with less choice and less diversity." NCTA charged that the current rules, which are included in the 1972 FCC regulations of cable TV, "were enacted based on false presumptions."

The leapfrogging rules are restrictions as to which TV stations a cable TV system is allowed to import from a distant city. If it chooses to import an independent TV station, the CATV system may import the signal from anywhere, except that if it chooses to carry a signal from one of the 25 largest TV markets, the CATV system must choose a station from one or both of the two nearest top 25 markets.

The Brakes Are On

According to the NCTA analysis, leapfrogging rules have slowed or stopped the development of cable TV in certain areas of the nation.

Decoding Box—Microwave transmitters will be "decoded" to VHF frequency through an unobtrusive "little black box" (in this case, beige), about six inches square and two inches high. The box is equipped with lock and key to permit subscriber control of programming. When the key is turned on, and the dial tuned to the VHF channel designated for that building, Channel Xtra reception begins. For regular commercial channel reception, the viewer simply turns a dial on the decoding box.

This has been especially true in regions where potential cable TV systems would not have access to two independent stations in the same market. In addition, in some markets which do have independent TV stations, the programming on these stations consists of "specialty" type shows oriented toward religious or minority interest programming which may not be attractive to cable systems outside of that city.

Hence, NCTA found, new cable systems have largely been concentrated in areas which have clear access to independent stations which can be received from one microwave direction.

NCTA presented several maps to show that new cable systems are keyed toward cities with sufficient independent signals.

For example, in the East, of the 31 new cable systems since 1972, all but one import signals from Boston or New York City. In the West, San Francisco and Los Angeles are the major source of independent stations for 9 of the 10 new systems. In the Midwest, Chicago, Cleveland and Detroit independent stations are carried by 53 of the 66 systems authorized since 1972. And in the South, Dallas and Atlanta are the major sources for independent stations for 14 of the 21 new systems.

From this and related evidence, NCTA concluded that continuation of the leapfrogging restrictions would further hamper the develop-

ment of cable into many urban areas of the nation.

It's Too Vague

NCTA criticized the FCC for vagueness in establishing the leapfrogging regulation, since there was no substantial evidence that cable TV subscribers would be better served by requiring a CATV system to go only to the nearest cities for independent TV stations.

"It is not true that the closer distant station **will** have programming more likely to meet the CATV community's interest," NCTA said in challenging the FCC's contention that nearby cities would carry more pertinent regional programming.

"Our findings and analysis show that mere geographical proximity is **not** any basis on which to conclude that the closer station is offering programming more likely to meet the CATV community's interest more than a distant signal."

NCTA noted the FCC's earlier concern that CATV systems would rush to acquire signals from New York City, Los Angeles and Chicago if they could import stations from anywhere in the country. The FCC feared this would create a handful of powerful stations which dominated large regions of the nation. Such would not be the case even without leapfrogging restrictions, NCTA said.

Unwarranted Fears

NCTA termed "unwarranted" the Commission's "fears of super-stations resulting from unrestricted cable distant signal importation." In addition to the economic and technical limitations which would prevent cable systems from reaching cross-country for TV signals, several other marketplace factors would develop to encourage CATV operators to seek signals from nearby sources. Among these, NCTA said, would be the encouragement such policies would provide to independent stations for them to create innovative programming sought by CATV, which in turn would extend the broadcaster's advertising base.

To substantiate its claims, NCTA provided more than 100 pages of exhibits, including program schedules from 29 of the nation's most popularly viewed independent TV stations. In analyzing the program-

ming of these stations NCTA found that there was little or no "community interest programming (aside from news broadcasts) that would compel a cable system closest to any one station to select that station in preference to any other."

NCTA found that much of the programming on independent stations in smaller markets reveals a similarity of programming—syndicated shows and motion pictures—not unlike that of stations in the very largest markets of New York, Los Angeles and Chicago.

Related to these findings about signal importation is the effect which CATV carriage has upon the development of UHF television. NCTA contends that rather than

stimulate the growth of UHF stations, as they were expected to do, the leapfrogging restrictions actually have diminished the ability of UHF stations to grow.

"It is those signal carriage rules which prevent cable systems from obtaining the maximum number and variety of broadcast signals," NCTA said.

"In adopting a rule permitting cable systems to reach out and select stations from one or both of the two nearest top 25 markets, the Commission itself encourages cable systems to by-pass 31 of the nation's independent stations (or 33 percent) which are not in the top 25 markets."

NAB holds cable meeting

In its first meeting, the NAB Cable Radio Committee reviewed cable television's effect on various aspects of radio and called for the development of a comprehensive policy on the subject.

The Committee asked the NAB staff to produce a draft statement which the Committee may present to the NAB Board at its January meeting. The Committee asked the staff to examine the full range of radio-cable problems, including carriage of signals, origination, leapfrogging, FCC rules and forfeitures.

The Committee also asked the NAB staff to determine whether or not music licensing organizations

were collecting copyright fees from cable systems which originate oral programming.

William Sims, president, radio station KOJO, Laramie, Wyoming, said: "It was evident during this first meeting that the Committee could serve a very useful function in focusing attention on the radio aspects of cable operations and seeking fair treatment for radio stations."

Other members of the Committee are: Donald Thurston, president, radio station WMNB, North Adams, Mass.; Jack B. Chapman, president-general manager, radio station KGAK, Gallup, New Mexico.

Major study underway

A study that may revolutionize the broadcasting industry is underway by three major industry organizations.

The aim of the study is to determine the best method standard (AM) radio stations may broadcast in stereophonic sound.

The National Association of Broadcasters, the Electronic Industries Association and the Institute of Electrical and Electronic Engineers' Group on Broadcasting have established the National AM Stereophonic Radio Committee to determine criteria.

The Committee, organized at the request of the Federal Communications Commission, will study in detail the various systems for providing stereophonic broadcasts by AM stations and will report the results to the FCC.

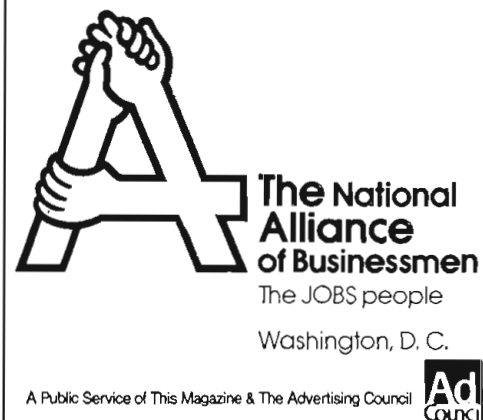
This action is in concert with the work performed by the National Stereophonic Radio Committee in the late 1950's, which led to FM stereophonic broadcasting, and studies now in progress by the National Quadraphonic Radio Committee, which is looking toward four channel FM broadcasting.



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NEW PRODUCTS

Low Noise Stereo Preamp

Burwen Laboratories now has available its latest high-fidelity component, the Model SP 5200 Low Noise Stereo Preamplifier, a fully professional unit having a number of unusual features and specifications.

The Model SP 5200 fulfills the necessary control functions for recording and monitoring, but does so with a high level of accuracy and with a dynamic range at 0 dB gain of 115 dB. The SP 5200 is an extremely linear, flat response amplifier, and also has provision for the connection of external signal processing devices such as a Dynamic Noise Filter and Program Equalizer in the record channel. A signal processor such as a Speaker Equalizer can also be inserted in the monitor channel ahead of the volume control.

The Model SP 5200 features a total of 33 signal input and output jacks, allowing for a wide variety of signal sources. The unit comes equipped with a five input monitor selector that allows listening to the signal source whether that source is processed or not, and also either of two tape signals. In addition, it is possible to tap in an auxiliary monitor input into the external signal processing chain.

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Stereo Console

The introduction of a new stereo console, redesigned studio furniture, distribution amplifier and automatic tape cartridge equipment was made at the 1975 NAB Show, Las Vegas, Nevada, by **LPB Inc.**

The S-12, 5 channel stereo console features the same standards of quali-

ty and flexibility as its larger 8 channel stereo counterpart. Davenport attenuators and Capitol telephone-type lever switches are teamed with solid-state plug-in modules. Two stereo inputs are available to each of the 5 channel faders. Channels 1, 2 and 5 are readily switchable to either mono or stereo inputs.

Stereo microphone modules are supplied for channel 1 with the high-level modules of channel 2 easily replaced with microphone input modules. An output selector switch allows the assignment of stereo outputs to any of three external loads. Muting and on-air light control relays are provided for channels 1 and 2, auxiliary contacts are provided for channels 3, 4 and 5 for control of turntables, cart machines, etc. Priced at \$1,995.

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Solid State FM Exciter

American Electronic Laboratories, Inc. (AEL) introduces the Model FM-20E solid state FM exciter. The unit, designed by the AEL Broadcast Division, operates in the 88 to 108 MHz frequency range and employs Direct Carrier Frequency Modulation.

AEL's exciter provides good performance over a broad flat response with negligible phase shift for improved stereo separation, extremely low distortion and noise. Special AFC and FMO circuitry provides long term frequency stability. The modular construction of the AEL FM-20E unit permits the combination of the Power Supply and Metering Module, Frequency Modulated Oscillator, Monaural Module, or Stereo Generator,

(Continued on page 54)

RCA TK-76: the TV camera with film camera freedom.



ONE-MAN NEWS.

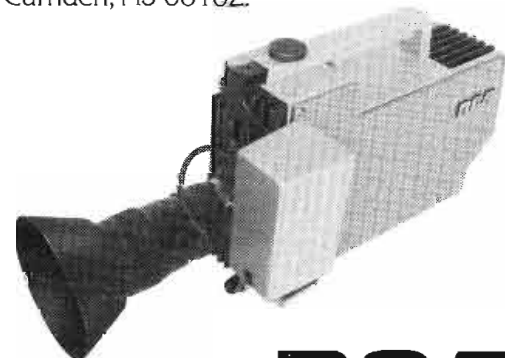
Even a one-man crew can get news fast with a TK-76 portable color camera. Aim-and-shoot automatic features deliver film camera quality even in low light. Instant warm-up puts you on-air or on tape just seconds after you're on the scene.

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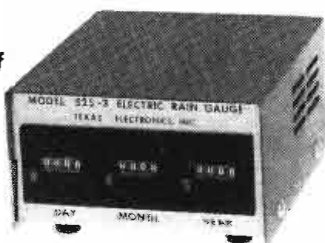
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Quad

(Continued from page 22)

level to the encoder can be lowered, resulting in increased enhancement at the expense of stereo separation and vice versa. The broadcast engineer can readily adjust this ratio to suit the station format by listening to his monitor system which preferably should allow for listening in the mono, stereo, and SQ-decoded formats. When only the front channels are driven, the stereo input passes through the encoder with no alteration or enhancement.

While using an SQ encoder for broadcasting, or while encoding four-channel material, the forward-oriented SQ encoding mode in the SQE-2000 is used³. The principal advantage of this mode to the broadcaster is the ability to transmit any existing Center-Back signals without loss to the mono listener.

Enhancement Of Monophonic Program Sources

Many broadcasters are utilizing the "nostalgia" format, particularly the 1950's and 1960's rock and roll variety. The majority of music made during this period was recorded monophonically. The SQE-2000 can even be utilized to enhance this kind of program material. The arrangement pictured in Figure 3 can also be used to synthesize stereo and four-channel information from monophonic sources if the function switch is set to "encode," and the SQ mode rear panel switch is set to "SQ INT" (Interior). The SQ Interior position bypasses the internal phase shift circuits for the front-channel inputs but not for the rear inputs. The result is a comb filter effect at the encoder output terminals. This process not only simulates stereo separation but also introduces phase shift components which result in quadraphonic enhancement. The best effect is obtained when all level controls are equal.

When using this method to enhance monophonic sources, some increase in the difference signal will

occur with a resultant slight decrease of sum signal, but not more than with normal stereo sources. Even though the original monophonic source has been expanded to a simulated stereo, overall frequency response and distortion characteristics remain unaffected. Moreover, the listener receiving the program in mono will be unable to detect any difference between the synthesized and the original monophonic transmission. This ability for the newly created stereo to "fold back" into a perfect mono is due to the reciprocal nature of the phase shift networks used in matrix encoders.

Locally Originated Quadraphonic Broadcasts

Possibly the most creative use of the SQE-2000 Encoder involves the production of locally originated quadraphonic programs. Those stations fortunate enough to be in a major market often have access to the facilities of a professional recording studio. Local musicians who are utilizing the services of the recording studio are usually anxious for exposure and a broadcast of their performance can often be arranged. Most modern recording studios are either equipped for, or can be modified to, accept quadraphonic material very easily, and they are anxious for some on-the-air mention of the services that they provide. Such programs have been very successfully aired in Los Angeles, New York, Baltimore, Washington, Cleveland, and Chicago as well as other locations.

When arranging for such a program, the encoder should be placed at the recording studio, thereby necessitating only a stereo pair of telephone lines to the broadcast studio or transmitter location as opposed to the four required if the encoder were located at the broadcast studio. If an appropriate recording studio cannot be found, the creative engineer can do a less elaborate but nonetheless most satisfactory job in his own studio or other convenient location.

Since the acoustics available in the normal broadcast studio are neither ideal nor controllable, the best approach to use involves employing close miking techniques. The SQE-2000 Encoder allows for a total of eight inputs, four of them at mic level and four at line level. If

³See "Recording Techniques for SQ Matrix Quadraphonic Discs," J. Audio Eng. Soc., Vol. 21, pp. 19-26, (Jan/Feb. 1973).

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four microphones can be fitted with line level preamplifiers then the engineer has, in effect, an eight-input mixer available to create whatever configuration is appropriate.

Figure 4 illustrates one technique for expanding the number of encoder inputs to the front channels utilizing the broadcast console. These additional microphones can be inserted at the broadcast console by assigning them to either the left stereo (Left Front SQ) or right stereo (Right Front SQ) positions. A microphone assigned to center will "encode" as a Center-Front SQ sound.

If the broadcast console lacks any "panning facilities," a microphone can be connected to the left on one input and to the right of another. Varying the ratio of the two inputs allows the positioning of a sound anywhere between the Left-Front and Right-Front corners.

Other techniques for mixing will occur to the creative engineer. For example, a tape machine set at 15 inches or 30 inches per second can be used to provide a delay for enriching the sound, or if some

feedback is employed around the tape recorder, an echo chamber effect can also be achieved. The application of these techniques depends largely on the flexibility of the audio console located at each station. Once the basic techniques are understood, creative variations can be made successfully.

Understanding SQ

The phasor diagrams of Figure 5 illustrate what happens when four-channel material is SQ encoded using forward-oriented encoding, or when stereophonic material is enhanced using the recommended enhancement schemes. Figure 5a shows the basic forward-oriented encoding mode. A Left-Front input results in a left only stereo output. Similarly, a Right-Front signal input results in a right only stereo output.

In the case of either rear input, an equal level, quadrature phase relationship is generated which is phase leading in the left or right encoded stereo output corresponding to the Left-Back or Right-Back encoder inputs. This encoding scheme allows for full front channel

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separation when monitored in stereo or four-channel, and assures optimum compatibility for all four-channel quadrasonic material.

Figure 5b shows the resultant phasors when the recommended enhancement mode is used. For a left only signal it can be seen that the separation in stereo is 7.6 dB but that the crosstalk signal is in quadrature with the main channel output and as such reflects a much lower apparent shrinkage of the stereo field than would result if the crosstalk were in phase. Left and right stereo input levels have been normalized so as to produce a unity enhanced stereo signal. Using these normalization coefficients, it can be seen that the Center-Front signal emerges in the correct power relationship as in the original stereo recording. The stereo center image becomes the Center-Front quadrasonic image and remains strictly in phase. In addition, the monophonic compatibility remains excellent with both left and right stereo inputs reproducing at the correct level with a 3 dB increase in the center front as is normally expected in stereo. As the stereo signal is panned across the stage left to right, the resultant decoded signal will move across the front semi-circle of the room from center left to center right.

Figure 5c shows the basic SQ encoding phasors. Notice that a Center-Back signal will encode as an equal level 180° antiphase component. The encoding for the four corners and center front, however, is the same for the basic and forward-oriented encoding.

Figure 3 shows the encoder connected in the transmission line before the first compressor or limiter.

The encoder should be located near the operator so that the enhancement process can be defeated while transmitting an original quadrasonic program. In the case of automated stations, it is sometimes desirable to have the encoder in the production area. This allows the engineer to enhance stereo selections, and bypass the encoder for original quadrasonic recordings without burdening the automation system with the switching chore.

When utilized as in Figure 3, the encoding feature of the SQE-2000 can be bypassed by depressing the

mixer function button, resulting in a conventional stereo program. As mentioned before, it is necessary to bypass any enhancement when the stereo input consists of a previously encoded source.

A Quadrasonic Control Center

A quadrasonic encoder becomes most valuable to the broadcaster when it is installed in the most flexible manner possible. Such an installation encourages frequent usage and consistent quality. Figure 6 shows one possible method for establishing a three-source quadrasonic facility utilizing a minimum of external switching. Possible inputs for the encoder include a quadrasonic microphone array for locally originated material. These microphones can be utilized in discussion format broadcasts, locally originated musical events, or commercial production.

When not in use, the level controls for these microphones are simply left at zero. With Switch A set to Position 1, the normal stereo program material available at the console buss can be enhanced at

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will by selecting the encoder function on the front panel and adjusting the line level inputs for the desired enhancement as described previously. Alternately, selecting the mixer function allows the stereo signal to pass through the encoder unchanged. In addition, stereo-quadrasonic synthesis from monophonic sources is accomplished by returning the Function Switch to "ENCODER" and selecting "SQ INT" on the rear panel. For this last arrangement, all line level controls should be set equally. Finally, additional four-channel sources such as quadrasonic tapes and carrier type quadrasonic discs can be encoded by throwing Switch A to Position 2.

Conclusion

Quadrasonic enhancement of existing stereo and mono material offers a new dimension to the quadrasonic listener without materially degrading the service to conventional stereo and mono listeners. For the broadcaster willing to go the extra mile, origination

of local quadrasonic material rounds out a service that competitive stations cannot offer. All it

takes are engineering and programming know-how and some ingenuity. □

FCC revises fee schedule

The FCC has revised its fee schedule to specify filing and grant fees for stations with authorized power of 2.5 kw.

On June 27 of this year, the Commission adopted rules that provided for standard broadcast stations with power of 2.5 kw as an intermediate step between the present 1 and 5 kw classifications.

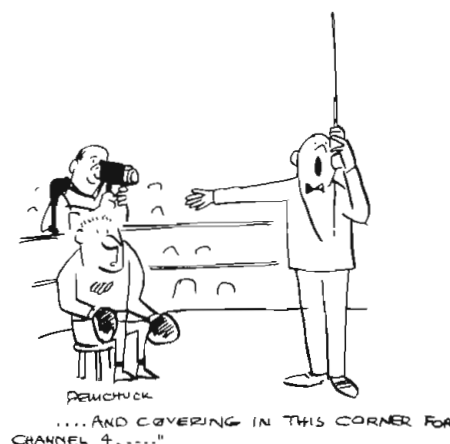
On July 22, it proposed amending its fee schedule to provide for applications for construction permits for the new 2.5 kw stations and major changes in existing stations that request 2.5 kw power.

Under the revised fee schedule, there will be a \$300 filing fee and a \$2,025 grant fee for applications for new daytime-only 2.5 kw power stations, or for major changes in existing stations requesting 2.5 kw

power.

For an unlimited-time station (either new or major change) requesting power of 2.5 kw, the filing and grant fees will be \$600 and \$4,050, respectively.

The action, which amends Section 1.1111(a)(1) of the rules, becomes effective October 22, 1975.



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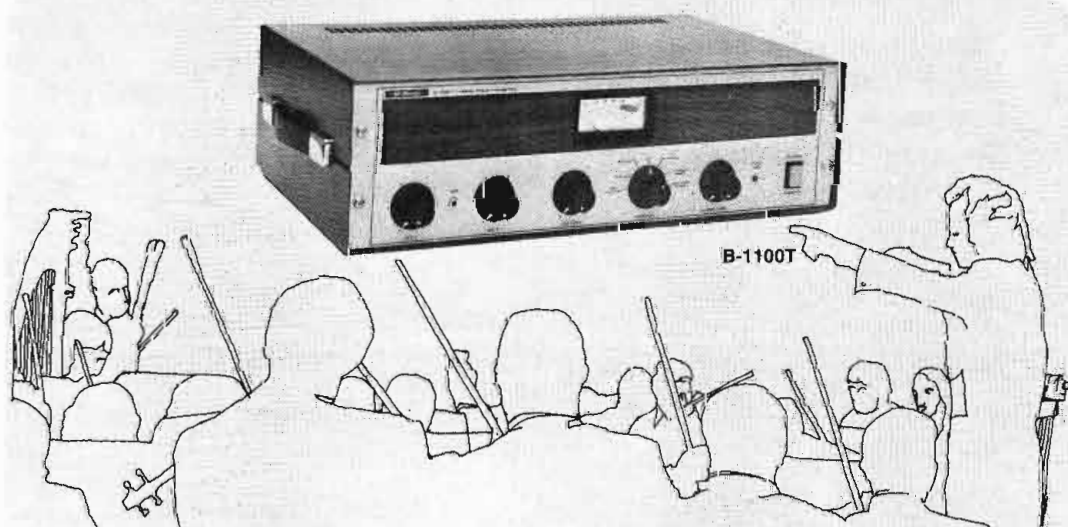
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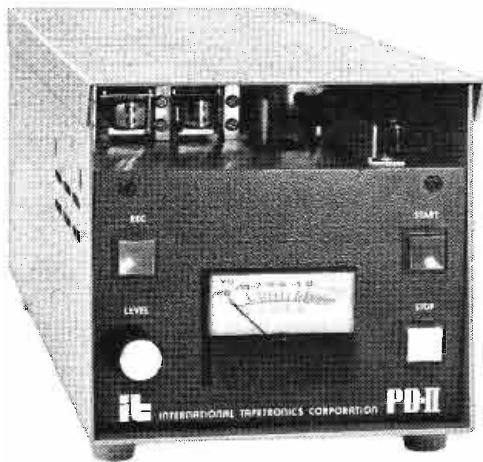
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New Products

(Continued from page 49)

and the SCA Generator into a single rack mounted unit. (Two SCA generators can be plugged-in if the monaural module is used).

According to AEL, the unit's Frequency Modulated Oscillator (FMO) generates a full, completely linear signal at the carrier frequency. The use of Automatic Frequency Control and Monolithic digital circuitry, plus a specially cut reference crystal provides the FMO with stability and reliability. Special control circuitry is provided for off-frequency shut-down.

For More Details Circle (102) on Reply Card

Compact Audio Console

Broadcast Electronics, Inc. announces the introduction of a new, compact audio console. Designated as the Model 4BEV-50 "Versa Console," this new console is a versatile single channel mixer for CATV, CCTV, film studios, commercial sound installations, dubbing facilities, and remote broadcast uses.

The Versa Console has four mixers and it accepts ten inputs—seven inputs being externally switchable for microphone or line level sources. All inputs are transformer coupled to IC pre-amplifiers. The mixers are long life sealed pots with cue detents. The Versa Console provides both a balanced 600 ohm line output and a high impedance PA output. An internal 1 KHz test oscillator supplies tone directly to the mixing bus to facilitate quick and accurate level adjustments.

Monitoring facilities in the Versa Console include a switchable VU meter, a separate FET muted cue amplifier and a speaker. There is also a front panel headphone jack switchable to either the program or cue circuits.

For More Details Circle (103) on Reply Card

ENG Battery Pack And Charger

Production of Model GRL/HL-33NC battery pack and companion model GRL/HL-33NCT single-channel charger has been announced by **General Research Laboratories**, a division of **FREZZOLINI ELECTRONICS INC.** The Battery Pack was designed specifically for service in the backpack power unit of the ENG Ikegami HL-33 or HL-35 professional TV broadcast color camera.

The battery itself is mounted in a case ready for immediate installation in the backpack. It contains 24 "D" cells that provide 4 AH. Re-charge-

able in less than three hours, the GRL/HL-33NC battery pack is said to be the lowest cost battery pack with NiCad reliability available for the Ikegami cameras.

GRL/HL-33NCT single-channel charger has a built-in timer for automatic charging of the battery pack.

Manufactured in Hawthorne, New Jersey, delivery schedules are two weeks from stock.

For More Details Circle (130) on Reply Card

Tape Insert Edit Accessory

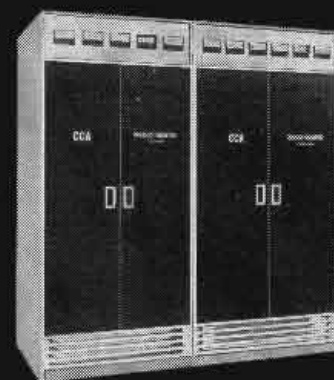
A new accessory which affords clean insert edits in multichannel recording is being offered by **Ampex Corporation** for use on its MM-1100 and AG-440 audio recorders.

Called Pick Up Recording Capability (PURC), the accessory permits the editing or dubbing of new material over previously recorded material without creating errors at either end of the new insert.

Typically, during a dubbing sequence both the erase and record heads are activated simultaneously. Because of the space between the two heads, over-recording occurs on the

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BROADCAST ENGINEERING

unerased tape. Likewise, a gap is left at the end of the dub.

By individually controlling the turnon and turnoff operations of the erase and record heads, PURC prevents over recording at the punch-in position and eliminates the resulting gap or blank spot at punch-out.

For More Details Circle (104) on Reply Card

Telecine System

The new telecine system type OMY 40 designed by **Bosch-Fernseh** is offered in a variety of combinations. They range from a simple system with vidicon camera for scanning black/white program material to versions with preview capability and a universal 2-camera version with provision for color preview permitting different program material to be scanned, viz. 16 mm-, 35 mm-, Super 8 film and slides.

Both cameras either color or black/white, vidicon or Plumbicon^R versions, can be used optionally for preview or as main camera. In the case of a breakdown, the main camera can be replaced immediately by the preview camera.

The central cabinet unit of the

OMY 40 with withdrawable operating control panel can be equipped with either two slide projectors or one slide and one Super 8 projector. The slide projectors permit both sequential and direct selection. Furthermore, the slide and Super 8 projectors provide selection by remote control.

The 16 mm or 35 mm film projector is connected to the side of the central unit thus permitting operation from the front and insertion of the OMY 40 system into a rack front.

For More Details Circle (105) on Reply Card

Modular FM Transmitter

The Model 635 35 kW FM is the newest in the high-power **Sparta** line of modular broadcast transmitters.

Based on a Model 605B FM transmitter as a driver, which automatically provides 5kW backup power, an exclusive feature is that the 3-cabinet 635 can be arranged in various groupings to suit smaller buildings. Another user's saving is realized in that 3-1/8" transmission line feeds the antenna. 100,000 Watt ERP can be achieved more easily and efficiently, and less expensively, using the Model 635 and 6-bay antenna rather than a higher-powered transmitter using 6" line.

A few unique features of the 635 besides modular installation include; VSWR protection, Automatic Power Control, and the 'tally light' fault locator system. Sparta's 680 direct FM exciter is standard.

The broadband grounded grid final amplifier assures high power stability without continuous fine adjustments. Maintenance access is provided through full-size doors front and rear, plus interior swingout panels through which all control circuitry is accessible. Options include manual or automatic power switchover devices, and Model 682 Stereo and Model 683 SCA Generators.

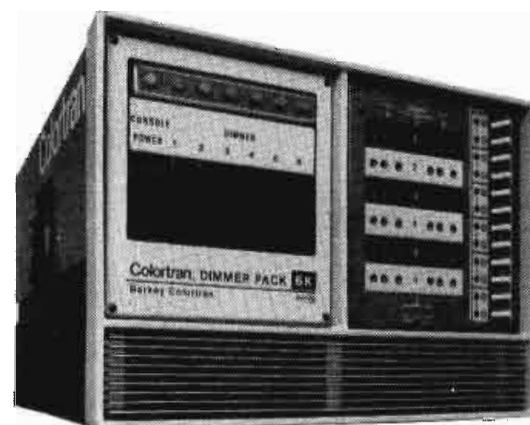
For More Details Circle (106) on Reply Card

Image Motion Compensation

DYNASCIENCES, pioneer in image motion compensation, announces a new low-cost VIBRA STOP LENS for image stabilization. The VIBRA STOP needs no power and is completely self-contained in a compact lightweight unit, yet is capable of performance comparable to that of sophisticated gyro/servo lens systems or complicated isolation mounts in eliminating bouncing, shaky pictures.

VIBRA STOP was originally designed to compensate for vibration and bounce in cine and TV photo-

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graphy from moving vehicles. It has since proved valuable for hand-held cine use, and is expected to prove useful for telephoto still photography, for laser and IR stabilization, and in electro-optically directed systems. VIBRA STOP is: •Light—only 3 pounds; •Small—4-3/4 in. diameter, 4-1/2 in. length; •Rugged—more durable than most cameras; •Passive—no power required; •Versatile—fits standard cine and still lenses up to 73 mm (2-7/8 in.) O.D.

For More Details Circle (107) on Reply Card

Wideband SSB Multiplex System

Coastcom announces a stackable, wideband SSB multiplex system with highly flexible performance capabilities, making it practical for a broad spectrum of telecommunications applications, including program, slow scan TV and data channels. These individual SSB channels are available with bandwidths of 5, 8, 10 or 15 KHz.

Among the exclusive features of this system, designated the SBC 502, is the ability to multiplex up to ten 5KHz channels on a single base band without the need of group or super-group equipment. By utilizing active network techniques to suppress the unwanted modulation products, the requirements of the LC bandpass filters are relaxed, resulting in superior band edge group delay performance without the need for phase equalization. The channels provide a dynamic range in excess of 70 dB and an output audio power level of +18 dBm RMS.

For More Details Circle (108) on Reply Card

Radar Motion Detection System

A complete UL listed alarm system featuring reliable detection of moving intruders at ranges up to 100 feet has been announced by **Mountain West Alarm** of Phoenix, Arizona. Volume coverage can provide floor-to-ceiling and wall-to-wall protection.

The R4 alarm system should be of special interest to homeowners, businessmen, and institutions who require total property protection at low cost.

For many applications the R4 Microwave Intrusion System can provide protection with no added equipment as it detects motion over a large area. Local alarm is provided with a distinctive yodel type electronic siren, may be heard a block away.

In addition, the R4 provides means for connecting other detectors from doors, windows, floor mats, fire

detectors, and panic switches to the same alarm. Alarm relay outputs are available for connecting the R4 to telephone dialers, direct wire alarms, and other audible signals.

The 10.525 GHz (FCC certified) microwave motion detection system covers a 30° angle over ranges adjustable from 0 to 100 feet. Moving intruders are detected with sophisticated solid state digital circuits that eliminate false alarms due to random vibrations, air motion, telephone bells, etc.

The system is simple to install—sits on a shelf or mounts permanently. The motion detector may be completely concealed behind non-metallic surfaces such as doors, walls or in closets, basements and attics. Powered from 115 VAC or 12 VCD. Switches to 12 Volt battery for emergency power, provides trickle charge to maintain battery.

For More Details Circle (109) on Reply Card

Tape Delay

Dyma Engineering, Inc. announces a standard modification to the REVOX A-77 reel-to-reel tape recorder to provide five seconds of program delay. Such tape delay devices are used for censoring program material on "talk shows."

The A-77 tape delay is available in console roll-around or rack mount versions.

The REVOX roll-around console manufactured by DYMA features space and provisions for future addition of tape delay.

When supplied as a complete package by DYMA, tape delay is automatic—when tape is loaded in the delay head, it is automatically selected.

For More Details Circle (110) on Reply Card

Video Production Switcher

Ross Broadcast Products has developed and is now delivering the Ross RVS16-6, its newest full function video production switcher. Designed for mobile or studio fixed applications, the RVS 16-6 is a sophisticated switcher. New circuit design concepts have allowed Ross to provide production versatility in a super compact package; the human engineering of the RVS 16-6 should allow ease of operation and logical procedures.

Features include: 16 inputs, 6 busses, built-in color black and background generator, downstream keyer, two independent effects groups each with 96 wipe patterns, soft wipe, soft key, bordered wipe, spotlight, positioner and chroma keyer. State of the

art C-Mos circuitry assures low power consumption and high reliability. And the compact electronics and power supply package requires only 7" of rack space.

The Ross RVS 16-6 is big brother to the RVS 16-4, the switcher purchased by operations such as the CBC, WGBH Boston and Global Television in Los Angeles. The RVS 16-6 has been selected by ORTO, the Olympics Radio and Television Organization, a division of the CBC, for fixed studio application at the '76 Montreal Olympic games. Broadcast engineers reportedly are attracted to the RVS 16-6 for its ultra reliable high quality performance, versatility, and system compatibility.

For More Details Circle (111) on Reply Card

Demodulator Kit

Video Aids Corporation of Colorado (VACC) has introduced an Electro-Optical Isolator Demodulator kit Model D-1 and D1-A. Similar to their model A1 and A1-A Electro-Optical Isolator Kits for converting Sony Receivers into Receiver/Monitors, the unit is smaller in size and may be used as a Video Line Isolator. The new model D1 and D1-A fits into the palm of your hand and can be installed into a Sony color receiver in less than thirty minutes by most technicians. Both models A1 and D1 or A1-1 and D1-A can be installed in twelve inch or larger Sony Color TV Receivers to permit using a standard color TV receiver as a color monitor (video-in and audio-in) as well as a demodulator (video-out and audio-out).

Specifications for the video isolator section of the Demod isolator are: Bandwidth 1 Hz to 8 MHz; Differential Gain: less than 2% Differential Phase: less than 2 degrees; Video output is 1V p-p into 75 ohms, through a BNC connector. Audio specifications are: 60 Hz to 10 KHz plus or minus 3 dB. Audio output is 0 dB or 2V p-p into 600 ohms through a phono jack connector. Power consumption is only 1 watt.

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Distribution Amplifier

Dynasciences Video Products has announced the 4000 Series, distribution amplifiers. These units provide an economical means of combining up to ten video and/or pulse distribution amplifiers in a single, standard 3 1/2" x 19" rack.

The Model 4000 rack allows you to add or combine the plug-in modules and provides 2 loop-through input with 5 output connectors for each

amplifier. The Model 410 is the common power supply for all plug-in modules.

The plug-in module, Model 420, Video Distribution Amplifier provides five 75-ohm output signals from one bridging input signal with minimum differential gain and phase error. The VDA's also have provision for high frequency peaking to compensate for long cable runs.

The plug-in module, Model 450, Pulse Distribution Amplifier, is interchangeable with the Model 420 without rack modification. The Model 420 will provide five 74-ohm regenerated output pulses from a single loop-through input.

Each Model 410 Power Supply is capable of providing power for 10 video or pulse distribution amplifiers in any combination.

For More Details Circle (113) on Reply Card

Professional Tone Arms

Micro-Trak has two new professional tone arms available, models 303 and 306. The 303 is a 12-inch tone arm, weighing one pound, with a minimum tracking force of 1/10 gram.

The 306 is a 16-inch arm at 1.25 pounds. It also has a minimum tracking force rating of 1/10 gram. Resonance is less than 10 Hz 1/2 gram at 30x10⁶.

Both arms are designed for on line, 24 hour a day operation.

For More Details Circle (114) on Reply Card

Studio TV Camera

At the recent National Association of Broadcasters Convention in Las Vegas, **CEI** introduced an addition to its line of color TV cameras. Designated the CEI-285, this new model was designed to make life easier for the person operating a studio camera. It features a convenient tiltable 7-inch view finder which makes heretofore difficult angle shots easier to handle. Its flat screen provides a large viewing area and eliminates distortion. Also, it affords higher resolution and greater brightness for reproducing sharper images. This self-contained view finder can be easily removed for plug-in bench-top maintenance.

The new CEI studio camera has other convenient operator features such as view finder selection. This permits a choice of its own and/or other cameras for special effects situations.

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(Continued on page 60)

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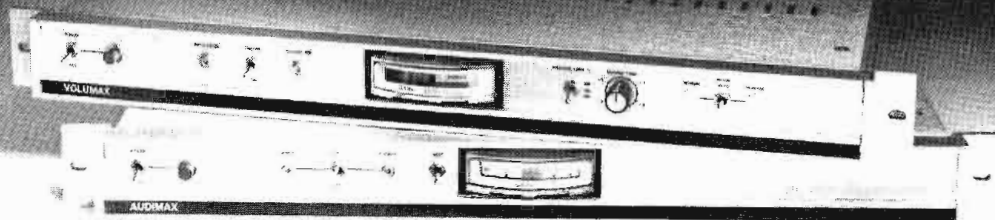
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AM Rules

(Continued from page 41)

In determining the number of transmission facilities available to a particular community, the treatment of stations proposed in pending applications for that community becomes a matter of critical importance. The FCC therefore added a new Note 8, which defines the status of such proposed stations in accordance with previous FCC precedent in similar matters.

In common usage, a broadcast station is a "transmission facility" for the community to which it is licensed, and provides a "transmission service" for that community. Since these terms are not elsewhere used in the rules, the FCC considered it advisable to define them and have appended a new Note 9 for that purpose.

Conclusions

The implementation of these new rule amendments should provide many opportunities, unattainable since the adoption of the restrictive amendments of 1964, for the assignment of new AM stations. And it affects the orderly expansion of facilities of existing stations and can be expected to result in an increased flow of applications seeking new or augmental facilities.

Nobody can yet forecast the rate at which such applications may be filed and, accordingly, whether the FCC's processing staff will be able to dispose of these applications without inordinate delays. In the event a large backlog of unprocessed applications appears to be developing to the point where it is administratively burdensome, the FCC **may** impose measures controlling the rate of application filings. These measures would probably involve the declaration of "open" and "closed" seasons for the filing of applications.

Unlike the past when the FCC surprised the industry with its "closed" seasons, they now say advanced notice will be given, so all parties will have ample time to complete and submit any applications which they are in the process of preparing. No comments are made by the FCC as to whether we need to purchase hunting licenses for this open and closed season. □

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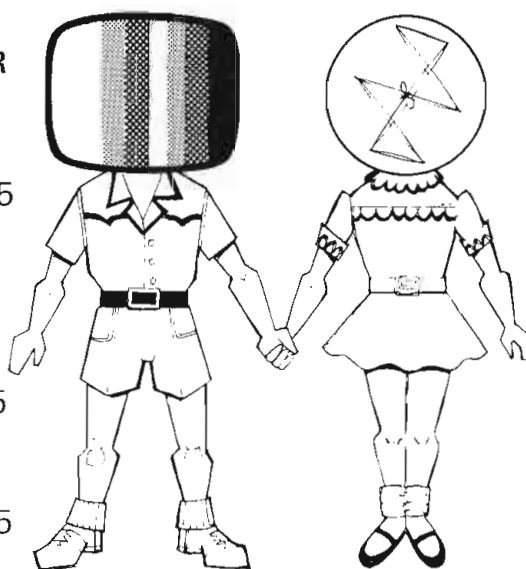
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Regional conferences Set for Oct. and Nov.

A special panel of top personnel of the Federal Communications Commission is scheduled for the closing session of this Fall's six Regional Radio Conventions.

The two-day meetings are being sponsored by the National Association of Broadcasters and the Radio Advertising Bureau.

Scheduled for the first two conventions are:

—In Atlanta (Oct. 13-14), Ashton Hardy, general counsel; William B. Ray, chief, Complaints and Compliance Division; Richard Shiben, chief, Renewal and Transfer Division; Lionel J. Monagas, chief, Industry Equal Employment Opportunity Unit; Martin Levy, chief, Broadcast Facilities Division, and Phyll Horn, chief, Field Operations Bureau.

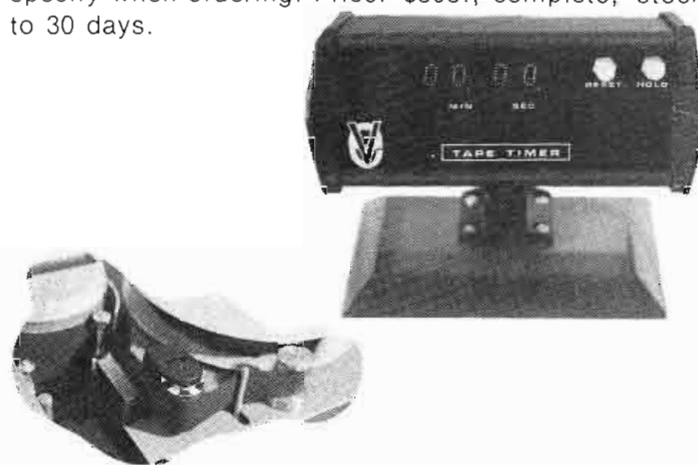
—In Boston (Oct. 16-17), Arthur Ginsburg, assistant chief, Complaints and Compliance Division; Neal McNaughten, assistant chief for engineering, Broadcast Bureau, and Paul Putney, assistant chief, Broadcast Bureau.

Participants in the remaining conventions in New Orleans (Nov. 10-11), Chicago (Nov. 13-14), Denver (Nov. 17-18) and San Francisco (Nov. 20-21), will be announced later.

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YES—the leader in digital tape timing devices now introduces another **FIRST**. Replace the old, poor-resolution, mechanical counter in your IVC transport with the **NEW VAMCO Model 759 DIGITAL TAPE TIMER**.

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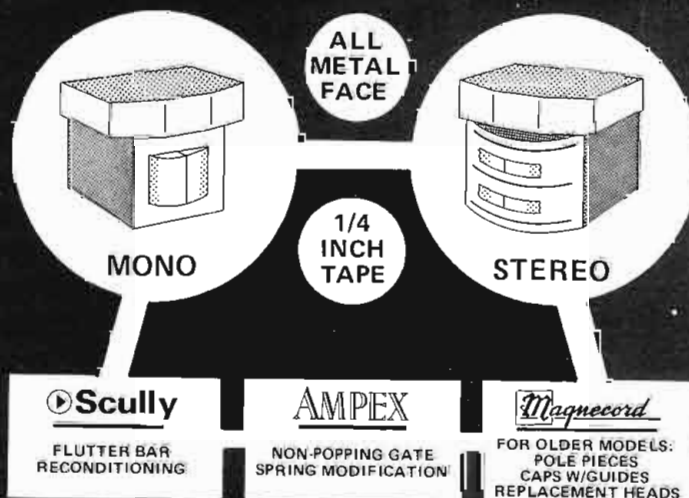
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New Products

(Continued from page 57)

Tape Accessories

Memorex has announced an expanded tape accessories line—including two record care accessories—which will offer the hi-fi enthusiast tape and record care products of the same high quality as Memorex audio

tape products.

The new accessories, ranging in retail price from \$3 to \$11, include **8-Track Head/Capstan Cleaner**: An 8-track cartridge with a non-abrasive fiber-cleaning tape in one end and a capstan cleaner in the other. A small bottle of head cleaning solution is included; **Cassette Cleaning Kit**: A standard audio cassette containing a non-abrasive fiber-cleaning tape, and a bottle of head cleaning solution; **Professional Head Demagnetizer**: A universal head demagnetizer with interchangeable heads for use on all cassette, 8-track and open reel systems; **Record Care Kit**: A record cleaner, bottle of record cleaner fluid and a stylus cleaning brush, contained in an attractive plastic case; and **Record Cleaner**: A small cylindrical tube covered with a felt-type cloth used to clean dirt and dust from record grooves.

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Audio Remote System

Micro-Trak Corporation has just introduced their model 6440 audio console, and its associated System D audio packages.

At the FM show in Atlanta, the System D portable, a complete package concept, including everything necessary to run a remote show, was on display. Packaged in rugged cases, the System D was designed to meet the rough duty of broadcast remotes.

The 6440 console is a full stereo control console with four channel input. Switch selectable auxiliary inputs allow the use of tape machines, telephone lines, or other 600 ohm inputs. The unit includes built-in output level meters, amplifier, and speaker.

The 6440 is Micro-Trak's first entry into the control console field, although the company has been designing and

building broadcast audio equipment for a number of years.

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Intercom System

The CS9000 series intercom system from **McCurdy Radio** is a flexible modular plug-in configuration that allows multiples of their basic 10 x 10 arrangement to be extended to meet virtually any professional requirements.

The basic 10 x 10 system allows 10 inputs and 10 outputs. Multiples of the system can easily be assembled. The standard unit includes all input amplifiers, output amplifiers, cross-points, power supply, and is housed in a 19-inch frame.

McCurdy also can supply key panels, microphones, and speakers as extra-cost options to complete the system.

The system features solid state balanced crosspoints, switchable amplifiers to allow different microphone types, full 3-Watt output into 8 ohms, and drive control to ground brought out from all crosspoints for muting.

For More Details Circle (121) on Reply Card

NTSC Color Sync Generator

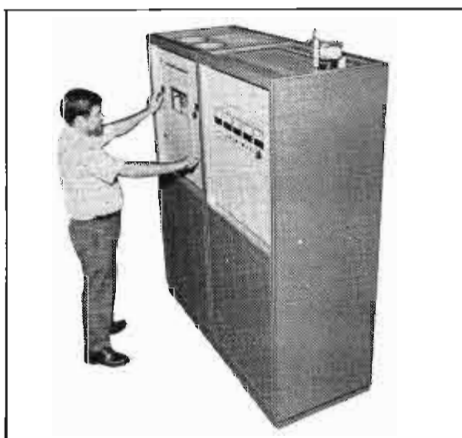
Shintron announced a broadcast specification NTSC Color Sync Generator called Model 315. The unit features a newly developed dual-access modular plug-in making cable access more convenient in station installations.

In addition to the mechanical convenience, the unit has all necessary distribution amplifiers built-in. For example, the subcarrier output has individual 360° phase adjustable network to accommodate those newer color cameras in the market.

The unit provides four sets of outputs and has three blank spaces for

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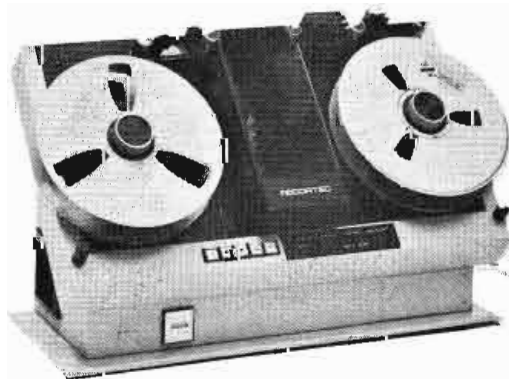
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such advanced features as Gen-Lock and Pattern Generators.

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Wire Service Alarm

Audio Services Inc., has a solid state teletype alarm system available for silent or audible remote indication of wire service bulletins and EBS transmissions.

In addition to its own built-in indicator system, the Tel-alert also is capable of controlling and/or powering a variety of high or low voltage

devices, depending upon the model desired.

Tel-alert uses digital integrated circuits. The built-in bulletin/EBS indicator system on the front panel features LED's, rather than incandescent lamps.

For More Details Circle (123) on Reply Card

Cue System Receiver

Comrex has a new crystal controlled cue receiver that will permit cue/program/instructions to be relayed to studio and field personnel.

The CRA system fits right into electronic (LIVE) journalism applications. These receivers, operating on TV channels 2 through 13, can be used as off-air monitors to provide program cue for real time remote broadcasts.

For More Details Circle (124) on Reply Card

Thermoelectric Power

Thermoelectric Power Environmental Modules for mounting in communication shelters to power electronic equipment and maintain proper interior temperatures, are now available from 3M Company.

Each module comprises one or two new-generation LP-powered 3M thermoelectric generators, flues, stacks and controls. It mounts into a rectangular opening in the shelter wall. No special support or structural changes are needed.

Part of the unit projects outside the shelter, with minimal intrusion inside, to provide maximum space for other equipment.

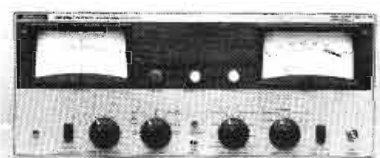
Control dampers divert heat from the generators' cooling fins into the shelter as required. Thus, depending upon outside temperatures, the shelter interior is supplied totally with outside air, totally with heated-and-recycled air, or with any mixture necessary to maintain interior temperatures suitable for electronic equipment and

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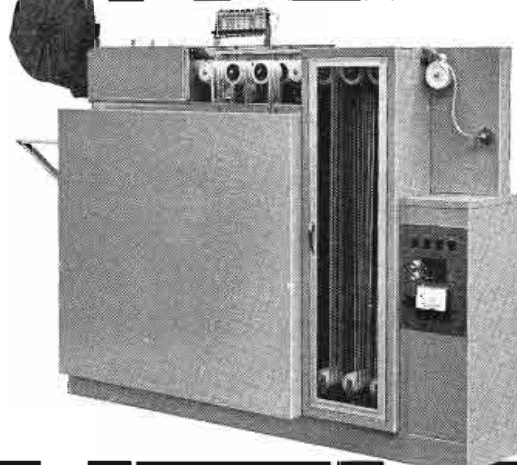
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AMPEX VR-1100 excellent condition with "Allen FMS 1124 modified to high bond 7.06 MHZ, Allen 1240 switcher, diamond DPA-3 color adapter and ampeg mark ten video head assembly installed. Provision for external air compressor. \$15,000.00. Davis Audio Visual, Inc. - Video Systems Division (303) 433-7443, Denver. 10-75-1t

COMPLETE TV STATION—Channel 12, High Power TV Transmitter plant including 1400 ft. tower, 35 kw GE transmitter. RCA Travelling Wave Antenna and Radomes, input and monitoring equipment etc. etc. For Sale in place but must be relocated. Now operating the the U.S. ADDRESS ALL ENQUIRIES TO: Mr. D. L. George Imaging Limited, 83 Barber Greene Road, Don Mills, Ontario, M3C 2A2. Telephone (416) 446-5432 10-75-1t

A FEW COMPETITIVELY PRICED used Revox A77 decks available. Completely reconditioned by Revox, virtually indistinguishable from new and have the standard Revox 90 day warranty for rebuilt machines. Satisfaction guaranteed. Example, A77 with Dolby, \$675, plus shipping. Write requirements to ESSl, Box 854, Hicksville N.Y. 11802 (516) 921-2620. 10-75-6t

TO SELL: MIC: Sure 519SD - \$45.00; Shure 565SD - \$45.00; Shure 565 - \$40.00; Shure 1750 - \$25.00; E. V. 631AL - \$35.00) AKG D119ES - \$25.00; E.V. DL-42 - \$232.00. Sound level meter - \$200 Simpson 885; Hi-Band Monitor Radio - \$40.00, Sonar 105 - 6 channel. G. Matthews, Audio Designs Inc., Box 327, Forrest Park Station, Dayton, Ohio 45405. 10-75-1t

STODDART RADIO interference-field intensity meters. Stoddart NM-22A, 150KHZ-32MHZ. Complete - \$2,195, less antennas - \$1,595. Stoddart NM-30A, 20-400MHZ. Complete - \$1,295. Stoddart NM-52A, 375-1000MHZ. Complete - \$1,495, less antennas - \$1,095. All are in excellent condition and calibrated prior to shipment. Surcom Associates, (213) 382-6985. 6-75-tf

RCA 5C TRANSMITTER, Good condition with some spares, use overseas or for spare parts, also one TT-2AL available. Fran Miller, KOMO, 100 Fourth Ave. No., Seattle, Washington 98109. (206) 223-4026. 10-75-1t

HELP WANTED

TRANSMITTER SUPERVISOR wanted for new RCA transmitter installation. Highly desirable southwestern top-50 market. Must have extensive experience with high powered UHF television transmitters. The person we're looking for must have the highest professional standards. Send resume and salary requirements to: Dept. 340, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. We are an Equal Opportunity Employer. 10-75-1t

TELEVISION CHIEF ENGINEER, strong on total maintenance, for established network UHF. Immediate opening, ideal community. Send resume: R. Nelson, President, WXLt, Sarasota, Florida, 33578. Equal Opportunity Employer. 10-75-1t

HELP WANTED (CONT.)

FIELD SERVICE ENGINEER

Extensive travel, all benefits. Experience in color video and switching systems preferred. Contact: Mr. Buzan, Vital Industries, Inc., 3700 N.E. 53rd Ave., Gainesville, Fla. 32601. Phone 904/378-1581.

CATV MANAGER AND CHIEF TECHNICIAN WANTED—Prefer dual-skill individual, but will consider applications for either position. Preferably available Spring 1976 to monitor construction of County-Wide Bi-Directional CATV System in Western Wisconsin. Send resume and salary requirements to: WWCC CABLE, c/o Ralph Evans, 3500 N. Sherman Blvd., Milwaukee, Wisconsin 53216. 10-75-2t

ELECTRONIC MAINTENANCE TECHNICIAN/ENGINEER, with executive potential, for Computer Animation system and supporting hardware. Should also have a good familiarity with basic broadcast video equipment. New York City location. Call J. Mitwell, (212) 628-5987, 10-12 a.m. 10-75-3t

TV ENGINEER: Technical Quality Control and VTR Operator/Editor for progressive production unit. Qualified on Ampex Quads for color camera setup, lighting and production switching. Send resume to Operations Director, 2600 S. Mooney, Visalia, CA 93277. An Equal Opportunity Employer. 10-75-1t

IMMEDIATE OPENING in Missouri for experienced broadcast engineer as Chief of AM/FM Stereo. Need knowledge of automation, solid state electronics and belief in running a good shop. EOE. Write Dept. 338, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. 10-75-1t

MOVE UP from your present job in broadcast engineering. We handle all engineering jobs and openings coast to coast. Send full resume confidentially now. The AMPS Agency, 6331 Hollywood Blvd., Suite 623, Los Angeles, Calif. 90028. Tel: (213) 462-7301. 8-73-tf

WANTED

WANTED: All surplus broadcast equipment especially clean A.M. & F.M. transmitters, contactors, capacitors. Surpluss Equipment Sales. Clark & Potomac Phase monitors. 2 Thorncliffe Pk. Dr. Unit 28 Toronto 17, Ont; Canada 1-73-tf

WANTED Used IGM instacart 48 tray. Contact Bruce Clark, WKLO, 307 W. WALNUT St., Louisville, KY 40202. 502-589-4800. 10-75-1t

PRODUCTS WANTED: NY based national TV marketing specialist looking for products. We offer marketing and technical expertise. Smith-Beemish, Inc., P.O. Box 591, Farmingdale, N.Y. 11735 (516) 420-0986. 9-75-3t

WANTED: Education Public Broadcast Station needs surplus broadcast equipment, 1 or 1.5 kw FM transmitter, and studio equipment. Tax exempt status. Contact Boulder Community Broadcast Association, 885 Arapahoe, Boulder, Colorado 80302. 6-75-6t

WANTED: PRE 1926 RADIOS AND TUBES, ESPECIALLY IN NEW CONDITION. STATE MAKE, MODEL, CONDITION AND PRICE WANTED. AUGUST J. LINK, SURCOM ASSOCIATES, 1147 VENICE BLVD., LOS ANGELES, CALIFORNIA 90015. 8-75-tf

NON-COMMERCIAL EDUCATIONAL FM Station desires donations of studio and technical equipment of all types. All donations are tax-deductible. Contact Paul Copeland, Northwest Junior College, Box GG, Senatobia, Miss. 38668. 10-75-2t

WANTED 14" Aluminum Tape Reels. MultiMedia Associates, 3290 E. 48th Street, Indianapolis, IN 46205. 10-75-2t

RCA B&W TV CAMERA, TK-10, 11, 30 or 31. Electronics should be reasonably intact, need not be working. Kenneth Tusar, 201 Evergreen 5-1C, Vestal, New York 13850. 607-797-3941. 10-75-3t

6181 TUBES, Used, RCA MI-40790 Headwheels, RCA PK-730 Color Camera. Box 609, Altoona, PA 16603. (814) 943-2607. 10-75-2t

"I had the budget to build any kind of FM station I wanted..."

KBWD's Jim Laird explains what Precision Monitoring can add to broadcast capability



"TFT was a must, right from the start."

It's a rare event when a Chief Engineer gets to design his dream station from the ground up. Management's confidence in Jim Laird was amply rewarded, however, with perhaps the most modern, efficient FM station in southwest Texas. The TFT FM Frequency and Modulation, Modulation Only and Stereo Monitors were key ingredients of the new facility. Here are a few of Jim's reasons why:

On Selecting TFT

"... when you've got an opportunity to buy the best, why not go for it. I've been reading the broadcast books for a long time, and it seems that TFT gear is a cut above the rest. You get what you pay for, and they (TFT) just put a lot more into the system."

On Coverage

"... TFT gives us the extra edge we need so we can use our transmitter to its maximum ability without worrying."

On Accuracy

"... very darn good when it comes to proof of performance. If I have an error, I look at the transmitter, not the TFT monitor ... I have the utmost confidence my TFT is telling the truth."

On Design

"... they seem to be more easily operated as far as the way you set the thing up. And the fact that they can be located right here at the studio is one thing we really like."

On The Frequency and Modulation Monitor

"... FM was a new adventure for us, and I needed good readout of our pilot. The TFT 723 was right on the money then and we're using it all the time now."

On The FM Stereo Monitor

"... It does have the extra human engineering to make it easier to operate. I feel the thing is considerably more stable than others too."

On Confidence

"... well, we got our FM gear based on our experience with the TFT AM monitor. Now, after checking out the FM, I envision having TFT at all the stations we own."

On Price

"... sure it costs more, but even if I'd been on a tight budget, I wouldn't have scrimped on the TFT monitors ... it's the only way I can keep my transmitter honest ... do everything I want it to do and get a little bit more out of it."

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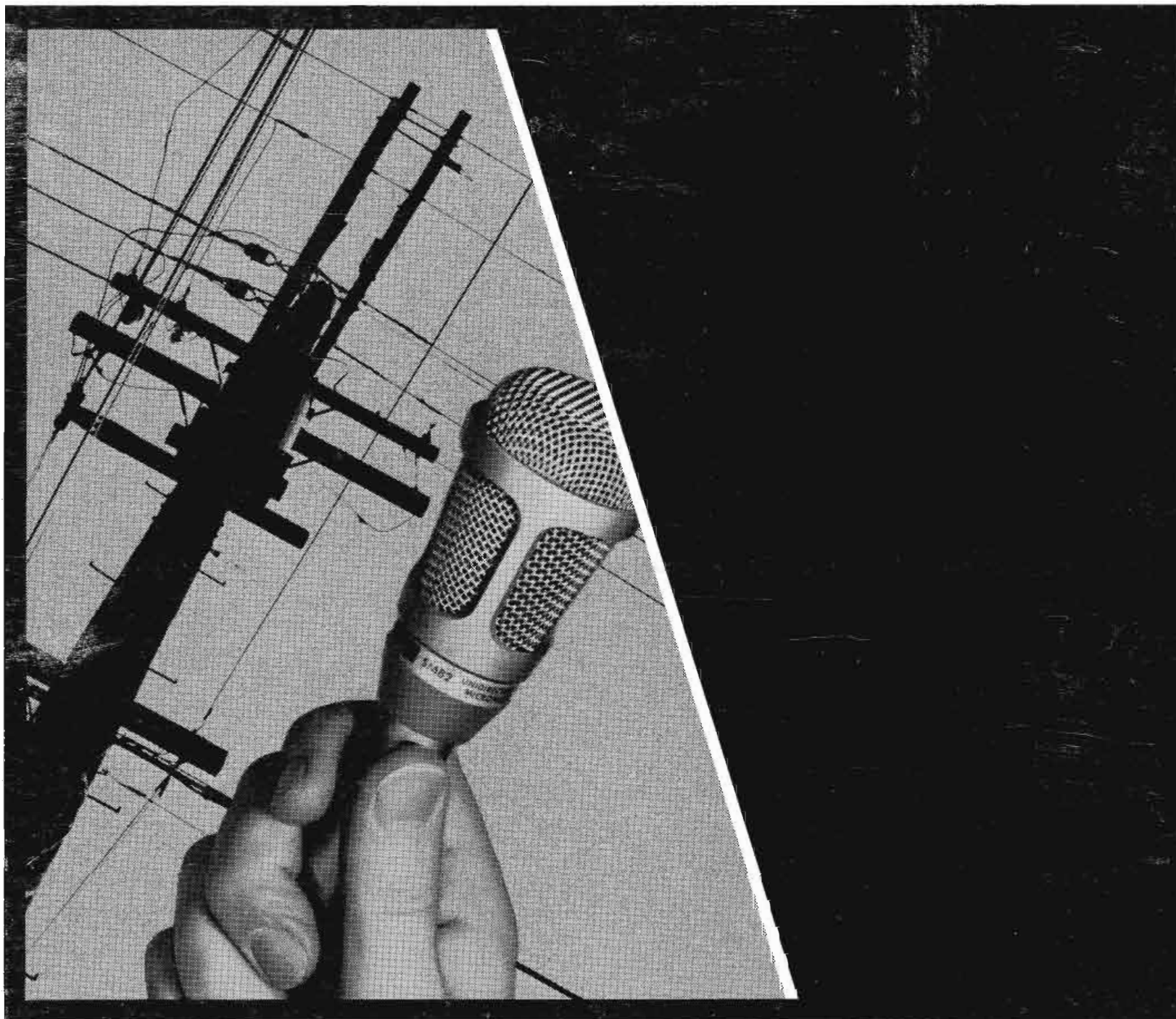
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