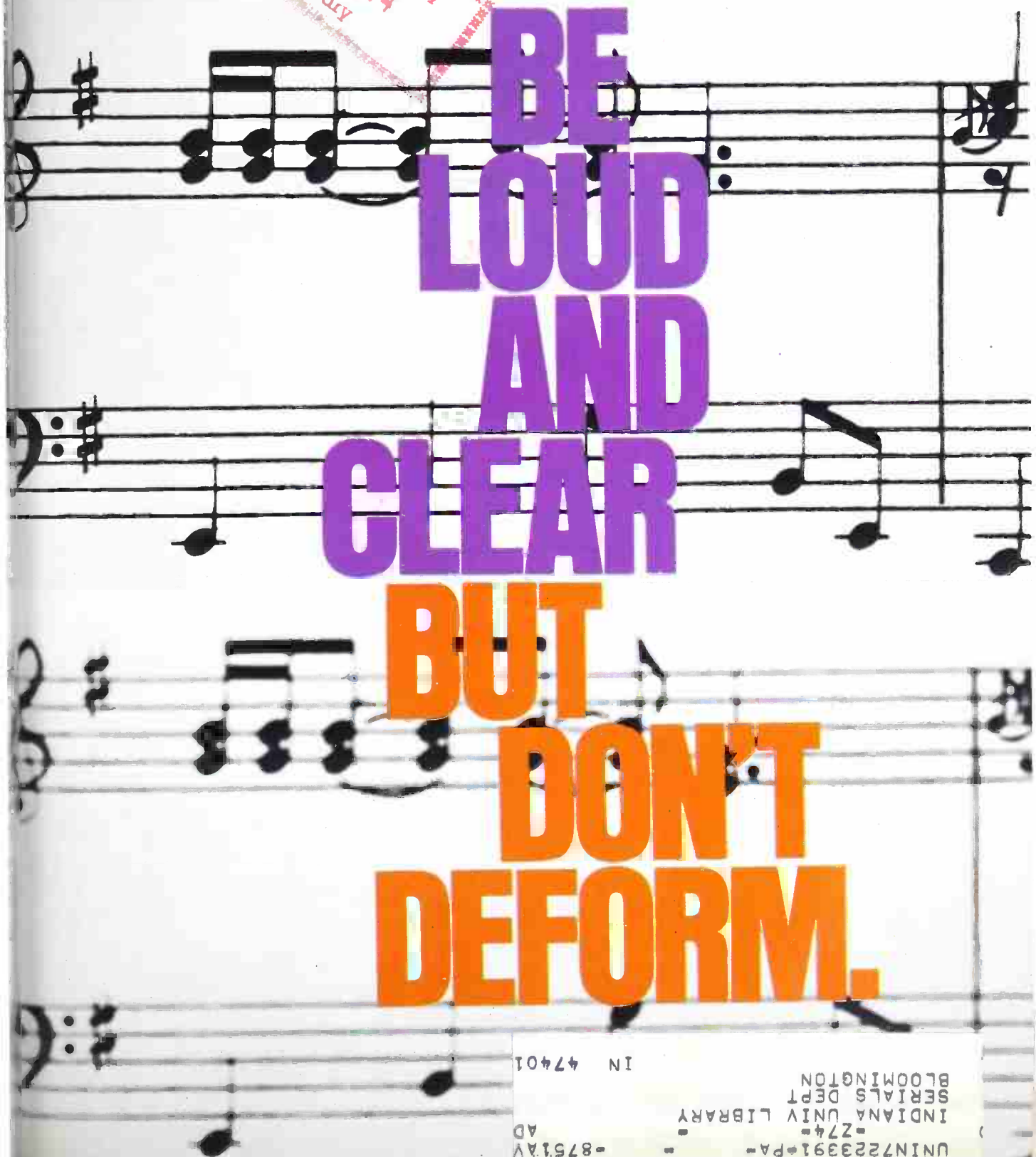
OCTOBER 1974

BM/E

BROADCAST MANAGEMENT/ENGINEERING



BE LOUD AND CLEAR BUT DON'T DEFORM.

Sony Video Tapes: made to quality standards so high we've never had a major customer complaint!

Sony Video Tape is quality video tape. It's designed, manufactured, quality controlled, marketed, and guaranteed by Sony . . . one of the largest video tape manufacturers in the world!

Consider this fact: Sony has never had a major customer complaint on any type of video tape we make! That's the kind of quality control that pays off . . . for you . . . with a uniformly balanced picture, in crisp black & white, or vivid color, with the highest signal-to-noise ratio available, with unmatched durability, and with benefits like no head clogging and fewer dropouts.

No matter what brand of VTR equipment you use, check this quality line-up of Sony Video Tapes:

¾-inch U-Matic Videocassette Tape*: virtually eliminates dropout and color noise. Available in playing time from 10 minutes (237 feet) to 60 minutes (1175 feet).

½-inch video tape: with special backing treatment to reduce windowing and scratching. Comes in playing time from 10 minutes (380 feet) to 60 minutes (2370 feet).

1-inch video tape: with increased density of oxide coating for optimum picture and sound.

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Endless Loop Video Cartridges: for continuous-use applications like trade shows and product demonstrations. Available in 5 and 10 minute playing times.

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Sony. Quality video tape!

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- ☐ ½-inch Tape.
- ☐ 1-inch Tape.
- ☐ 2-inch Tape.
- ☐ Endless Loop Video Cartridges.

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COMPANY/INSTITUTION

ADDRESS

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STATE ZIP

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You can run video through cable lengths of up to 25,000 feet with DYNAIR's equalizers.

That's right. You can run video up to *five miles* with DYNAIR equalizing equipment . . . and you can do it inexpensively and be assured of precise signal restoration.

Let's talk dollars: $495 will give you a flat signal the end of 4000 feet of RG-11/U, with 55 dB of common mode rejection; an additional $290 will let you run balanced cable, which will eliminate duced hum. For under $3600 you can run video ith a bandwidth of 16 MHz up to *two* miles. Or ith another of our systems, you can transmit oadcast (5 MHz) video up to *five* miles through alanced cable, without repeaters, for about $5000.

Many options are available, with the system price ependent upon whether it's balanced or unbal-nced, the distance of the run, and the required ndwidth. And it's compatible with all color andards.

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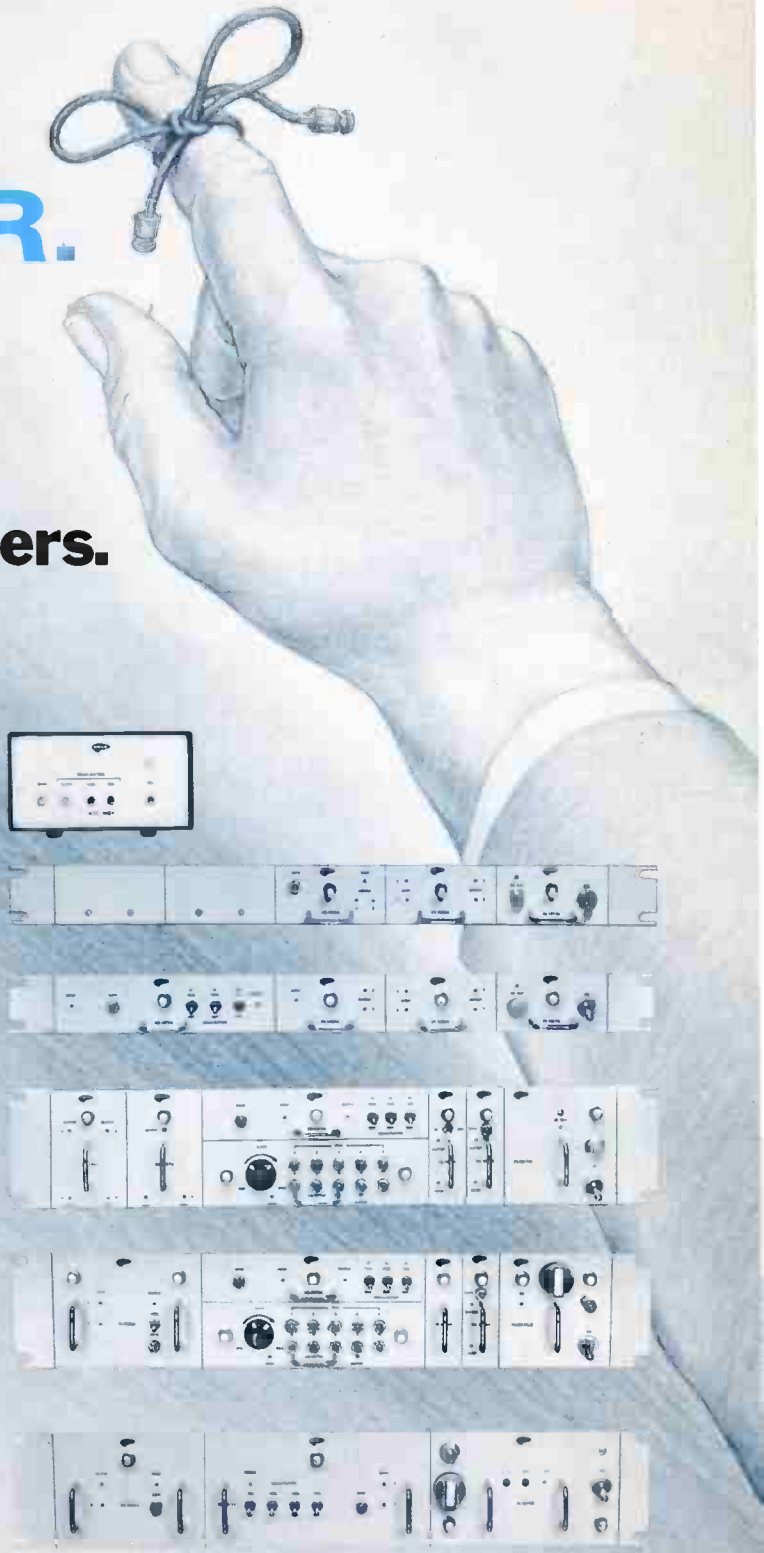
And it's all done with standard, off-the-shelf quipment. No long delivery delays . . . no added ngineering costs or one-time production costs. eld-proven standard products which are easily mbined to satisfy almost any equalization require-ent to 25,000 feet.

If you don't have a copy of "Video Transmission echniques", you would be wise to write for one. 's free from DYNAIR, and its 70 jam-packed ages will tell you a lot about how to handle long deo runs and what DYNAIR equalizers can do r you.



(Prices are budgetary and do not include cabling.)

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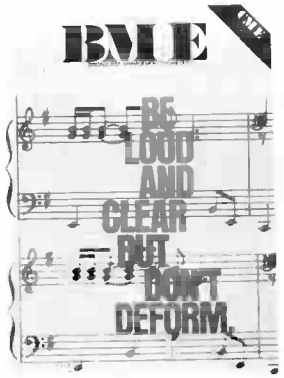

You can "reform" your audio to increase loudness but the final result is often a "deformed signal." If fidelity is important to you—and it should be—read Geoffrey Bryan's article on page 32 carefully.

BROADBAND INFORMATION SERVICES, INC.
274 Madison Ave.
New York, N.Y. 10016
212-685-5320

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CM/E: A supplement for those with cable interests following page 50

BPA
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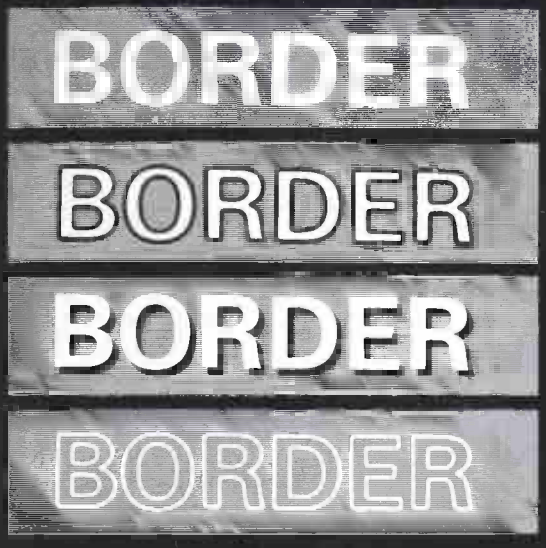
BORDERLINE GENERATORS



STARTING WITH A NORMAL KEY SIGNAL, THE GVG BORDERLINE WILL----------

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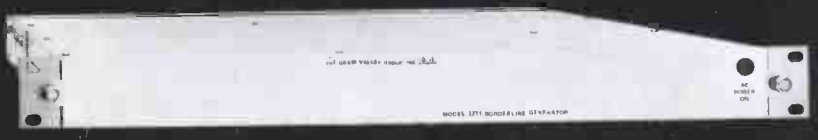

DESCRIPTION

Grass Valley Group Borderline Generators are used to add borders to captions and titles from camera video signals or character generators. The added borders greatly inhance the insert visibility, and are particularly effective in situations requiring a white insert into a predominantly white scene.

Model 3271 is for use with GVG 1400 Series switching systems and 900 Series special effects equipment. The keying circuitry in the special effects amplifier is utilized for the inserting function, thereby enabling effects such as wipe key between bordered inserts.

Model 3272 is for use with special effects equipment of other manufacturers. It provides a widened key signal output which can be connected to the external key input of most special effects systems. The widened key output, together with a slightly delayed (H and V) title video signal, is used to achieve the border effect.

Model 3273 is a complete system which provides bordered inserts into a composite video signal, such as at the output of a switching system. The unit is entirely self-contained and requires no horizontal or vertical driving signals.

Borderline Generators are available for NTSC, PAL, PAL-M, and CCIR standards.

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BROADCAST INDUSTRY NEWS

NAB FALL CONFERENCES SEEK ENGINEERS

The 1974 Fall Conferences of NAB will differ from previous years. Special sessions are scheduled to appeal to chief engineers, radio and television program directors, and sales managers as well as managers.

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

TOWERS IN THE NEWS

Two new entrants in the race for "tallest TV antenna" will in the near future push past all present contenders, and end in what amounts to a dead heat, higher above their respective surroundings than any tower-borne antenna has been before. On top of the Sears Roebuck Building in Chicago, (pix shows location of tower base) WLS-TV will erect a 350 feet antenna for a total of 1804 feet to the street.

In Toronto, Canada, the Canadian National Observation and Communications Tower, shown in the model, will put the tip of the TV antenna 1805 feet above the street. Close competitors: The Ostankino Tower, Moscow, 1748 feet; World Trade Center, New York, (not yet built), 1727 feet; Empire State, New York, 1422 feet.

Another spectacular, though not cloud-scraping tower operation, was the recent addition of a 100-foot pole to the top of the 400-foot tower at WOMC-FM, Metromedia's 190-Kw stereo outlet in Detroit. As the photo shows, a specially equipped helicopter lifted the new tower section into place. The aim of the tower modification was increased coverage in areas surrounding the city.

A day-long Engineering Confe ence will cover basic problems su as Interconnection of Program Fac ities, (presented by Moseley Ass ciates, ABS and AT&T); The Fu ure of Quadraphonics (RCA); NE Advancements in Audio Vid switching techniques (TeleMatio FCC rules and regulations (Bartle NAB, Kassen FCC); Tuning a Maintaining Transmitters (Gat Harris); Principles of Microph Utilization (Shure).

Broadcast experts will zero in the status and prospects of dire to-home TV via satellites and n working by satellites.

Conference dates and locations ar

New York	Oct. 22–23	Waldorf Astoria
Atlanta	Oct. 28–29	Hyatt
Chicago	Oct. 30–31	Hyatt O'Hare
Dallas	Nov. 14–15	Fairmon
Denver	Nov. 18–19	Brown Palace
Las Vegas	Nov. 20–21	Sands

Broad Technical Program For NAEB Las Vegas Meeting

For the 50th anniversary conventic to run November 17 thru 20th Las Vegas, the National Associati of Educational Broadcasters has pt together a comprehensive progra of technical sessions covering top from satellite receiver tests to sta of-the-art of videotape recordi from digital audio circuitry to ti compression techniques; and ma others.

Among other sessions on the fo day program will be a number management of educational broa cast operations; on the latest proje of education via radio and televisi on new programming resour being developed by educatio broadcasters around the count and on the latest approaches to fu raising by educational broadcaste McGeorge Bundy, president of t Ford Foundation, and Buckminis Fuller, inventor and philosopher, a among the distinguished gu speakers. The Las Vegas Hilton

continued on pag

COHU will sell you an Encoder, Auto Balance & Enhancer

for what you would pay the competition for one of these items.

This exciting newcomer to our video processing equipment line combines three separate products into one, and is designed to interface with new or presently-in-use telecines, or any three tube RGB color camera system.

Vertical Interval Reference insertion capabilities in the encoder insure unsurpassed signal and stability. Remote control of burst, color bars, and chroma, as well as detail on/off and detail gain are standard features.

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Automatic horizontal and vertical enhancement holds the contour signal constant at more than 55 dB signal-to-noise ratio.

Cohu's Encoder, Auto Balance, Enhancer combination gives you what you need, plus what you'd like to have, at the price of an encoder or enhancer alone . . . you expect more from Cohu and you get it.

For further information contact your local Cohu Sales Engineer or Cohu, Inc., Electronics Division, P.O. Box 623 San Diego, California 92112 or phone: 714-277-6700. TWX: 910-355-1244.

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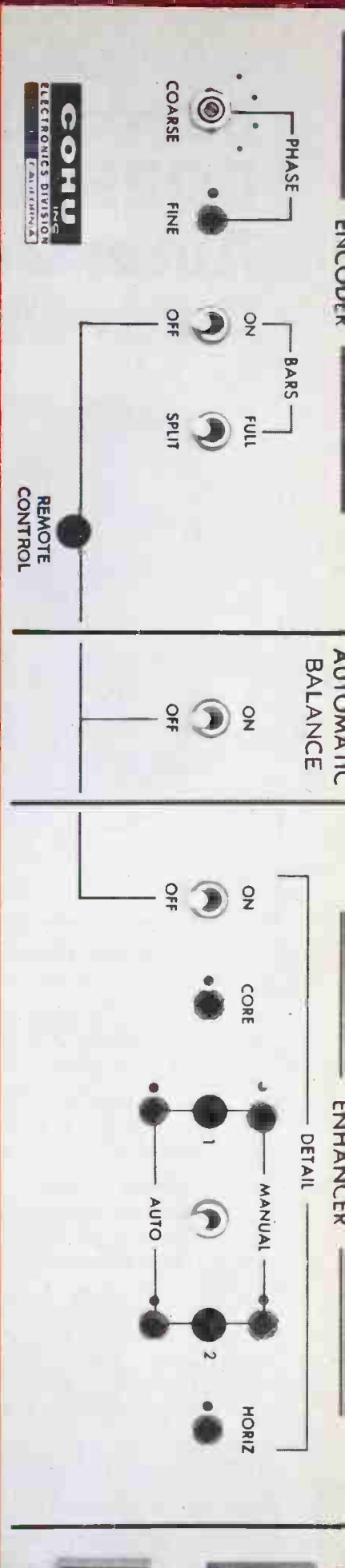
*This function is active only when used in conjunction with Cohu's 1500 Series Film Camera



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NEWS

headquarters for the meeting.

25th Anniversary for KPGY

KPGY, Iowa State University radio station, originally signing on as KMRH, will celebrate its 25th anniversary the week of October 14-20. Former staff members are to be honored and the station invites all alumni to get in touch.

NAEB To Give Award To Ford Foundation

An award for "extraordinary contribution to the nation's education in general, and to public broadcasting in particular" will go to the Ford Foundation at the National Association of Educational Broadcasters meeting in Las Vegas, in November. The award, The NAEB Distinguished Service Award for 1974, will be given to McGeorge Bundy, president of the Ford Foundation by William G. Harley, president of NAEB.

Another part of the Las Vegas meeting, the 50th anniversary meeting of the NAEB, will be a course presented by San Diego State University and offering academic credit titled "Contemporary Problems in Public and Instructional Telecommunications." Enrollees will select sessions they will attend, in consultation with the course instructors, Dr. Donald G. Wylie of San Diego State University and Mr. Paul J. Steen general manager of KPBS, San Diego. Fee: $26. Info: San Diego State University, San Diego CA 92115.

NAB Opposes Divestiture Of Cross-Media Ownership

At a recent meeting with the Federal Communications Commission, a three-man team from the National Association of Broadcasters presented arguments and voluminous material in opposition to the FCC's proposals for forcing certain cross-media owners to divest themselves of broadcast properties.

On the NAB team were special counsel Lee Loevinger, a former FCC Commissioner and former head of the Justice Departments anti-trust division; John Summers, NAB general counsel; and John Dimling NAB vice president and director of research. Among the materials submitted were: a study indicating that cross-ownership did not raise ad prices; a study showing that media concentration is now at an all-time low; evidence that cross owners dis

continued on page 1

EIMAC provides reliability year after year—and now offers a 3,000 hour warranty.

For years, the industry-wide standard warranty for power grid tubes has been 1,000 hours.

For years, the operating lifetimes of EIMAC tubes have exceeded this warranty — reducing down-time and boosting on-the-air time in thousands of transmitters. So, EIMAC offers a new warranty policy for 81% of all standard power grid tubes: 3,000 hours/1 year, with prorated adjustment from 300 to 3,000 hours. Failure during the first 300 hours results in complete replacement.

This warranty is a direct result of reliability that has been built into every EIMAC product for the past 40 years. Our 3,000 hour warranty stands as proof.

For details about which tube types are covered by the new warranty, contact EIMAC, Division of Varian, 301 Industrial Way, San Carlos, California 94070. Or any of the more than 30 Varian/EIMAC Electron Device Group Sales Offices throughout the world.

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much less trafficking in licenses th others; an analysis of broadcast ne coverage, showing little difference diversity between paper-affiliat and non-affiliated stations, with t advantage with the affiliated.

Some of the other NAB conte tions were: the area of competiti between television and newspape for advertising is limited, since handles mostly national ads, pape mostly locals; a prospective ru would not affect most present cros media owners, but would probab inhibit establishment of new statio in smaller communities; there is plethora of media advertising every market—indeed, many obser ers consider the public overload with divergent information.

NAB Asks FCC To Allow Automatic TV Transmitters

Saying that "the time is now" f automatic transmission systems f television, the report of an enginee ing committee of the National Ass ciation of Broadcasters urges t Federal Communications Commi sion to alter the rules in favor of su systems. The report summarizes t present state of technology bearin on automatic tv transmission a concludes that broadcast manag ments could now benefit great from automatic transmission. T system should be free of all recor keeping functions, with no operati logs required. Nor, said the repo should such a system be in any way continuation of the present remo control concept. "Compliance wi the Commission's technical criter would be a design feature of the sy tem . . . . Any deviation beyond e tablished limits on the technical to erances would deactivate the tran mitter."

The "Birds" Are Flying, And Users Get Busy

The era of the domestic satellite g a flying start this summer in t U.S., and a wide range of compani and organizations are mobilizing use this late-20th-century commun cations technique.

As earlier reported in BM/ Western Union started the para with its Westar I, launched in Ma and now has FCC authorization send up Westar II this month (Oct ber). First commercial service usi Westar I was announced by Ame can Satellite Corporation and Western Union in July: service i

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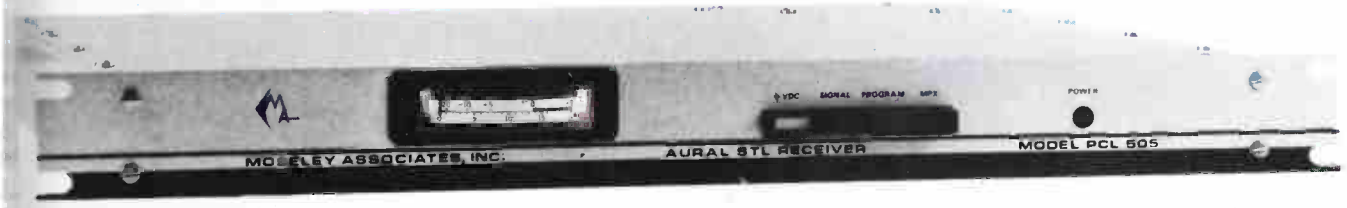
INTRODUCING

THE MODEL PCL-505 AURAL STUDIO-TRANSMITTER LINK



From the pioneers in solid-state aural studio-transmitter links (STL) comes an all new system — **the Model PCL-505.** Monaural and composite versions of the PCL-505 are available to fulfill all requirements. The composite approach, a single link for stereo, was **a Moseley first!** Even quadraphonic stereo has been considered in the design of this system. Modular construction is used throughout the transmitter and receiver and greatly simplifies routine service and maintenance. True direct frequency modulation, first used in the Moseley PCL-303 STL, assures the maximum possible performance. For the international broadcaster, the PCL-505 is available for operation in all common STL bands from 148 MHz to 960 MHz. Request Bulletin 250 for full details on this outstanding system.

Visit us in Booths 4 and 5 during the NAFMB Convention in New Orleans and see the PCL-505 STL.

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THAT WAS IN THE CAMERA
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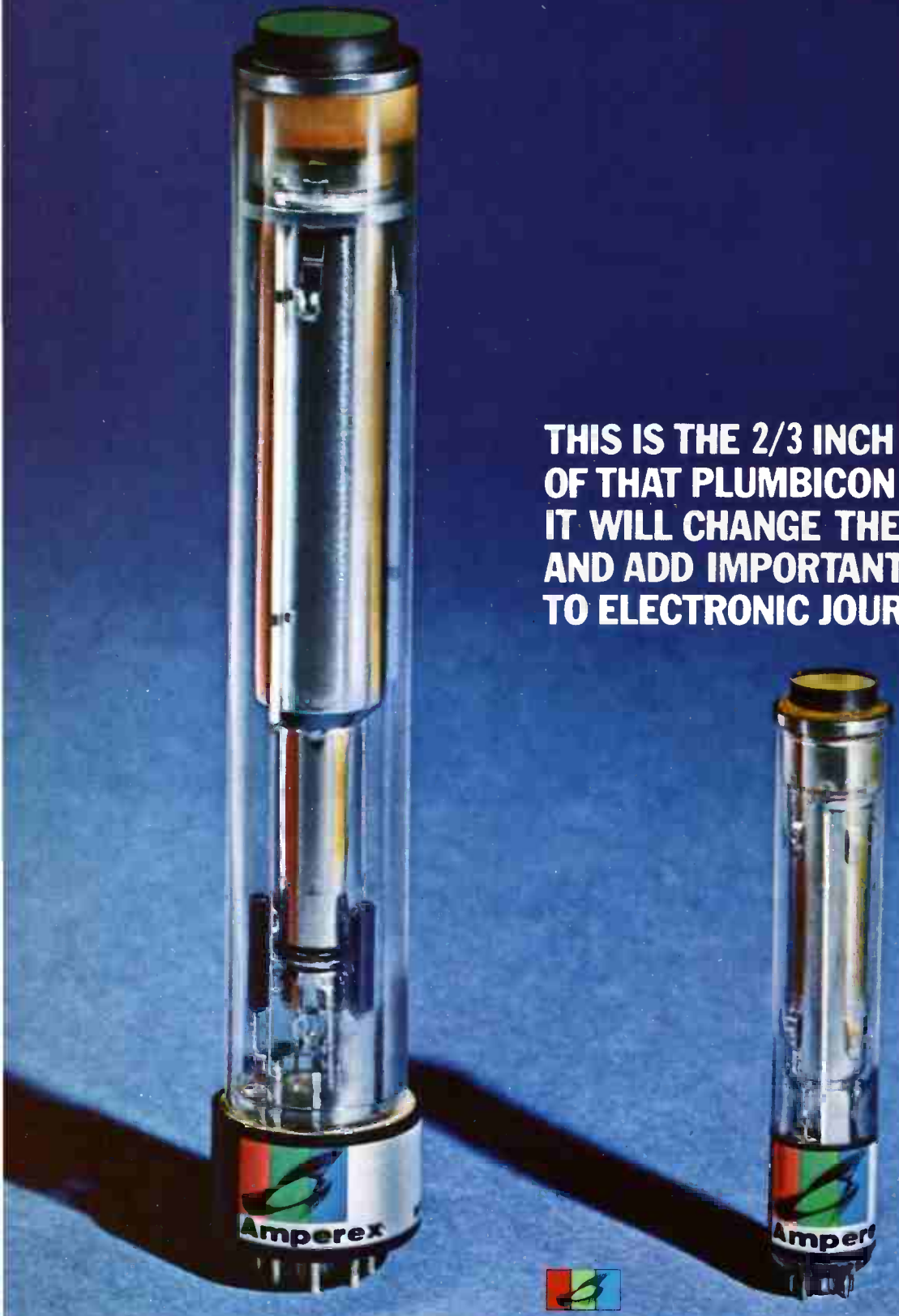

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TO ELECTRONIC JOURNALISM.

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cluded voice and data transmission between many cities coast to coast. Both WU and ASC say they will expand the service rapidly.

ASC also announced an agreement with the American Broadcasting Company to provide radio network linkages for four ABC nets, with the satellite hop initially being between the ABC master control in New York and the Los Angeles central control. From those points, terrestial service would fan out to other cities. ABC said that as time goes on they would increase their use of satellites in networking.

A different kind of use emerged in August, with the experimental transmission of a Muzak program to the roof of the Waldorf Astoria Hotel in New York. Program took to the air at RCA Globe Com's earth station, Valley Forge, Pa., travelled to the Canadian Anik I satellite, and thence to New York. One main object was a check of a very small earth station for reception. Such stations, said Muzak officials, might make feasible distribution of many of their programs via satellite.

RCA got from the FCC expanded authorization to build earth stations in Alaska, for the comprehensive satellite communications system planned for that state. Scientific Atlanta got the contract to build some of the earth stations for the RCA Alaska net. Collins Radio announced a $6 million contract to build earth station ground communication equipment for AT&T's Domsat Program.

The Public Broadcasting Service got FCC authority to use an experimental earth station to check feasibility of using satellites for the PBS net. And the Cable Satellite Access Entity, industry group studying the feasibility of cable use of satellites, announced a highly encouraging report from their consultants, Booz, Allen and Hamilton.

SMPTE Sets Plans for Meeting in Toronto

A full day of sessions on the problems and techniques of signal identification within tv programs is one of the features announced by the Society of Motion Picture and Television Engineers for their 116th Technical Conference, running November 10 thru 15th at the Four Seasons Sheraton Hotel in Toronto.

Among other technical topics will be films for television, satellites in broadcasting, cable tv, sound record-

continued on page 14

NEWS

ing and reproduction. Exhibit spac which went on sale July 24th, co sists of 78 booths, according to e hibit chairman Robert Dexter. I quiries should go to SMPTE at 8 Scarsdale Ave, Scarsdale, N 10583. More than 3000 registrar are expected at the conference.

Concert Music Meet Reports 5 Million Classics Fans

There are more than 5 million pe sons in the audience of classic music stations in the U.S., accordi to a report based on audience ratin and presented at the annual meeti of the Concert Music Broadcaste Association, held in Lenox, Mas August 9 to 12th.

At the meeting, attended by mo than 150 station managers and ot ers interested in good-music broa casting, the CMBA gave an awa to Arthur Fiedler, Boston Pops co ductor; and heard talks by Fiedl Mrs. Serge Koussevitsky, Gunth Schuler, and Fr. Robert Drina Congressman from Massachuse who was a sponsor of the all-chann receiver bill. There were sessions sales, promotion, and programmin and on new trends in engineerin Chairman C. K. Patrick of WCI Cleveland, announced that the 19 meeting would be held in Clevelan

TV Revenues Topped All Records in 1973

The final count on television's nances in 1973, released late in A gust by the FCC, showed total rev nue of $3.46 billion and profits $653 million, both record figur and up 9% and 18%, respectivel from the year before. The three n tional networks, considered separat ly, had revenues of $1.40 billion a profits of $185 million, the latter 66% from 1972. Local revenue a vertising increased 15% more th network or national and region spot revenue increased

FCC Re-opens Prime-Time Access Decisions

With its January, 1974 modific tions of the prime-time access ru (half-hour "cleared time" daily, r moval of Sundary from rule), barr before September 1975 by action June of the Court of Appeals, t FCC decided to reopen the who rule to possible modification, reaffi mation, or removal. Comments we

continued on page

Fewer parts... fewer problems with audiopak® A-2 broadcast cartridge

Ribs are molded into the flange— no pencil leads to break and jam.

No top wire. Reloading's easier.

Tape guide is an integral part of the cartridge base —not glued in— to insure accurate azimuth control.

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In the broadcast cartridge world, the simpler the better. That's why the design of the audiopak A-2 eliminates parts that can give you trouble.

The lessons learned from our years of experience developing the world's leading 8-track cartridge have been applied to our audiopak A-2. The result is a more durable, more reliable broadcast cartridge. And because we manufacture the entire product—from tape to packaging—we can assure you of the highest possible quality control.

We're so sure we have the best product on the market, we want to prove it... at no cost to you. For your free sample and more information on the audiopak A-2 broadcast cartridge, write on your company letterhead to: Capitol Magnetic Products, Division of Capitol Records, Inc., 1750 North Vine St., Los Angeles, Calif. 90028. Attention: Marketing Manager, Professional Products.

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INTERPRETING THE FCC RULES & REGULATIONS

"Fairness Doctrine: 1974" Part I

By Frederick W. Ford and Lee G. Lovett
Pittman, Lovett, Ford and Hennessey, Washington, D.C.

Over the past several years, this column has annually presented an up-dating of the Fairness Doctrine. Within the past few months, the Commission has adopted its "Fairness Report" - an extensive, thorough presentation of the obligations of broadcast licensees under the Fairness Doctrine. An examination of this 1974 Report is of paramount importance for every broadcaster.

Preliminarily, the Fairness Doctrine may be succinctly defined, in laymen's terms, as follows (1) when programming involving important, controversial issues is presented, there is a responsibility to present a *reasonable* amount of programming on all sides of that issue and (2) there is an obligation to provide some controversial issue programming. The U.S. Congress codified the Fairness Doctrine, in 1959, by inserting provision Section 315(a) in the Communications Act. The U.S. Supreme Court confirmed the constitutionality of the Fairness Doctrine in its 1969 *Red Lion* decision.

Background

In June 1971, the Commission instituted a broad-ranging inquiry into the efficacy of the Fairness Doctrine and related public interest policies. The Commission observed that nearly twenty-two years had past since it last gave comprehensive consideration to the Fairness Doctrine and declared that the time had come "for a reassessment and clarification of basic policy."

As a result, numerous parties filed comments with the Commission, and a full week was devoted to panel discussions and oral arguments, with over fifty persons participating in the discussions and with over thirty other persons making oral arguments.

Forthcoming from the Commission's inquiry was its 1974 "Fairness Report" which provides succinct and meaningful guidelines for broadcast licensees in meeting their Fairness Doctrine obligations. In two parts over the next two months, this column will set forth pertinent details for broadcasters concerning the current status of Fairness Doctrine obligations.

Fairness Doctrine Generally

As the Commission noted in its "Fairness Report," it is appropriate to recall the underlying purposes of the Doctrine and its relationship to freedom of speec In 1949, the Commission set forth the basic premise of the Doctrine in its *Report on Editorializing,* 1 FCC 1246.

> "It is axiomatic that one of the most vital questions of mass communication in a democracy is the development of an informed public opinion through the public dissemination of news and ideas concerning the vital public issues of the day .... The Commission has consequently recognized the necessity for licensees to devote a reasonable percentage of their broadcast time to the presentation of news and programs devoted to the consideration and discussion of public issues of interest in the community served by the particular station. And we have recognized, with respect to such programs, the paramount right of the public in a free society to be informed and to have presented to it for acceptance or rejection the different attitudes and viewpoints concerning these vital and often controversial issues which are held by the various groups which make up the community. It is this right of the public to be informed, rather than any right on the part of the Government, any broadcast licensee or any individual member of the public to broadcast his own particular views on any matter, which is the foundation stone of the American system of broadcasting."

Of course, even a slightly perspicacious perso would see what would appear to be a striking parado that the affirmative use of government power to e: pand broadcast debate flies in the face of the freedo of speech concepts traditionally implied by the al sence of governmental supervision or control set fort in the First Amendment. Indeed, the First Amend ment has clearly been interpreted to protect the fr marketplace of ideas by precluding governmental i trusion. However, as the Commission points out in i "Fairness Report:" "The continuing evolution of th media of mass communications - both technological and in terms of concentration of control - has le gradually to a different approach to the First Amend ment. This approach - an affirmative one - recognize the responsibility of government in maintaining an enhancing a system of freedom of expression."

It is the physical characteristics of the broadcastin medium itself that presents the principal impedimer to free expression. It must be remembered that bac during the 1920s, government regulation of broad casting was virtually non-existent, and broadcaster had the same freedom of action traditionally afforde the publishers of newspapers and magazines. The di

istrous result of this policy was summed up by the ommission as follows:

"From July 1926, to February 23, 1927, when Congress enacted the Radio Act of 1927 almost 200 new radio stations went on the air. These new stations used any frequency they desired, regardless of the interference thereby caused to others. Existing stations changed to other frequencies and increased their power and hours of operation at will. The result was confusion and chaos. With everybody on the air, nobody could be heard."

Therefore, in 1927, Congress acted to end the crisis y establishing an effective system of government licensing. It was obvious that licensing was essential to ie development of an effective system of broadcastig. In 1943, the Supreme Court concluded that, beause of the scarcity of available frequencies, the licensing system established by Congress did *not* vioite the First Amendment. But it was 26 years later, the landmark decision *Red Lion Broadcasting Co., FCC,* 395 U/S. 367, that the Supreme Court set orth a comprehensive First Amendment theory which ndicated both the licensing system and the Commison's Fairness Doctrine. In the Court's opinion, the irst Amendment did not confer upon anyone the ght to operate a radio station. Stated the Court,

"If there is to be any effective communication by radio, only a few can be licensed and the rest must be barred from the airwaves. It would be strange if the First Amendment, aimed at protecting and furthering communications, prevented the government from making radio communication possible by requiring licensees to broadcast and by limiting the number of licenses so as not to overcrowd the spectrum.

* * * *

"The basic purposes of the First Amendment would, in fact, be *undermined,* if there were an unabridgable First Amendment right to broadcast comparable to the right of every individual to speak, write, or publish. Nevertheless, provision must be made to ensure recognition of the First Amendment interests of citizens of the United States to advance appropriate views and to ensure free and robust debate."

Significantly, the Court also stated, "It is the right the viewers and listeners, not the right of the broadisters, which is paramount."

In light of the fundamental purpose of the First mendment and the paramount right of the people to ave that purpose implemented in the broadcast meium, it became clear that the licenses granted by the overnment to the "chosen few" broadcasters could ot be considered as a privilege to ignore the probms which "upset the people . . . or exclude from the rways anything but their own views of fundamental uestions." As the Supreme Court declared,

"The First Amendment confers no rights on licensees to prevent others from broadcasting on 'their' frequencies and no right to an unconditional monopoly of a scarce resource which the government has denied others the right to use."

"As far as the First Amendment is concerned those who are licensed stand no better than those to whom licenses are refused. A license permits broadcasting, but the licensee has no constitutional right to be the one who holds the license or to monopolize a radio frequency to the exclusion of its fellow citizens. There is nothing in the First Amendment which prevents the government from requiring a licensee to share his frequencies with others and to conduct himself as a proxy or fiduciary with obligations to present those views and voices which are representive of his community and which would otherwise, by necessity, be barred from the airwaves."

Thus, the purpose and foundation of the Fairness octrine is that of the First Amendment itself: *"To eserve an uninhibited marketplace of ideas in hich truth will ultimately prevail, rather than to untenance monopolization of that market, whether be by the government itself or a private licensee."*

However, the Commission clearly recognized that ere exists within the framework of Fairness Doc-

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FCC Rules and Regs

trine administration and enforcement the potential f undue governmental interference in the processes broadcast journalism, and the resultant possibility diminution of the broadcasters and the public's legi mate First Amendment rights and interests. As a r sult, as noted above, the Commission has taken long, hard look at the Fairness Doctrine and h updated and clarified the Doctrine through the r lease of the 1974 "Fairness Report."

Fairness Doctrine Specifics

The Commission candidly admits that, in enforci the Fairness Doctrine, it must continually "walk tightrope" between saying too much and saying t little. Nevertheless, the Commission also believes th it has a clear responsibility and obligation to assur the task of reaching a determination as to what pa ticular policies will best serve the public's right to informed. The Commission believes that the public need to be informed can best be served through a sy tem in which individual broadcasters exercise wi journalistic discretion, and in which government's r is limited to a determination of whether the licens has acted reasonably and in good faith. As the Co mission declares in its 1974 "Fairness Report," it still convinced that,

> "There can be no one all-embracing formula which licensees can hope to apply to ensure the fair and balanced presentation of all public issues. Different issues will inevitably require different techniques of presentation and production. The licensee will in each instance be called upon to exercise his best judgment and good sense in determining what subject should be considered, the particular format of the programs to be devoted to each subject, the different shades of opinion to be presented, and the spokesman for each point of view."

A. Reasonable Time

Of course, the first and most basic requirement the Fairness Doctrine remains unchanged. Clear the Fairness Doctrine establishes an affirmative re sponsibility on the part of broadcast licensees to pr vide a reasonable amount of time for the broadcast programs over their facilities devoted to the discussio and consideration of public issues.

Determining what constitutes a "reasonab amount of time" is, still, a responsibility of each ind vidual broadcast licensee. It is the individual broa caster who, after evaluating the needs of his comm nity, must determine what percentage of the limit broadcast day should appropriately be devoted news or discussion and consideration of public issue rather than to other legitimate services of radi broadcasting.

Nevertheless, broadcasters must take heed: As t Commission succinctly declares, "We wish to make plain, however, that we have allocated a very lar share of the electromagnetic spectrum to broadcas ing chiefly because of our belief that this medium ca make a great contribution to an informed public opi ion. *We are not prepared to allow this purpose to frustrated by broadcasters who consistently ignor their public interest responsibilities.*"

You, the individual broadcaster, must rememb that you are the person who must select, or be respo sible for the selection of, the particular news items be reported or the particular local, state, national, international issues or questions of public interest be considered. *The responsibility is yours. The Co mission will not tell you what you must broadcast.*

Of course, the Commission has, in the past, indi-ated that some issues are so critical or of such great ublic importance that it would be unreasonable for a censee to ignore them completely; however, such atements on the part of the Commission are rare ex-ptions, and not the rule. As the Commission states, We have no intention of becoming involved in the se-ction of issues to be discussed . . . ."

. Opposing Viewpoints

It is important to remember that not only must you, ie individual broadcaster, provide adequate time for ie discussion of public issues, *but broadcast time ust be allocated for reasonable opportunities for ie expression of opposing viewpoints.*

While it has been frequently suggested to the Com-ission that individual stations should not be expect-l to present opposing points of view and that it ould be sufficient for the licensee to demonstrate at the opposing viewpoint has been adequately pre-nted on another station in the market, or in the print edia, the Commission *rejects* the suggestion. In sup-ort of its rejection, the Commission relies upon the upreme Court's pronouncements in the *BEM* deci-on which states that it would be an administrative ightmare for the Commission to attempt to review ie overall coverage of an issue in all of the broadcast ations and publications in a given market. But most nportantly, the Commission declares that "We be-eve that the requirement that each station provide r contrasting views greatly increases the likelihood at individual members of the public will be exposed varying points of view."

Therefore, you, the broadcaster, must make time vailable for a reasonable opportunity for the expres-on of opposing viewpoints. However, the following ust also be remembered:

> "The Fairness Doctrine will not ensure perfect balance and debate and each station is not required to provide an 'equal' opportunity for opposing views. Furthermore, since the Fairness Doctrine does not require balance in individual programs or a series of programs, but only in a station's overall programming, there is no assurance that a listener who hears an initial presentation will also hear a rebuttal. However, if all stations presenting programming relating to a controversial issue of public importance make an effort to round out their coverage with contrasting viewpoints, these various points of view will receive a much wider public dissemination. This requirement, of course, in no way prevents a station from presenting its own opinions in the strongest terms possible.

onclusion

Of course, in providing adequate time for discus-on of public issues, and providing reasonable oppor-nities for the expression of opposing viewpoints, any knotty problems arise for broadcasters. For ex-nple, a broadcaster must be able to determine what tually is a controversial issue of public importance. milarly, the broadcaster must be able to recognize a ecific issue that has been raised. More importantly, e broadcaster must determine what actually is a reasonable opportunity" for the expression of con-asting viewpoints. Each of these areas will be exam-ed in turn.

Next month we will examine in depth (1) what con-tutes a "controversial issue of public importance";) what specific issue has been raised; and (3) what a "reasonable opportunity" for contrasting view-ints. Additionally, we will examine the Commis-n's complaint procedure as it relates to the Fairness octrine as well as the application of the Fairness octrine to the broadcast of paid announcements and litical broadcasts. **BM/E**

Previewing the National Radio Broadcasters Conference and Exposition

Several new broadcasting items will be unveiled

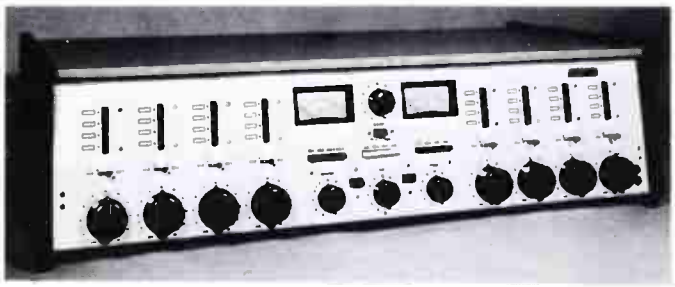
Make your station more profitable is the lure to the brand new National Radio Broadcasters Conference and Exposition, Fairmont-Roosevelt Hotel, New Orleans, October 10–13. Seminar and panel sessions covering all aspects of radio sales, promotion, programming, management, engineering, and community service blend into that conference theme, says NAFMB executive director Abe Coron.

Those who attend are in for some additional treats—first hand inspection of some brand new broadcast equipment and the incomparable food and entertainment of the incomparable French Quarter of New Orleans.

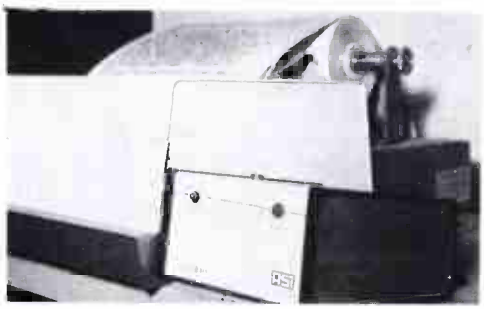
Among the new equipment on hand will be the first time exhibition of a new line of FM transmitters from CCA Electronics and the new Model 334 Dolby B noise reduction system (which will have premiered a few weeks earlier at the Audio Engineering Society Show in New York.

Although the conference and exposition is NAFMB-sponsored, it is open to all radio broadcasters. Many of the topics of the sessions will deal with problems that are relevant to both AM and FM broadcasters. Exhibitors however, are hedging a bit and will be showing primarily FM equipment.

New CCA FM transmitter (FM20C[illegible] also has a new dire[illegible] FM exciter (FM40E[illegible]



Three new products will be introduced by Ampro: a totally new dual stereo console shown above (up to 12 channels) for simulcast or stereo; a 12 channel version of existing rotary and slider faders; and new tape cartridge machine which includes a special splice finder circuit.



Audio Services will show its Tel-alert system which signals the control room (without electrical noise interference) that a bulletin or EBS test is on the wire. Company will also show its Network Tone Decoder to detect Touchtone type signals on an incoming network line for activating appropriate equipment.

Automation equipment manufacturers and syn[illegible] cated program services for automation will be there in force and since AM stations are as interested in aut[illegible] mation today as FMers, there will be something in everyone.

Featuring automation equipment will be Sch[illegible] Electronics, Systems Marketing Corp., and Cont[illegible] Design Corp. Schafer will be showing its new ver[illegible] cally-stacked multicart Audiofile system introduced at NAB in March and Control Design will show [illegible] removable drum system for easy pre-loading.

As we go to press a number of program serv[illegible] companies will be present: Broadcast Programm[illegible] International from Bellingham, Washington, Dra[illegible] Chenault and Bonneville. Vendors selling automa[illegible] business services will present: Compu/Net, Pap[illegible] work Systems Inc. and perhaps one or two more.

The new FM transmitter line from CCA will be [illegible] usual in several respects. For one, its power ratin[illegible] depart from the conventional: 12 kW instead of 10[illegible] instead of 5 and so on. These ratings are possi[illegible] through new IPA design. New exciters are employ[illegible] and CCA has gone to solid state with plug in modul[illegible] Other than transmitters, CCA will have a full aud[illegible] line, tape carts, turntables and FM monitors on d[illegible] play. There may be some new STL gear shown.

In the areas of STL and remotes, both Marti El[illegible] tronics and Moseley Associates will be there. Mose[illegible]

continued on page 2[illegible]

The new Volumax® Model 4300.

Anything else is a limited limiter.

When it comes to automatic peak controlling, the new Volumax is the smoothest operator around! It's the latest in our quest for the ultimate AM limiter. The only similarity between the Model 4300 and conventional peak limiters is that they both prevent overmodulation. And here the similarity ends!

Volumax patented control action assures maximum utilization of each watt of carrier power, without overmodulating the transmitter and with absolute minimal signal distortion. The Model 4300 features: more precise limiting at maximum allowable limits, easier set-up and proof-of-performace procedures, and extended control range of over 15dB, with less than 1% harmonic distortion.

With automatic peak phasing, negative speech asymmetry is silently inverted for positive modulation to the maximum allowable limit of 125%.

Try a 4300 and listen. You'll see why other limiters are limited. And why we think the new Volumax Model 4300 is the ultimate limiter.

CBS LABORATORIES

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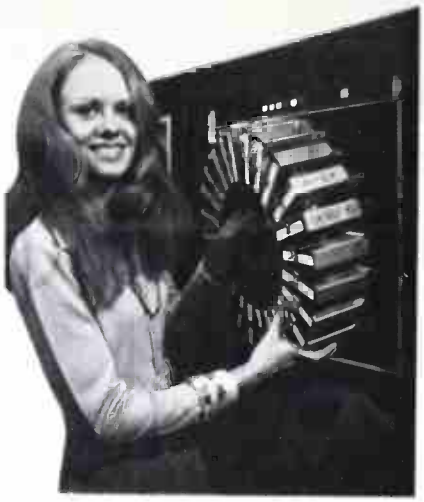
Circle 102 on Reader Service Card

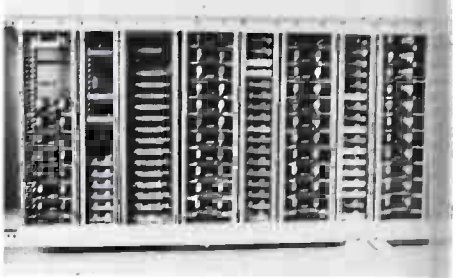


Control Design will exhibit production models of its removeable-drum cartridge player first shown at NAB. Company will also show a new line of cartridge machines incorporating a new concept in head placement.

Included in CCA's exhibit area will be this Futura 6 mono system.

Another CCA product will be this new FM monitor (FMM-1T)

Photo of Ampro's new cartridge recorder/reproducer with automatic splice finding circuitry.



Studio switcher built by Audio Services. This 40 in, 10 out stereo unit is a little larger than that usually ordered by a station.

will have some new insight to share as a result of extensive recent installations.

Transmitters will also be shown by AEL, RCA and Sparta. Sparta is taking only its FM line but included is the 610 3X battery operated unit shown at NAB for emergency standby. Centurion consoles will be shown by Sparta along with its portable mixer unit. Primary emphasis will be on FM and stereo.

RCA will show most of the radio line exhibited at NAB, Houston. A highlight of the exhibit is expected to be a demonstration of a quad broadcasting system. RCA will have a full complement of equipment for radio broadcasting from the studio through the transmitter and including FM antennas. RCA expects visitors will be particularly interested in their custom audio console, the new BC-50 series of inexpensive modules introduced at NAB this spring.

How to improve signals will be the special emphasis of noise reduction experts Dolby and Burwen, signal processing people such as CBS Labs and Broadcast Electronics (who will show the Spotmaster CCE 500 Brightner) and we can include in this category the stereo phase enhancer of Garron Electronics.

As mentioned, Dolby will have its new Model 334 Dolby B noise reduction system for FM broadcasters present. This new unit uses 25 usec pre-emphasis curves so that it in no way affects high frequency components while delivering some significant S/N improvement levels. Two FM stations with Dolby B should be on the air during the convention so that visitors can gain some first hand experience with this significant piece of equipment.

Burwen will be displaying and demonstrating thre new dynamic filters for broadcasting application These units operating on program lines, remote feed and cutting channels (in recording).

Also in the new category will be a network ale alarm system from Audio Services. This unit will de code the ten codes now sent on the UPI wire servic Audio Services will also show its EBS Tele Alert Sys tem and one of its latest custom studio switching sys tems. The company also hopes to show a master dig tal clock system.

Consoles will be shown, in addition to those b broadline suppliers already mentioned by Broadca Electronics and Ampro. Audio accessories by Broad cast Electronics, Micro-Trak and Stanton Magnetics

Tape cartridge gear will be shown by Ampr Broadcast Electronics, and Garron as well as th broadline manufacturers. Garron expects to displa its multiple cassette deck. Tape recorders will be th highlight of Ampex.

FM Antennas of all kinds, including the popula CK1000 bay will be shown by Phelps-Dodge. Dielec tric Communications will show a new line of tes equipment including RF loads and RF wattmeters.

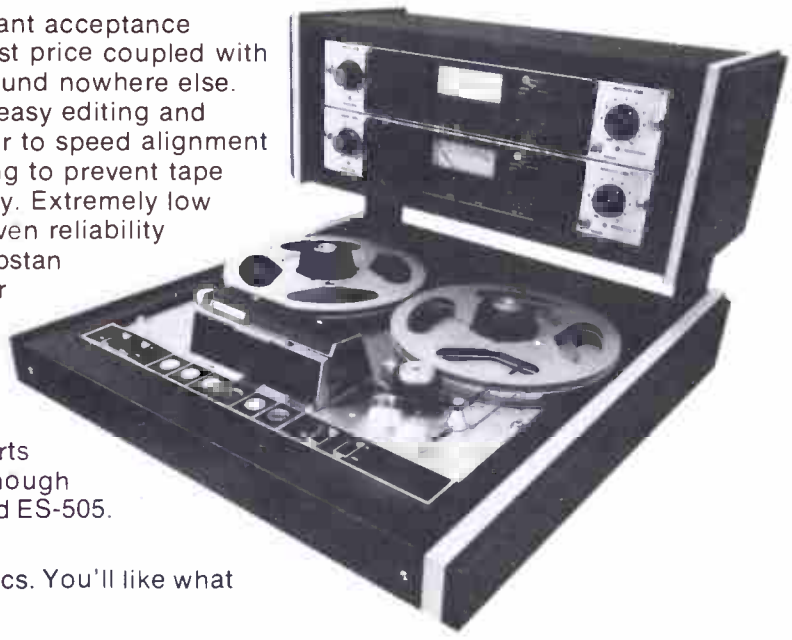
Showing the latest in FM/SCA receiver design wil be Johnson Electronics. 1975 models will be on dis play.

If you've never heard of Freeland Products compa ny not only can you visit their booth but you can visi the plant of the New Orleans based service company The service? Rebuilding transmitter tubes. Not a bad idea for increasing profits. **BM/E**

Swiss performance at American prices has made the ELECTRO SOUND 505 the new standard of the tape recording world.

It isn't surprising when you consider the Electro Sound tradition of excellence and high reliability that has made us the world's leading manufacturer of professional high-speed tape duplicators. It certainly isn't surprising when precision performance like that of the ES-505 comes at one half the price of the most expensive European and domestic machines.

Why has the ES-505 met with instant acceptance the world over? Because of modest price coupled with "operator engineered" features found nowhere else. Like a disappearing headgate for easy editing and cleaning. A built-in audio oscillator to speed alignment and testing. Optical motion sensing to prevent tape damage. Improved timing accuracy. Extremely low wow and flutter. And the time-proven reliability of disc brakes and a replaceable capstan idler, both developed originally for our tape duplicators.



Add to this an optional third reel to simplify tape handling and the world's only 1½ year extended parts warranty and you have reasons enough for the success of the Electro Sound ES-505.

Send for a brochure and all the specs. You'll like what you see.

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Circle 116 on Reader Service Card

GREAT IDEA CONTEST

October and November wind up the Great Idea entries for this year. In December, finalists in the contest will be represented for reader votes on Windjammer Cruise Winners. But don't forget to tell us your preferences for this month. Fill in the ballot which appears on the Reader Service Card.

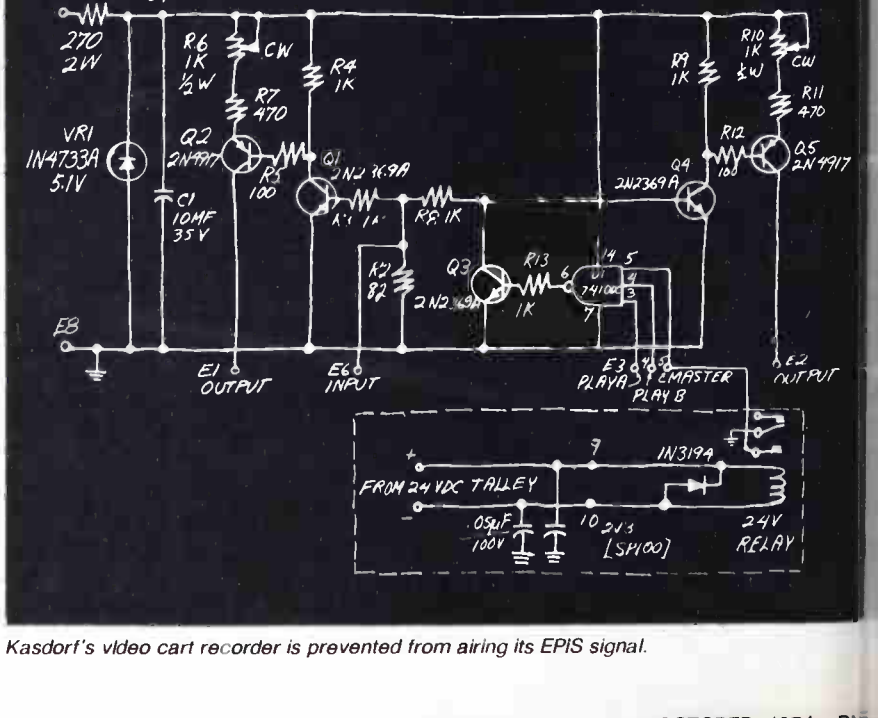
62. TCR-100 Can't Air Its EPIS Signal.

George Kasdorf, Engineer, WTMJ TV, Milwaukee, Wis.

Problem: To prevent production-code signals from being aired. EPIS (*E*lectronic *P*rogram *I*dentification *S*ystem) is a useful addition to our TCR-100 video cart, but in our automated operation it is possible to air the readout signal used for commercial or promo identification. This is possible if: the cart machine is not pre-rolled and is switched on the air prematurely; the TCR-100 is not in the remote mode; the cut bar is hit accidentally; there is not enough time in the preceding event of the switcher.

Solution: One way to eliminate this is to have the TCR-100 output with the EPIS signal on a separate preview monitor. The signal that feeds this is, of necessity, the one that is switched on the air.

In order to prevent this from happening, we have installed a simple inhibit from the switcher On-Air talley to the Master inhibit input (E5) of the video output module PC board. Since we have the SP-100, the Master input is not used; if yo have a Master tape machine hook to your TCR-100, another ga would have to be used. There are tw unused gates in U1, the IC mounti on the video output module.



Kasdorf's video cart recorder is prevented from airing its EPIS signal.

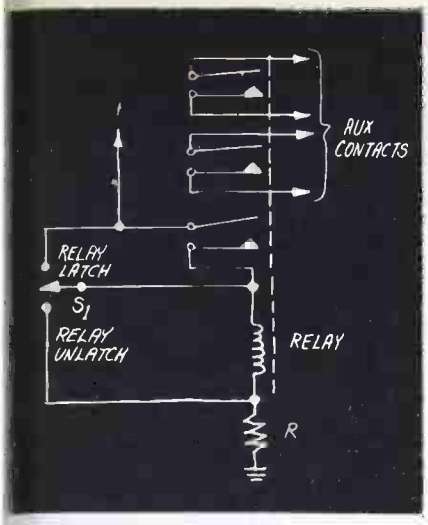
63. A Resistor Eliminates an Extra Relay.

Michael D. Callaghan, Chief Engine KWST-FM, Los Angeles, Calif.

Problem: To eliminate some of t relays in a remote control syste Some of these setups provide a co tact closure only on the Raise Lower function. This means two se arate relays are needed to obtain latching mode; one relay to latch a hold, and the normally-closed co tacts of the other to release a allow the first relay to drop out.

Solution: This circuit works wi two components: a relay and a res tor. It will work on AC or DC relay

An SPDT momentary switch used to latch and unlatch the rela Any number of these switches m be connected in parallel for remo operation. If it is likely that two d ferent locations may be trying both latch and unlatch the relay multaneously, resistor R should able to dissipate the full supply vo age. Otherwise, it need only be rat at half the relay coil rating, a should have one-third the resistan of the relay coil in either case.



Callaghan shows a novel method of eliminating an extra relay in remote control system

When S1 is closed in the upper position, the supply voltage is dropped across the relay coil and resistor is in series with it. The relay will then pull in and be held by the holding contact at the top of the relay coil. When S1 is moved to the lower position, the relay coil is shorted. The supply current flows through R, enabling the holding contact to open. The relay drops out, returning the circuit to its original condition.

64. Accurate Cart Timing With a Photo Timer.

Jim Barker, Production Engineer, KCHA AM-FM, Charles City, Iowa

Problem: To determine the amount of recording time left on a cartridge when recording multiple cuts. Like most non-network small-market stations, our spots are not always exactly 30 or 60 seconds on the button. Chances are, you've also tried squeezing one last cut on a cart, only to find it lacks a few seconds, necessitating a re-cut.

Solution: Our engineer installed a female-type 117 VAC plug on the rear of our SMC-590 Record Center and connected it to the power line between the start switch and the cart transport solenoid. A photo enlarger timer serves the purpose of timing carts, since it has a large face and counts down from 60 mins. to zero. It's plugged into the add-on cart plug, and when the machine starts the timer also begins. We timed, to the second, all our carts and labelled them with embossed tape.

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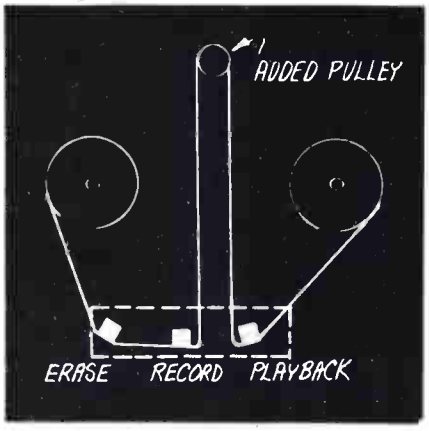
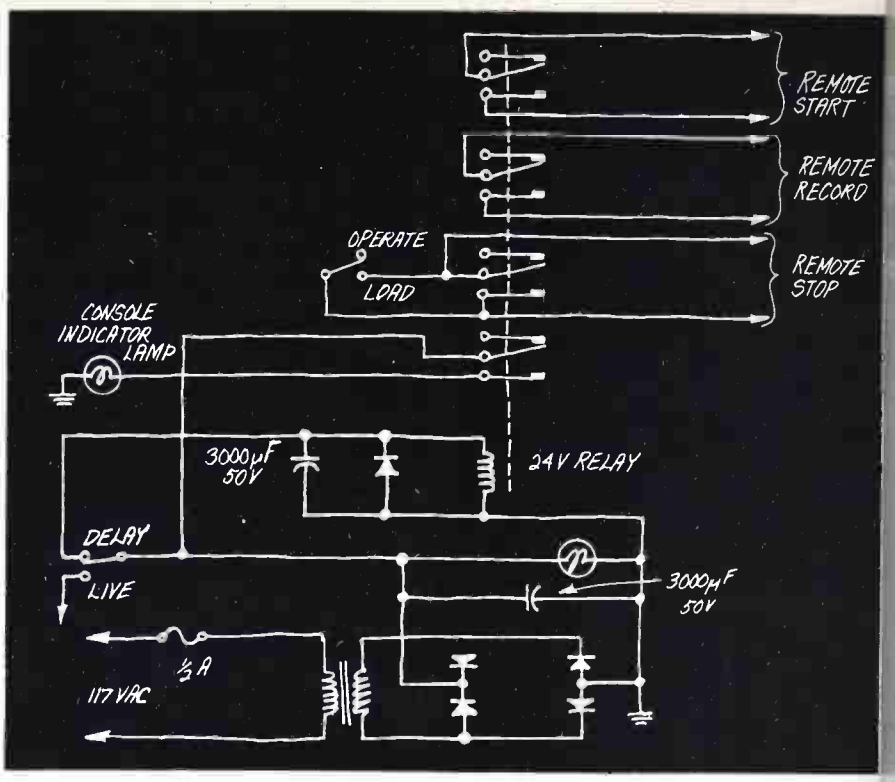
65. Modified AG-440 Rebroadcasts Delayed-Tape Program.

Jack Hurray, Engineer, WIXY-WDOK, Cleveland, Ohio

Problem: To design a tape delay which has the following features: 1) it should use open reel tape with 1.5 hours capacity which can be saved for rebroadcast; 2) the disc jockey can easily go from delay to live programming; 3) no splices to run over as with cartridge-type delay system 4) delay time is 4 secs. at 7.5 ips; 5 the machine should stop automat cally about 5 secs. after the boar operator punches the Delay-Liv



Added pulley to Hurray's Ampex rebroadcasts delayed-tape programs



"panic") button.

Solution: Our station built a tape delay by modifying one Ampex 440. However, different systems can be adapted from this idea. The only mechanical modification necessary was to reduce the tape hold-back tension. Also, a small hole was drilled at the top of the transport for the pulley wheel used to extend the distance the tape travels from record to playback heads. The pulley, mounted between the tape supply and take-up reels, is used to loop the tape during talk shows but not when the tape is rebroadcast. Capacitor C2 keeps the machine running to erase the tape that has not reached the playback head.

66. Disabling Cue Tone Speeds Actuality Transfer.

Ronald Pesha, Chief Engineer, KLMR, Lamar, Colorado

Problem: To enable stations using frequent news actualities to edit the original cart tapes directly onto cartridges. A modification, an SPST switch, disables the cue-tone Record head. Insert this normally-closed switch in series with the lead to this head, or a normally-closed version in parallel with the head to short it.

Solution: In operation, an original tape of a news actuality which would normally be edited by cutting and splicing is cued to the first desired word. The cartridge is started normally, then stopped at the end of the first desired segment of the actuality. The original tape is run ahead to the first word of the second desired segment. The cartridge is restarted with the cue record head disabled via the switch.

67. Audio Editing Without Splicing.

Michael W. Babb, WINN, Louisville, Ky.

Problem: To make ready news actuality cuts for airing within the shortest possible time. (Also see Ronald Pesha's Great Idea in this issue. It solves this problem, but in a different way—Editor.) In a busy newsroom, it is not uncommon to obtain news story audio either by telephone or from a street reporter just minutes before airtime. It is also not

continued on page 28

uncommon for this to contain a long string of "uh's," "oh's," and long pauses. Maybe even a few expletive deletes.

The conventional tape-edit method requires mechanical splicing; a time waster which does not allow last-minute actualities to be included.

Solution: On tape cart A, dub the audio to be edited from the beginning to the end of the word preceding the material to be removed. Then stop the cart. Remove it from the recording machine and manually rewind the tape (counter-clockwise) about ¼-in. This is done to remove any pops or clicks that would otherwise appear on the cart. Reinsert the cart into the recorder, and cue the material to be dubbed on the source machine past the phrase you are deleting. Start the cart recorder and the source machine in the normal fashion. Record to the beginning of the next portion. Cart A now contains the edited audio cut, but also the cue tones which will stop the cart in the middle of the cut. To solve that problem, dub cart A to another cart without releasing the start button until after all cue tones have passed the heads.

68. "Paint" Objects Out of the Scene.

Robert Fahringer, Hughes TV Network, New York, N.Y.

Problem: To chroma-key out unwanted portions of a scene while videotaping.

Solution: Paint boom mikes or another distracting object chroma-key blue. This particular color won't harm the painted object; it can be used at all times. When using chroma generators, for instance, if the mike inadvertently appears in a picture, it will be chroma-keyed out. A further advantage is that, by painting mikes chroma-key blue, you can move them closer to the talent without worrying about the mike bobbing in and out of the picture.

69. Semi-Automatic Cartridge Winder.

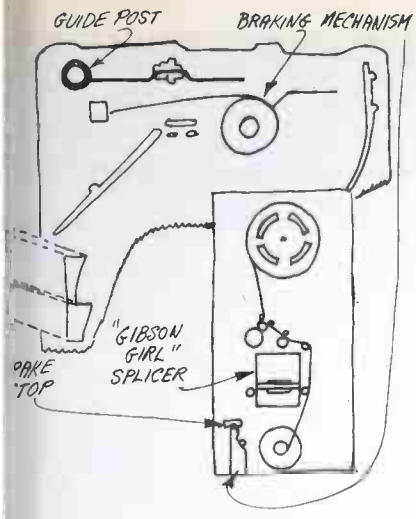
Chuck Marsh & Don Cowden, WHFB, Benton Harbor, Mich.

Problem: To reduce the time consumed in measuring, splicing, and assembly of in-station custom-length tape carts. We prefer to wind our own carts for two reasons: the overall cost is less; it permits us to wind them to any desired length at a moment's notice.

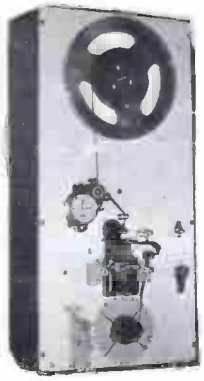
Solution: We devised a modification to our Spotmaster Cart Winder that, besides winding tape on the cart, also aids measurement and tape splicing. Removing the newly wound reel from the winder, placing it in the cart body, measuring and cutting the tape so ends are parallel, and applying and trimming the splicing tape is eliminated with this method.

The parts necessary for the modification came from a discarded cartridge and a small "Gibson Girl" splicer.

The posts used as tape guides are fabricated from two nylon cartridge posts glued top-to-top. The ree



ami-automatic cart winder, by Marsh & owden saves time making custom-timed arts.



raking mechanism is also taken om a discarded cartridge and cut size on a grinder. The stop used to old the brake is simply a piece of rtridge body cut to size and tched.

When winding a cart, the spring is lled back and held in place by the tch. When measuring and splicing e tape, the spring is released and lowed to slip into place between e notches on the cart reel, thus lding the reel motionless while the roper amount of tape is threaded t and into position on the splicer. fter splicing, remove the reel and lace in the cart body, insert the re- iner arm, and secure the top cover. ll the parts are attached to the cart inder with a water-base glue, bond- g them to the winder with suffi- ent strength yet still allowing parts be removed without damaging any them.

0. Comparator Defines ccuracy of RF Ammeters.

ay Miller, Chief Engineer, KGWA, Enid, kla.

Problem: To determine the rela-

continued on page 30

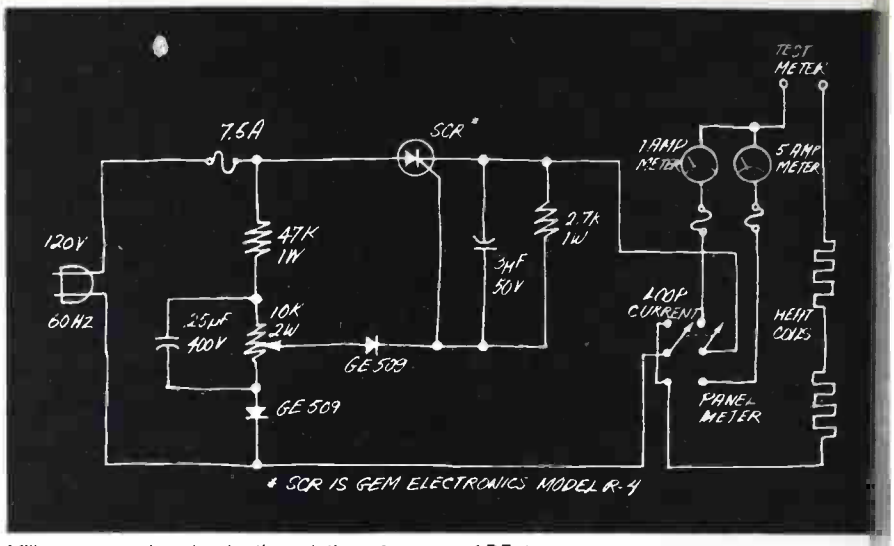
tive accuracy of an RF ammeter without using a meter standard. Our station has 19 RF ammeters. But not all require certified calibration. Rather, we needed to know their relative accuracy.

RF ammeters using thermocouple construction have an effective accuracy tolerance which varies less than 2% up to 65 MHz. These meters may be tested by passing ordinary 60 Hz line current through them; the known-accuracy meter is connected in series with the meter under test.

Solution: Four new 5-amp meters were wired in series with a used meter of like rating. It was found that the older meter tracked the average of the new meters from 2 to 4 Amps. This meter (labelled "Panel" meter in the schematic) is the surrogate standard. Use the procedure to select the 1-amp meter.

Construction of the comparator is not critical. Two 300-watt lamps wired in parallel may be used instead of the 1000-watt heat coil loads. The coils have to be adjusted for maximum indicated current. In our case, the coils were adjusted for 4.2 amps maximum. We removed one heat coil and substituted a 100 and 200 watt lamp for measuring the loop current meter's accuracy.

Remember, the comparator does not take the place of the FCC-required certification of base current and common-point ammeters.



Miller comparator checks the relative accuracy of RF thermocouple ammeters

71. Tower Light Performance Checker.

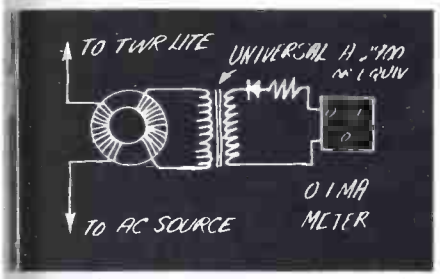
George Hillier, Chief Engineer, WVB Norfolk, Va.

Problem: To observe tower ligh for correct operation without actu ly "looking" at them. Accurate checking each bulb on your tower,

knowing at which height a problem exists, is easily done without even leaving the building.

Solution: A large steel washer (one for each level of lighting on the tower) serves as the core of a current transformer. Interrupt one side of the feed going to the lights. Take a short length of wire and wind 12 turns around one side of the washer. Insert this wire at the point of interruption of the light feed. The beacon levels will probably only require six turns since they draw more current than lamps at the obstruction levels.

Next, wind about 40 turns around the other side of the washer with No. 22 hookup wire. Connect to a general-purpose output transformer



Hillier's tower light checker eliminates neck-craning.

(such as Universal A-2900). Transformer output voltage is rectified via a small-signal silicon diode and drives a 0-1 ma. dc meter movement.

Calibration of the meter reading should be a very simple task and will vary with each installation. Insert a resistor to calibrate the meter needle for full-scale deflection. We selected 0.8 ma. as the top reading so that failure of one lamp will still leave sufficient drive to operate the meter. By inserting the metering circuit down stream from the flasher, a check on its operation is automatically built in.

72. Making Room For Many, Many Remotes

Jack D. Wilson, Chief Operator, KPOC AM-FM, Pocahontas, Arkansas

Problem: Management wants to broadcast feeds from: three churches; three sports networks; one news network; one remote receiver; one cassette recorder. Furthermore, it was desired to monitor and/or record from sources not on the air. Equipment available: one Gates "Yard" console (two remote line in-

continued on page 58

Getting Better AM Sound: It's a Mike-Thru-Antenna Job

By Geoffrey L. Bryan

You are likely to get poorer sound, not the "louder, brighter" sound that you want, if you simply put equalization and compression in the audio line without a thorough check and readjustment of the antenna, the transmitter tuning, the modulator, the power supplies and other sections of the transmitting plant. Poor functioning in any one of these sections can frustrate your attempts to alter sound quality. This article tells how to make the check-out, starting with the antenna and working back.

With all of the frenzied activity in AM radio these days—format changes, buying and selling stations—quite a few chief engineers find themselves in the midst of "loudness wars" between competing stations in their markets. Typically, your station hires a hot-shot new program director, and the first thing your engineering department hears from him is, "I want the station to sound LOUD. I want the station to sound BRIGHT. I want the sound to knock people over when they tune us in."

Shortly thereafter a small pile of boxes arrives at the station: limiters, compressors, equalizers, and any number of other gadgets to squash, boost and filter the audio signal going to your transmitter. You were not really consulted about all this; the program director bought the stuff out of his own budget. But you are expected to install the equipment and make the station sound LOUD and BRIGHT.

If this scenario sounds familiar so far, then the customary result should also. You installed the whole string of audio processing equipment, twiddled all the knobs, even let the program director twiddle all the knobs, and he still isn't happy. "The station doesn't sound BRIGHT enough," he moans. "Why don't we turn up the 5 kHz boost on this equalizer? That will help, won't it?"

No.

Everyone has forgotten something. An AM radio station is an integrated *system;* every part of the system must function properly in order for the whole system to work.

The densest audio signal in the world is of no use if the transmitter can't modulate with it, and the most wideband audio signal attainable is of no use if the antenna system bandwidth is too narrow to handle it. You can compress all you want, and you can boost high frequencies until you drive your limiter into clipping, but you are not going to be able to cram that signal through your transmitting system unless it is in top-notch shape. It is like trying to shove a tornado through a keyhole.

Mr. Bryan is a design engineer with NBC in Washington, D.C.

Installing lots of miracle audio processing equipment, in the name of LOUDness and BRIGHTness, can actually undermine the sound of the station.

Let's say this again, in language even program directors can understand: The transmitter and antenna system have a *direct* bearing on how the station sounds. If you are really serious about the sound of your station, you must start at the antenna terminals and work backwards.

Antenna Bandwidth

The frequency response of your transmitted signal is directly related to the bandwidth of your antenna system. Although most of the transmitter power goes into the carrier, this part of the signal carries no information. The audio information is contained in the upper and lower sidebands, located symmetrically about the carrier, whose frequencies are the sum and difference of the modulating frequency and the carrier frequency.

For an AM station with a carrier frequency of 550 kHz, modulation with a sine wave at 10 kHz will produce sidebands of 540 and 560 kHz. Modulation with frequencies less than 10 kHz will produce sidebands that fall between these limits.

In order for the station to have reasonably good high-frequency response in its transmitted signal, the antenna system must not attenuate these sidebands. Standard engineering practice is to design the system to have no more than 1 dB loss at 10 kHz on either side of the carrier.[1] But this is a very difficult condition to design and maintain. Further, many older stations have antenna systems designed in the days when the practice was to produce high "Q" at the carrier frequency, ignoring the sidebands.

Here is where a good consultant is well worth his fee. If your common point impedance has not been checked lately, do it now. You may find some surprises. Unless the resistive and reactive components are fairly constant *and symmetrical* out to 10 kHz on either side of the carrier frequency, you will encounter

[1] Edmund A. Laport, *Radio Antenna Engineering* (NY McGraw-Hill, 1952), p. 125. I recommend this book; it is one of the few in this field that is readable.

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sideband attenuation that costs you high-frequency response. There goes BRIGHTness.

Perhaps you will find that the system has not been designed for wideband response in the first place, or incorporates features (such as drastic feedline-to-antenna impedance matching ratios) that preclude wideband response. The consultant may recommend steps to increase the effective radius of your towers, such as outrigger wires along the tower sides, or he may want to rework the tuning units or phasor. Once again, his assistance can be valuable.[2]

How is your ground system? If you live in an area with acid soil or copper thieves, you may discover that you don't have much of a ground system left after a few years. Your local coverage will suffer unless the ground system is intact, because good ground conductivity is essential in keeping the angle of radiation low. There is no use transmitting into the sky. And more to the point of station sound, a faulty ground system will cause impedance excursions (during heavy rain, for instance) in which the resulting mismatch will *at least* chop off sidebands. In a mismatch of any magnitude, the sideband loss will be the least of your problems; an investment in copper generally turns out to be money well spent.

While we are on the subject of impedance, we should not overlook the importance of having all RF and ground connections clean and tight. Not only will this help keep the impedance constant, but you may find that a loose connection or broken tower bond is the culprit in an unstable directional array, and thus solve two problems at once.

The Transmitter[3]

Plate-modulated AM transmitters have not changed much in the last twenty years, and there is no reason your old transmitter can't perform quite well *if it is in good shape.* Unless it has been taken care of properly, however, you will run into problems.

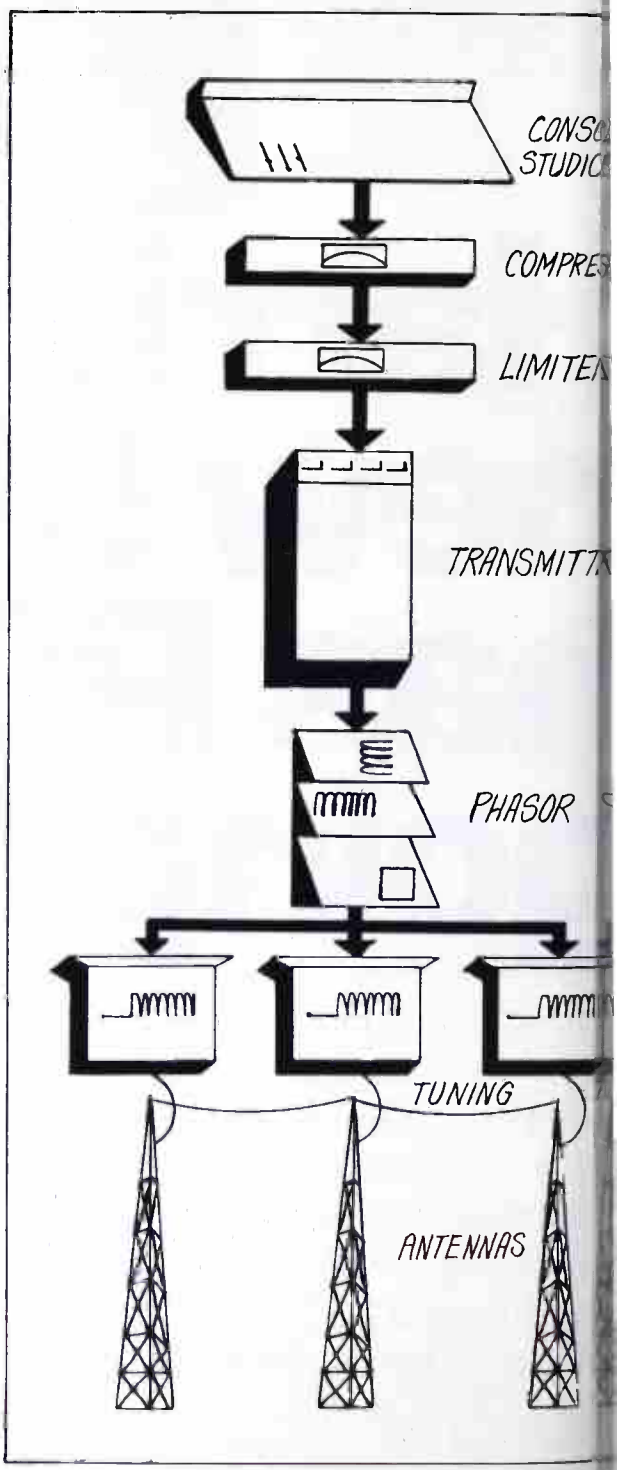
One of the most common complaints about old transmitters is that they sound "mushy." This problem occurs in modulation, and thus there are two places to look for trouble initially: the modulator section of the transmitter, and the power supply. What you want to minimize here is *intermodulation distortion.*

Intermodulation (IM) distortion occurs in a nonlinear system when two frequencies interact to produce additional sum and difference components. The effect is very unpleasant, and much more serious than harmonic distortion, because the sum and difference products tend to fall squarely into the audio passband, whereas harmonic distortion products are often too high in frequency to matter. IM distortion is similar to the sound made by a blown speaker.

IM problems may be the very reason the station doesn't sound BRIGHT. Since the IM products fall heavily into the audio midrange, they act to cover up the BRIGHTness in the program material which t program director wants to hear. *This problem cann be equalized out, no matter how hard you try.* Y have to fix it at the transmitter.

The first remedy to apply is *new* modulator tub (Expect to replace them more often from now o Then go through and systematically replace all co pling and bypass capacitors that are more than a f years old. You will probably notice an improveme already, but the best is yet to come.

Check your power supply. Think about when yo



Each of the main sections of the broadcast chain, shown in representation above, must be checked out before processin added to the audio line to "improve" the sound quality. Engine tells here how to do it.

[2] Incidentally, don't think you can occupy more than the 10-kHz-wide channel the FCC has allocated for you, even though your antenna system has the bandwidth to do it. Interference complaints from a neighboring station could make you fair game for a citation. The point here is to eliminate antenna bandwidth as the limiting factor in your transmitted signal.

[3] Much of the material in this section grows out of conversations with John Foote, now Chief Engineer at WNDE Radio in Indianapolis.

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transmitter was designed—a day when program material didn't keep the transmitter continuously nudging the 100% modulation mark—and you will realize that it has a built-in "energy crisis." Unless the source impedance is low at all modulating frequencies, and the reserve capacity is high, you are in for trouble. Mercury vapor rectifiers are notorious for increasing their series resistance with age; consider replacing them with the new silicon stacks. Check the capacitors here, too; a dried-up oil capacitor offers undesirable high impedance to the modulator section. (Don't be tempted to parallel additional filter capacitors across the existing one to "beef up" the power supply. You will encounter an effect called "power-supply bounce," in which the transformer and rectifiers can't deliver the necessary current fast enough to keep all of that capacitance charged.)

After you are satisfied in these areas, make sure your transmitter is properly tuned. If you really want to do this properly, have the complete RF path gone over with an impedance bridge. You cannot rely on current peaking and dipping using front-panel meters. Remember that you are not merely looking for the proper impedance at your carrier frequency; the sidebands are critical. Be sure the impedance is symmetrical and flat on either side of the carrier. Keep in mind that the grid drive for each stage, which is a function of tuning, must be exactly right for the transmitter to operate at design efficiency; you will waste valuable power otherwise.

Tuning is especially important in transmitters that are designed for high efficiency in the final (90% or so). These transmitters employ a cluster of third-harmonic traps in the final, in order to minimize wasted power. Unless these traps are tuned precisely (a difficult task, by the way) they are useless, which means almost automatically that the power supply is inadequate to power the transmitter, because of the reduced efficiency. The power that is robbed by the RF section because of this is robbed from the modulator section, and you find yourself right back at the problem of "mushy" sound. Before you bother to make another step, you will have to get the transmitter working at an honest 90–95% efficiency, because all your other efforts will fail while the transmitter is acting as a power hog because of mistuning. Call in outside help if necessary.

A note should be made here about "super-modulation": the attempt to achieve 125% modulation in the positive direction while maintaining 100% negative modulation. Whole articles have been written on this subject alone, and many a myth still hangs on it. Let's look at a few facts.

As you raise the level of modulation, the power requirements of the transmitter increase exponentially, by the square. Unless your transmitter power supply is healthy, the modulator in like-new condition, and the transmitter meticulously tuned, you are probably deceiving yourself in trying to attain this high level of modulation. The most common result of turning the positive modulation up to 125% is a corresponding loss in negative modulation depth. The net effect is nothing, because all you have done is shift the centerline of the modulation envelope a little higher (it won't sound any louder coming out of a receiver), and raised your electric bill somewhat. Super-modulation requires wider swings of the modulator than usu and unless the transient response of the power sup is excellent there will be insufficient power remain for the modulator to swing completely negative afte large positive peak.

If you find yourself "playing" with the audio produce the asymmetry necessary for 125% posit modulation, take that as a warning that your tra mitter is not meant to super-modulate. Experience h shown that the male voice, and even heavily-proces records, exhibit a consistent asymmetry ratio mu greater than 1.25 to 1. Therefore, if normal au doesn't *easily* give you 125% positive modulati peaks, it is the fault of your transmitter and not yo audio processing (this assumes you are using a mo ern AM limiter that provides for an asymmetrical s nal output). Forcing asymmetry out of a transmit that doesn't like it usually produces enough distorti to obliterate the BRIGHT sound the program dir tor wants, for reasons discussed above.

Check carefully before you turn up the modulatio

Audio Processing

At this point we have finally worked our way ba to the audio processing gear the program director o dered. In case any readers have skipped ahead to th section, let me re-emphasize what I have been sayi all along: audio processing devices *cannot* make for deficiencies farther down in the system. Let look at some useful audio equipment, and establi useful *functions* for the equipment.

The Limiter. This is one piece of gear you can't without, because it is essential to prevent overmodul tion on instantaneous audio peaks. Some stations a tempt to make their limiters do more than this, ho ever, which often causes trouble.

The state of the art today allows limiters to be d signed with virtually instantaneous response to aud peaks. This works out very well, as it turns out, wh the limiter is operated so that normal program le pushes it no more than about 3 dB into its limiti curve. If you attempt to boost the density of yo audio signal with the limiter by raising the input lev a curious thing happens: because of its fast respons the limiter trims off all of the high-frequency comp nents of your audio signal! If the program direct wants the station to sound BRIGHT, and yet insis on operating the limiter with the front-panel met pinned, he is driving with the brake on.

Furthermore, at this limiting level, some comme cial limiters are unable to cope with sudden bursts program material, such as those that come after pau es in a network newscast. If these bursts slip throug overmodulation results, and so you have to reduce th input level to your transmitter accordingly. But th defeats the purpose of attaining high modulatio which was what everyone thought the limiter was f in the first place. It is better to reduce the input lev to the limiter, and make it do only the job it was d signed for.

Clippers. These devices, with back-to-back shu diodes across the audio line, are very easy to hom brew, but they spell BIG TROUBLE. A clipper ca singlehandedly do more damage to your audio sign than anything else in the system.

The theory behind clippers is valid, *given ide*

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diodes. Unfortunately, the Ideal company is not marketing any diodes at the moment, so we are stuck with imperfect ones.

All real-world diodes have a characteristic rounded "knee" in the region where the switch from non-conduction to conduction takes place. An ideal diode would have a perfectly square corner at this point. The knee region represents a very serious non-linearity to introduce into the audio line. If your clipper is set to conduct (clamp the signal) right at the 99.9% modulation point, and your compressor is keeping the average signal level fairly high, the extremities of your audio waveform will constantly be entering this non-linear region of the clipper diodes, giving rise to every form of distortion. The non-linearity is heightened by time-dependent characteristics of the diodes, such as hysteresis.

"But," you argue, "my limiter has clipping diodes at its output. How can they get away with it, while I can't?"

Two reasons. First, these diodes do not operate all the time. They are placed there as a final safeguard against overmodulation, in the event a signal that is too high in amplitude manages to slip through the normal limiter circuitry. Second, since the limiter designers were cognizant of the knee effect, they placed the diodes in a relatively high-voltage circuit, so that the effect of the knee would be minimized in relation to the amplitude of the signal. But even this arrangement would be found wanting if the diodes were called upon to control the audio level continually, rather than occasionally.

So, if you are using a clipper, take it out and throw it in the dumpster.

The Compressor. This unit goes under a variety of trade names, and may work on a variety of principles, but the basic objective is the same: to keep the average level of the audio signal as high as possible. This is very important for several reasons.

First, in transmitting over AM radio, you are transmitting into a noisy medium. To overcome this problem, the compressor reduces the dynamic range of the program material, which improves the average signal-to-noise ratio of your transmitted signal.

Second, the compressor compensates for careless operators and the inconsistent studio levels that result, by bringing up the level of a program signal that is too low coming out of the studio. Not only does this insure that the listening audience is likely to be able to hear your broadcast, but in the process the compressor keeps you in compliance with the FCC's minimum-modulation requirements.

Most important to the program director, however, is the matter of *aesthetics*. The PD wants a distinctive and LOUD-sounding signal, and he knows that apparent loudness is most effectively achieved by consistent, dense modulation. You may not particularly care for the blaring, pumping sound that many program directors seem to cherish, but the engineer does not have the ultimate decision here.

The best advice is to try a number of the units on the market, because they are all different in the sound they produce. And many manufacturers allow for trial loans. Try to avoid proposals for connecting two or more compressors in series, a ploy advanced by many program directors on the theory that if one is good, two must be twice as good. Experience has shown that a second unit will often serve to *counter* the effect of the first.

Equalizers. These should be used sparingly, if at all, because there is such a temptation to use them to try to correct problems that are beyond their control. There may be some merit in reducing low frequencies with an equalizer, because thundering bass notes can contribute little to the overall loudness of your signal, and cause the compressor and limiter to pump unnecessarily. There may also be some merit in boosting the audio *slightly* in the 2-3 kHz range (no more than 3 dB), since studies have shown that the ear is particularly sensitive in that region. But an equalizer cannot be called upon to do much more than this.

An equalizer will *never* make up for the inadequacies of the transmitting system. Boosting various frequencies indiscriminately can actually *reduce* your overall modulation level.

Suppose you raise the level at 5 kHz by 6 dB. Since modern programming material is rich in energy in this range, the signal around 5 kHz is going to hit your limiter 6 dB higher than everything else. When this occurs, the limiter *must* reduce its gain 6 dB to avoid overmodulation. You have thus reduced the effective modulation level at 1 kHz to around 50%. Suddenly the value of the 5 kHz boost looks very questionable.

If you are not hearing enough high-frequency content on the air, take a trip to the transmitter site and find out why. Meanwhile, it would be better to take the equalizer out of the racks and hide it somewhere.

Some program directors, after being told all the reasons why they shouldn't have an equalizer before the limiter and/or compressor, hit upon the rather novel idea of putting an equalizer *after* the limiter, ahead of the transmitter input. Although our intuitive sense may rally against putting *anything* between the limiter and the transmitter except a pair of wires, the program director may insist on a more tangible argument. Here it is.

First, you can never exceed full modulation, no matter where you put the equalizer in the system. If you boost at 5 kHz by 6 dB, you still have to turn down the input level to the transmitter by 6 dB in order to prevent overmodulation, just as in the earlier example. Yes, you have to turn down the modulation because the FCC will nail you otherwise, even if you didn't mind having a terribly distorted signal that splattered all over the dial.

Second, any frequency-shaping filter brings with it two effects. It attenuates or boosts certain frequencies, which is what we want it to do. But *in addition* any audio filter introduces a variable time-delay which affects the frequencies *within the passband*. This is called *phase shift*. When this occurs, audio peaks that seemed to be within allowable limits are moved around and pile on top of each other, where they add algebraically. You end up having a totally unpredictable source of overmodulation, and the only way to guard against FCC citations is to turn down the input level to the transmitter. But this loss of modulation defeats our purpose.

It is a mathematical certainty that the problems introduced by filtering *cannot* be gotten around. The-

continued on page

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The Noise Fighters: Using New Routes Into FM

No recording studio above the street-front walk-in level would operate without noise reduction circuitry today. But broadcasting, with perhaps even more to gain from noise reduction, has been brought up short by the difficulties of choosing a system and getting decoders into millions of receivers. Now, however, the makers of noise-reduction equipment have found some routes *around* those hurdles, and broadcasting's noise-reduction era seems about to open.

We can count on any FM broadcaster's agreement with this proposition: we would get a fine boost in audience size and satisfaction from cutting the noise in FM program material as heard at the receiver, by 10 dB or more. It obviously should not depend on power increases or skewing of the radiation pattern. It would be especially welcome in stereo, which gave away more than 20 dB of S/N ratio to get its two-channels.

Recording, of course, has been using such circuitry for years now—Dolby is world-wide, and the two other major systems, Burwen and DBX, also hav strong markets in the recording studios.

But broadcasting, until recently, had barely wet i toes. The largest barrier was the scarcity of decode among the listening public and the problem of compa tibility. A few stations have put out Dolby "B" encoc ed signals more or less regularly over the past coup of years, and report little or no unhappiness on th part of listeners, (see notes on WVUD, below).

Chief engineers at other stations have held that Dolby-encoded signal, if not decoded, is too harsh fc

The Model 334 Dolby B Noise Reduction System for FM Stereo Broadcast

The block diagram shows how the Dolby B-Type encoding noise reduction system fits into an FM broadcasting chain. Each Model 334 contains two independent processor channels with common function switching.

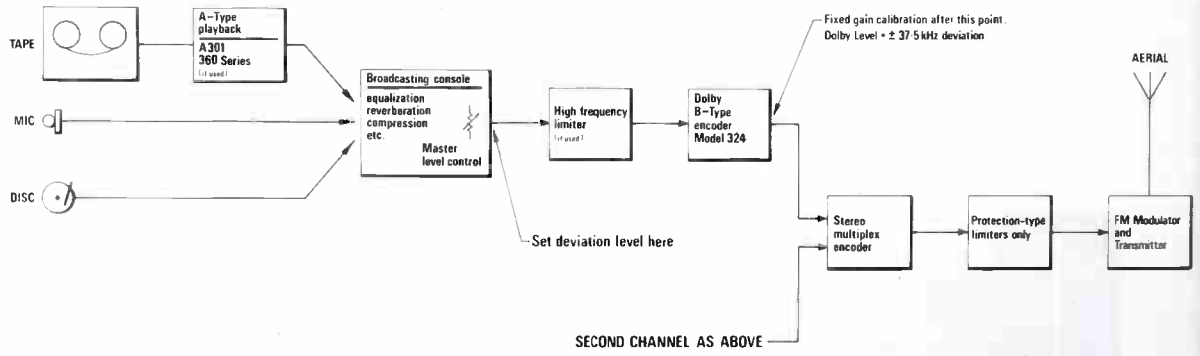
When used to encode transmissions, the Model 334 should be considered to be part of the transmitting chain, as opposed to a studio tool, and should follow all types of conventional signal processors. However, it should precede the stereo multiplex encoder and transmitter protection-type limiter.

The change in time-constant is effected by a network in the Model 334, switched automatically with selection of Dolby B-Type encoding. No modifications to the transmitter pre-emphasis circuits are required; the combination of normal transmitter pre-emphasis plus Model 334 conversion network produces an effective 25 usec time-constant.

Installation is simple. Signal connections are made via a rear-mounting Cannon connector and a level adjustment procedure is carried out (described later).

The system can be connected for remote operations. The Dolby Tone oscillator may be activated by means of a normally open push button at the end of the remote cable. The cable can be extended for long distances subject to the requirement that the total resistance in the cable is less than 1000 ohms. Similarly, a cable can be converted to remove the noise reduction action and the time-constant change; the unit then has a flat frequency response.

With a 75 usec pre-emphasis characteristic, the need to modulate the transmitter efficiently at low frequencies in the interest of good coverage often produces over deviation at high frequencies. The effects of such over-deviation are often lessened by the use of special processing units designed to prevent modulation levels exceeding 100% at any frequency. Notable examples are the CBS FM Volumax and the Gates FM Top Level or Limiter. The



their tastes. Another small incursion of Dolby circuitry into broadcasting has been in such remote-pickup operations as those of station WGBH in Boston, which has used Dolby "A" to cut noise on symphonic broadcasts coming in by telephone line, requiring an in-station "A" *decoder*.

But we can all see that there has been no big industry move into noise reduction. Now, new developments are opening broadcasting's door to the noise fighters.

1) The FCC in late June approved optional use by FM broadcasters of a Dolby "B" encoder that effects a reduction in the pre-emphasis to 25 microseconds, in addition to its noise-reduction action. With the Dolby encoding producing a "brightened" signal on non-Dolbyized receivers that approximately offsets the loss of highs from the drop in pre-emphasis, Dolby contends (and the FCC agrees) that the signal will be fully acceptable on all receivers.

2) Noise reduction applied to program handling *within the station* has begun to flourish, with Dolby, Burwen and DBX encode-decode equipment being used for recording production, and the Burwen variable bandwidth filter becoming very popular for reducing the noise in program material before it goes on the air.

In sum, we are developing three major areas of noise-reduction activity in broadcasting, each covering a section of the source-to-listener path not covered by the other two. The recording encode-decode systems, the Dolby "A", Burwen Noise Eliminator, and the various DBX models, cut the noise in recordings produced by the station. The Burwen Dynamic Noise Filter cuts noise in program material that, for any reason (there are many), has an unavoidable high noise content, catching the noise up to the filter input.

New Burwen variable-bandwidth filter, Model DNF-1100, (above) can be used in program line to reduce noise in source material and in preceding audio equipment.

The new Dolby "B" encoder for FM broadcasting, Model 334.

principle of these devices is to pre-emphasize the signal passing to the limiter circuit which then limits at the 100% level. The limiter is followed by a de-emphasis network, and the signal is passed to the transmitter.

The use of the Model 334 removes the necessity for pre-emphasis and only simple protection-type limiting is needed at the transmitter. The Model 334 should follow any processing unit which includes high frequency dynamic limiter circuits, and the high frequency dynamic limiting portions of such units must be disabled. Otherwise dull sounding reception will result. The circuits associated with any protection-type limiting must be changed so that they operate as if designed for 25 usec pre-emphasis.

In some existing installations it may be very inconvenient to place such processing units before the Model 334 (they may be installed at the transmitter, for example). In these circumstances, the processing unit may remain after the Model 334, but all processing circuits except the transmitter protection circuits must be disabled; the protection-type limiters should be maintained as for 75 usec pre-emphasis. The wideband limiter in the device should be backed off so that it operates only infrequently.

Changing the CBS Labs Volumax units when used before the Model 334, calls for the removal or substitution of several capacitors and resistors on AGC, control, and output loads. Detailed information is available from CBS Labs or Dolby. Information on the conversion of the Gates Solid Statesman FM Limiter and the FM Top Level will be available shortly.

Initial calibration of encoder is simple. Model 334 outputs are fed to FM multiplex encoder inputs—with no limiters or compressors following the Model 334 (except for instantaneous protection clippers). Next the Dolby Tone oscillator button is pressed and channel A and B output potentiometers adjusted to give 50% transmitter deviation (±37.5 kHz). Total modulation meters in stereo stations will indicate 59% (50% audio + 9% pilot), and in stereo stations with SCA 69% (50% audio = 9% pilot + 10% SCA). The Dolby Tone oscillator button is then released and channel A and B input potentiometers adjusted to give required modulation level.

The program may be transmitted conventionally, or in 25 usec Dolby FM modes by appropriate push button selection. Note that the transmitter preemphasis remains at 75 usec. The time-constant change is effected by a network inside the Model 334 unit.

The change to 25 usec pre-emphasis in the Dolby FM mode allows broadcasters to raise the transmitted modulation level with many types of program material. To achieve this increase, the channel input potentiometers, or the sending level from the console into the unit may be increased. Do not adjust the Model 334 output level potentiometers or any gains *after* the 334.

Until B-Type decoders are generally incorporated into receivers, Dolby Tone should be transmitted periodically to allow listeners to adjust or check level on add-on Dolby decoders. When FM broadcast stations conduct proof of performance tests (FCC rules, Section 73.254) Dolby encoding should be removed by switching it out.

The Model 334 may be used as a decoder for quality monitoring. Inputs are connected to the output of high quality conventional (i.e. 75 de-emphasis time-constant) off-air receiver. The outputs of Model 334 are connected into a normal monitoring system. The receiver may then be tuned to any station transmitting Dolby Tone. Noise reduction action is removed and channel A and B input potentiometers adjusted until the meters on the Model 334 indicate Dolby level.

The new Dolby "B" system handles the over-the-air sector: it knocks the noise between the encoder input and the receiver output. It can't affect noise already in the program before it reaches the encoder.

Any of the three functions, used alone, can be extremely helpful. But they complement each other, and it is conceivable that a station could find good use for two (see below for one such station), or even all three, depending on the station's style of operation. Here are some details on these new modes of attack on the broadcaster's ancient enemy.

The new Dolby FM system

The Dolby proposal that their "B" encoder for FM incorporate a reduction in pre-emphasis to 25 microseconds has been advanced at a number of engineering meetings in the last few years. Dolby claims a big plus from the system, over and above the noise reduction action. FM broadcasters are caught in a three-way bind: they can let the transmitter overload on high-frequency peaks (splatter, possible damage); they can run the overall level so low that they lose practically all the signal/noise advantage the pre-emphasis is intended to supply; or they can compress and limit severely on the highs, flattening dynamics and degrading signal quality (the usual choice).

The reason the 75-microsecond pre-emphasis is today handing broadcasters this packet of unhappiness is that the high-frequency energy in program material is much higher than it was when the FM pre-emphasis was set. Wide-range microphones, used close-up in the current multimike recording techniques, and the extension of the bandwidth of recording equipment in general, have produced material in which the high-frequency energy, on average, is far above what it was when the 75-microsecond rule was made.

So when the material is boosted at 75 microseconds before hitting the transmitter, the high-frequency peaks will often be far above the average level, forcing the broadcast to use heavy limiting. Cutting the boost to the 25 microsecond curve will allow the broadcaster to reduce the limiting, or raise his overall level, or use some combination. (Some stations using the new encoder, says Dolby, have been able to increase the level more than 5 dB, and still get a better-quality signal).

A group of station engineers questioned by BM/E agreed in general, that the pre-emphasis reduction held large promise for improving FM quality, giving the station a chance to produce a signal far closer to the old "high fidelity" promise of FM. Most FM signals have not qualified. Every one interviewed had either ordered one of the Dolby encoders or was strongly interested.

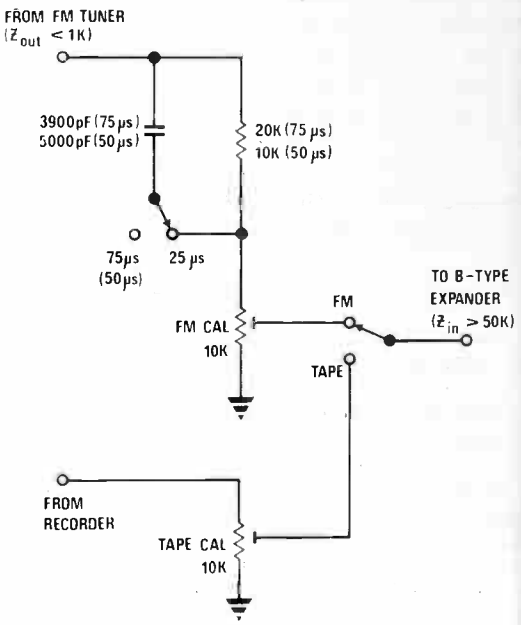
Dolby told BM/E that they had sold about 50 of the encoders, to FM broadcasters, with deliveries fully underway. Dolby is also announcing, just as this issue reaches distribution, a new "B" encoder, the Model 334, which has essentially the same circuitry as the Model 324, (which it supercedes) but a smaller package and other improvements noted in the accompanying box.

In the box we also summarize information from Dolby on how to install the Model 324 and 334 with a few cautions to be observed.

The expert use by Dolby of what is in a sense an ...cident of technology—the offsetting of the pre-e... phasis drop by the Dolby "brightening" on non-D... byized receivers—therefore seems about to clear ... way for FM to get that big boost we talked about; a... stereo FM, especially, will benefit.

At the receiving end, the full benefits will be re... ized, of course, only on equipment with Dolby dec... ers adjusted to the new pre-emphasis curve. Listen... with such decoding equipment will get the full bene... of the Dolby noise reduction, plus any improvement... signal quality effectd by the station in taking adva... tage of the reduction in pre-emphasis. All receiv... with Dolby decoders built in (at this writing, so... models of Marantz Lafayette, and AKAI) apply ... new de-emphasis curve when the Dolby is switched ...

For existing stand-alone Dolby receiver decode... there will be add-on compensators (such as the Sw... craft Model 621, audio net about $8) to effect the d... emphasis change; or a filter can be built according...



Circuit of adapter which will adjust de-emphasis curve to 25 microseconds when added to earlier Dolby "B" decoding unit... Commerically-made adapter units are also becoming availabl... (see story).

the circuit in the accompanying diagram, supplied ... Dolby.

Listeners without Dolby decoding will get improv... ments in audio quality from reduced limiting, plus i... provements in S/N ratio from any lifting of the mo... ulation level.

Even without Dolby's neat capture of the over-th... air job in FM broadcasting, the Burwen and DBX e... code-decode systems would have found it very dif... cult or impossible to move in because the encoding ... both cases is too "deep" for ready compatibility ... non-decoded receivers. But these systems, along wi... the Dolby "A," are beginning to move into statio... that do high-grade production work, for themselves ... for others. When a station becomes in part a recor... ing studio it will sooner or later find the advantages ... noise-reduction circuitry worth the money it cos... This is a sharply growing function in larger broadca... operations.

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Circle 132 on Reader Service Card

Knocking out noise at the source: one way to handle turntable rumble

Eliminating a *source* of noise naturally rates high in any noise-control program—if there is a practical way to do it.

Turntable rumble could be one such source in some stations. A turntable in the front line in a broadcast station has to be a rugged device—carrying a flock of disc jockeys through the day takes mechanical and electrical stamina. And there has been widespread opinion among broadcast engineers that the recent hi-fi consumer tables with extremely low rumble were too delicate for broadcast service. So the tendency has been to stay with time-tested models that were pretty noisy.

But many FM stations, particularly those trying to serve a musically-aware public, tuned to rock, or jazz, or classical, have been getting more and more negative listener reaction to turntable rumble. As pointed out in earlier articles here (see Ned Soseman's discussion, for example, in the March issue), a lot of FM listeners today have hi fi systems that put out a walloping bass: even moderately priced systems may have respectable output to 40 or 50 Hz. Turntable rumble easily becomes obstrusive on such systems.

The design of a turntable that is both rugged and quiet does not seem outside the industry's capacities. It may be rather expensive, since mechanical precision tends to be costly. But the recent experiences of two good-music stations indicate that it can be done.

At WQXR, New York's veteran classical-music station, Zaven Masoomian, chief engineer, found listener complaints about turntable rumble building to one of his most pressing problems. He says that rumble filters cut out too much of the music. His survey of available broadcast-type tables did not turn up any he considered quiet enough.

Chief Engineer Zaven Masoomian and engineer Alan Lintz try out one of new Panasonic SP-10 turntables

A little later the Panasonic SP-10, a new table with a radically different drive consisting of a brushless dc motor, fastened directly to the table, caught his attention, and he gave it a trial. So far, says Masoomian, the table has solved the problem: rumble is way down, and reliability is fine.

A parallel story comes from Meyer Godesman, chief engineer of WTMI, good-music station in Miami. Again, rumble was a problem, and the station management decided to give the SP-10 a trial. "After two or three months," says Godesman, "I had to admit to the excellent performance of the new turntables. They are consistent . . . and require little or no maintenance . . . rumble is so low we can't hear it."

When the material recorded is to be used in the station's own programming, there are obvious advantages in starting with a low noise content. The over-the-air "B" system, as noted, won't help with noise in the program before it reaches the encoder. In fact, as the experience of WVUD suggests (see below), high noise in the program material may become more evident after Dolby encoding, on non-Dolbyized receivers unless the net pre-emphasis is reduced. With that reduction (plus Dolby B) listeners without decoding are no worse off than before on *program* noise (as differentiated from tansmission noise).

The Bandwidth Filter

When it is not practical for a station to use encode-decode noise reduction within the station, the use of the third form of reduction, the variable bandwidth filter, becomes especially attractive. It is also useful against the whole familiar packet of noises that get into program material before it reaches the transmitter, including noisy cart or open-reel playback equipment, turntable noise, mike pickup of ambient noise, and noise in remotes.

As every engineer knows, the variable-bandwidth filter is a very old idea, repeatedly introduced and abandoned over the years. Its current resurrection, most notably by Burwen, depends on improvements in design that have apparently eliminated the old disadvantages of high distortion and very noisy action. Burwen's Model 1000 Dynamic Noise Filter is in use in more than 50 radio stations; a representative group of them interviewed by BM/E were nearly unanimous in praise.

Milton Smith, chief engineer at WPGC in Washington, and formerly chief engineer at WPIX-FM in New York (where he also used the Burwen filter), had this to say about results:

"We are getting an improvement on the order of 10–15 dB in our overall S/N ratio, and much more than that on some program material."

He reports control of, among others, the noise from low-frequency motor vibration transmitted to live microphones; the surface noise on old recordings; and the line noise and short-wave radio noise on network feeds. He notes a "dramatic improvement" in the quality of playback from carts onto which record material has been dubbed.

Smith uses the filter in the telephone line from studio to transmitter, just ahead of the final limiting amplifier which is before the stereo generator.

At WRFM in New York, Joseph Losgar, chief engineer, says the Burwen filter got him out of trouble with cart noise and ambient noise pickup by mic

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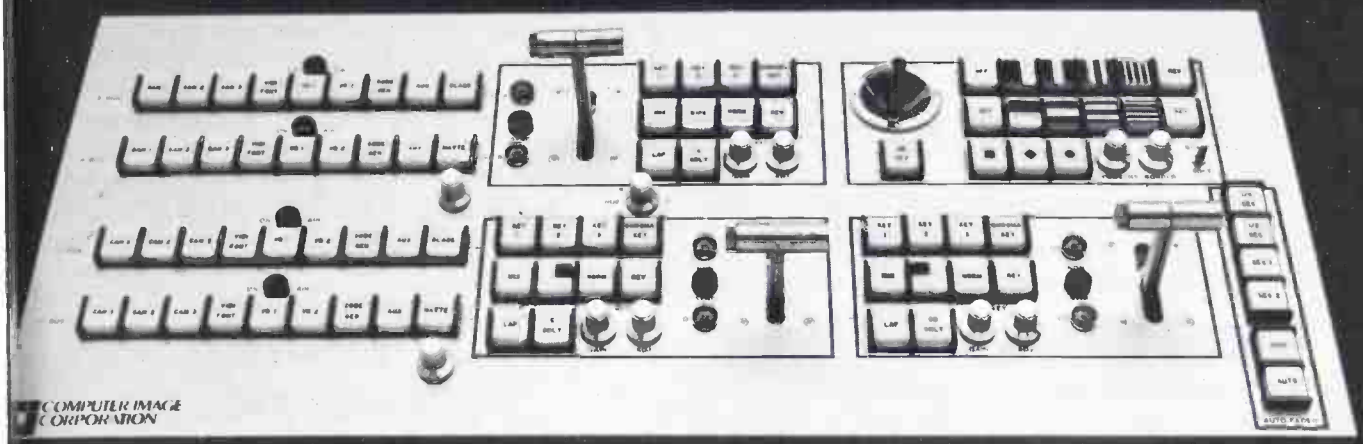

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Circle 133 on Reader Service Card

Modular Approach Big Factor in Audio Consoles for TV and Radio

New companies entering the field

"Infinite inputs, infinite outputs, infinite switching . . . assembly of systems without limitations" are the phrases used by RCA to describe custom built audio equipment, the BC-100 series. BM/E had seen the custom unit at WPIX-TV built several years ago—a large 25 input unit with a number of special features* including a 21 × 5 relay switcher with digital read outs to punch-in multiple feeds (film, VTR, tape carts etc) and six selective submasters. BM/E also knew that the New York City production house Lewro Television had a 20 input console and that the four output channels each fed one by two splitters. We suggested that RCA might spotlight some of the trends in audio for television and radio based on recent installations.

The photo gallery on this page, picked from over 30 installations, reveals no particular trend other than that each station can get the configuration it wants—at reasonable cost. For example WBEN-TV worked in a telecine mixer—as do most TV stations. Oral

continued on page 4

* Other features: two submasters (out of six) have compression amplifiers; also a warping mixer to mix six inputs at various levels. Echo-send channels and pre- and post faders for everything, are other features.

(Top) Custom audio console for WBEN-TV, Buffalo, has 11 inputs consisting of 11 pre-amps and one 6 × 18 high level input select panel. All channels have mixer modules (two with equalizers). Six have submaster modules. There is a custom built four-input telecine mixer. Monitor pushbuttons can look at three program channels. Unit has built in test oscillator.

(Middle) Custom console for Oral Roberts Univ. has 16 inputs all with mixers and equalizers. There are eight program out channels and eight compressor-limiters via a jack field. Console has one echo and one foldback circuit.

(Right) Another custom BC-100 audio console built by RCA for KCRA, Sacramento, has 16 inputs (eight three-input preamps; eight single-input high level) all with mixers. Eight are equipped with equalizers, four with submaster mixers and echo send controls. KCRA has four program channels.

The AKG C-414

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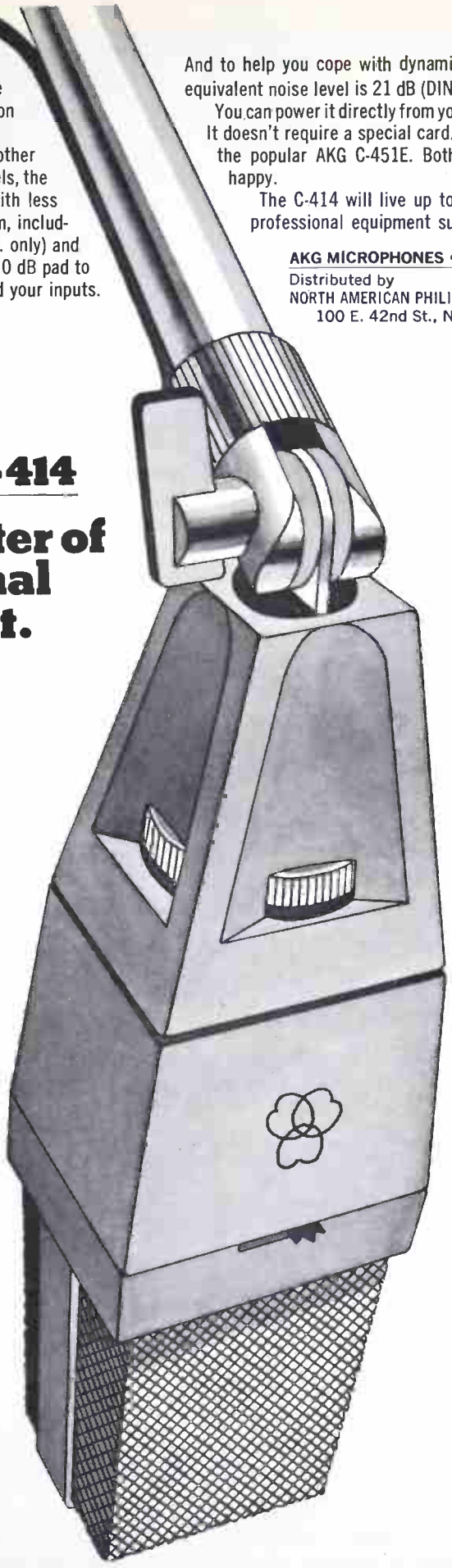
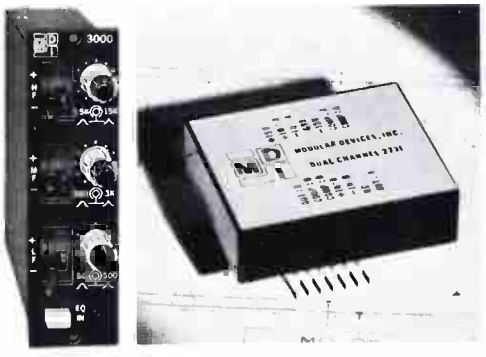


Circle 134 on Reader Service Card

At the NAB Convention, RCA introduced the new BC-50 modular system more compact in size and lower in cost for do-it-yourselfers.



(Left) Variable bandwidth equalizer from Modular Audio has three independent overlapping bands. Panel size is 1-½ in. × 5-¼ in. high.

(Right) Op amps are the universal circuit used in modules. This one has two complete amplifiers for flexibility in a small size.

Brick, l, and Gittleman, r, Modular Audio predict more voltage controlled circuits for automatic programmers.

Roberts University allowed for compressor-limiters. Each unit is built around five types of input modules (two different pre-amps, three high-level units with 1, 3, or 7 inputs), two mixer modules, an equalizer submodule and an iso-mix submodule. Heart of all these units is an op-amp submodule. Control monitors take on a variety of shapes but usually fit in a space equivalent to a number of input modules.

Should you prefer to assemble your own system without factory help whatsoever, this is possible also. At the last NAB Convention RCA showed the BC 50 series, intended expressly for serious do-it-yourselfers. Modules are somewhat smaller than those used in the 100 series.

The modular approach has long been promoted by companies such as Robins/Fairchild, ElectroDyne (Cetec) and others. It is likely to grow even more. Companies have sprung up just to serve the recording industry. Automated Processes Inc., for example, is a more recent company to appear to serve both the recording industry and broadcasters. These companies are offering a wider range of modules than the RCA broadcast line for example. A brand new company on the scene is Modular Audio Products Inc., Bohem N.Y. Modular Audio principals Julius Brick, pr dent and Marty Gittleman, chief engineer) claim modular products offered to broadcasters has not k up with the state of the art. Perhaps everybody u the same op-amp, but it's how this universal devic put into function boards that makes for differen Modular Audio's initial products are much like a one else's—input modules—but it says watch the t ure. This spring it introduced a state of the "equalizer" for individual channel use. It has three dependent overlapping frequency ranges—50 to Hz, 300 to 3 kHz, and .5 kHz to 15 kHz. Each ha own continuously variable center frequency and ba width controls. One shapes only the point where t is a problem—not an entire subband. Modular Au sees a variety of new products included as necessa including more voltage controlled circuits to meet manding audio needs.

Some of these "future" modules were shown at Audio Engineering Society Convention in Septemb as we went to press, and BM/E will report on them the future.

Better TV Sound: The Pressure To Do Something is Growing

Here and there with the help of FM or cable, the listener can get splendid TV sound. These simulcasts, though few in number, are heightening the already widespread "sound awareness" of the viewing public. Meanwhile, the industry is studying hard how to solve the main-line problems in TV audio.

They are off the mainline of TV operation, and they are happening so far to a small number of viewers. But events like the following are highly significant nonetheless.

- Once a month the audiences of more than 50 TV stations around the country get an hour and a half of TV music with the sound transmitter in high-quality stereo, through FM stations affiliated with the TV stations, and reproducible through the viewer's FM stereo receiver. This is ABC's "In Concert," the only regular series of simulcasts (there have been many one-shot TV-FM transmissions). More on how the concerts work below.
- In several communities cable operators will soon be offering a new service—the sound of selected TV programs split out of the TV signal, put on an unused FM carrier and sent out over the cable in that form, to reach the subscriber's FM receiver through the "FM coupler" many cable companies now supply. More on this, too.
- In New York a new pay-TV (over-the-air) system was slated to go into operation just before this issue reached subscribers; it will include high-grade stereo pickup and transmission of the TV sound, with outputs on the decoder for optionally feeding the two channels directly to the subscriber's stereo hi fi system, skipping the TV receiver entirely.

There are probably other similar "end-run" approaches to getting better TV audio now in operation or soon to start. Their existence and popularity reflect and affirm the growing public "sound awareness," a development that has spurred the industry's serious talk of the last couple of years on the problems of improving the main line of TV audio.

Other factors in addition stimulated the formati (in 1972) and the current activity of the Committ for the Study of Television Sound (hereafter call simply "The Committee"), which has representativ from every important segment of the industry.* The are many individuals in every part of the industry wi are sincerely concerned about the low estate of T audio, and now are pushing hard for some brea throughs that will get improvement underway. W may speculate, too, that TV set manufacturers are b ginning to think of better audio as a way to get a ne edge in the intensely competitive TV receiver marke

The main barriers to better TV sound are clear everybody: 1) the telco lines that carry most TV aud around the country; 2) the peanut-powered amplifie and miniscule loudspeakers that are standard in t day's TV receivers. The over-the-air section of T audio (FM) can easily be of top quality; but gettin that quality through to the listener is prevented by t other two sections. It's a classic chicken-or-egg situ tion: the set manufacturer will not spend the ext money that good audio will cost if it is not available the signal anyway; the networkers (and so far th means mainly AT&T) have a cop-out on improvir transmission quality, when the better quality wouldn come through the receivers.

That is why one of the current most serious effor of the Committee is the development of a diplexir

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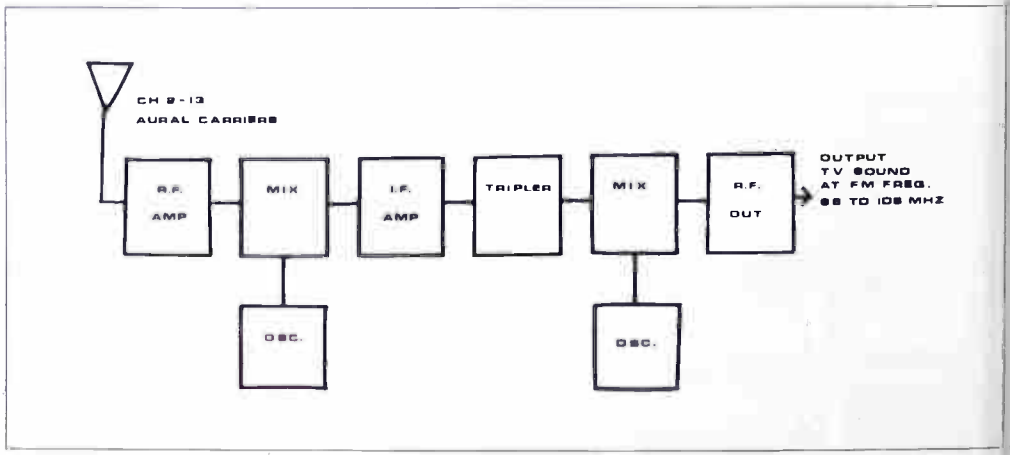
* Officially it is the JCIC Ad Hoc Committee for the Study Television Sound. Chairman is Daniel R. Wells, PBS, Washingto D.C.



Block diagram of the Catel headend processor which puts TV sound on an FM carrier, for separate transmission via cable to cable tv subscribers. At receiving end an "FM coupler" feeds carrier to the subscriber's FM receiver and high-fidelity system. Many cable companies supply the FM coupler, and a quantity of FM programming, for an additional fee.

BROADCAST EQUIPMENT

Character generator reads the SMPTE edit code, displays the time and frame information on one or

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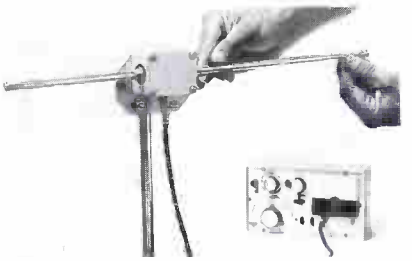
"Open air" stereo headphones are extremely light (2.3 oz), have sponge ear cushions allowing some ambient

sound to ears. Beyer Model DT302 has impedance of 2 × 600 ohms, power rating of 7 mW. $29.95. BEYOX. **301**

Mixer with six inputs is available in kit or wired form. Prokit II has both mike and line input on each channel,

switchable mike preamp gain, LED overload indicators, slide or rotary pots. GATELY ELECTRONICS. **302**

Radiation detection dipole tunes any



6 MHz segment from 50 to 260 MHz, connects directly to standard field strength meters for CATV measurements. TAC Model DET-1 has 75 ohms impedance, coaxial output connector. ANIXTER-PRUZAN. **303**

Hubrid power switches handle 60 and 100 amps at 120, 240 and 480 volts rms. New units in PACE/PAK line have complete power control circuits with diodes, thyristors and passive components in a single epoxy package. INTERNATIONAL RECTIFIER. **304**

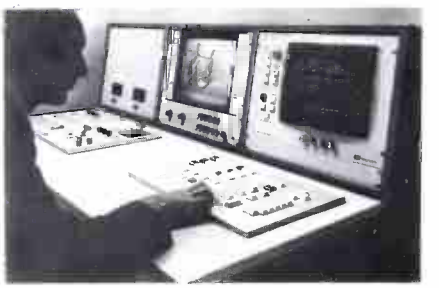
Multi-function counter is completely remote controllable, provides time interval measurements of pulse width, period, B-A, frequency (0.1, 1.0, and 10.0 seconds time base) events period B, events B/A, and frequency ratio. Model 2319FE has internal 5 vdc power supply, eight digit display. $725, with time base accurate to .0025% (higher accuracy optional). MODULAR DEVICES. **305**

Audio console uses modular components for design flexibility. Model

1604 will accommodate up to 16 inputs, 4 echo channels, 2 foldback circuits, 4 outputs, 4 submasters, and all other standard circuits for broadcast use. Modules are available for remote control of tape machines and turntables, or remote input selection. AUTOMATED PROCESSES. **306**

Broadcast power tetrode has a new screen grid structure which virtually eliminates negative screen current. Model 4CX250BC/8957 is a direct replacement for the 4CX250B, is ceramic/metal, forced-air cooled, with maximum plate dissipation of 250 watts and maximum input power of 500 watts. EIMAC DIV OF VARIAN. **307**

Computer-controlled remote VTR editing system is formed by connecting Model PEC-102 digital computer with new CRT command/display console and video/audio production switcher. System allows off-line or on-line editing with up to 8 quad or



helical VTR's or multi-track audio machines, using random-access magnetic storage disc of PEC-102 to compile edit decisions. CENTRAL DYNAMICS CORP. **308**

Micro-miniature dry-reed relays in one-piece molded epoxy cases have 1, 2, or 4 form-A contacts. Coil ratings are 5, 12, and 24 vdc, load handling up to 10 VA. $2.50 to $6. C. P. CLARE AND CO. **309**

Colored windscreens match microphones visually to colored dots on control knobs or sliders. The A61WS series of windscreens fit all Shure "ball-type" microphones, and provide wind and pop protection as well. $4.95. SHURE BROTHERS. **310**

Twin-hex coax crimp tool system has selectable dies, allows use with a variety of different coaxial cables and connectors. In most cases, the same die set crimps both inner and outer contacts of the connector to the cable, with typical time less than 30 seconds. $87 for tool, $37 per set of dies. AMPHENOL. **311**

Programmable frequency synthesizer covers 10 KHz to 40 MHz, with 1 Hz resolution throughout. Model 5500 has low phase noise, built-in AM, 2×10^{-8} per degree/C stability (higher as option). $4250. ROCKLAND SYSTEMS CORP. **312**

Magnetic disc memory system uses nickel-cobalt plated discs, can store up to 15 million binary digits per

PRODUCTS

second at 3600 rpm, or an analog bandwidth of 15 MHz. Model D-1 is a transport only, with drive and heads but no electronics. System stores up to 250,000 bits per track. DAVIS-SMITH CORP. **313**

Multi-function counter operates to 80 MHz, has auto ranging. Model 1900A has auto reset on all functions, gate timer, filter and attenuator. Manual override allows setting resolution to 0.1 Hz; events up to 10^6 can be totalled. Display has six digits. $349.00. JOHN FLUKE MFG. CO. **314**

FM/AM modulation meter measu FM deviations to 500 KHz at c riers to 1200 MHz, and AM de to 95% at carriers to 400 M

Model 2300 has distortion and cha nel separation performance mo than adequate to meet FCC regul tions for testing systems. $27 MARCONI INSTRUMENTS. 3

Automatic triggered scope displa color TV and video waveforms the push of a button. Model PS Minute Man has button-selected

vertical, TV horizontal, 3.58 M front-end vector display, five ti expand. It also functions as a st dard 10 MHz scope. SENCORE, I 3

Portable video delay unit provid delay from 10 ns to 165 ns, in 5 steps throughout the range. Mod UN180 (Matthey) also has a f trim of ±4 ns. BNC connectors c be at top or rear. TELEVISI EQUIPMENT ASSOCS. 3

Interlock 16mm film projectors clude "dynamic sync control" for justing timing between film and s arate sound track while projector running. Units are available with cessory tv package for progr transfer to CCTV or videota $2730 to $4120. W.A. PALM FILMS, INC. 3

RF adapter extends range of Mo 970A digital multimeter from KHz to 500 MHz. Model 9700 adapter has accuracy greater tha dB, measures 0.25 to 30 volts scale, $85.00. HEWLETT-PACKAR 3

Digital voltmeter reads true rms

Continued on page

Is the FM competition giving you fits with QS?

If you're an FM station in Miami, Los Angeles, New York, Cincinnati, Buffalo, Boston, St. Louis, Phoenix, Las Vegas, Stockton, Honolulu, San Diego, Sacramento, Woodland or Menomonee, and you're *not* using the Sansui QSE-5B broadcast encoder for 4-channel broadcasts, these are probably complicated times.

Because we know, and you know, that the competition out there *is* using this encoder and putting discrete 4-channel tapes, demodulated Quadradiscs (CD-4*) and even their own live 4-channel material on their FM MPX waves.

You'll have to admit, QS 4-channel is real competition.

But all is not lost.

You, too, can join the growing QS bandwagon. As early as today.

WSHE, KLOS, WQXR, WKRQ, WYSL, WBCN, KMOX, KBBC, KRGN, WGMF, WBUS, KUOP, Oceania Cable, KGB, KZAP, WZMF, KMEO and KSFM hooked up to QS for obvious reasons.

QS retains all current standards of hi-fi FM stereo, including signal level, S/N, dynamic range, frequency response.

QS helps you retain your present service area and still broadcast realistic 4-channel. The size of your audience and your total rating position should even *expand*.

QS is quite frankly an inexpensive proposition. An investment of about US$900 buys and installs the QSE-5B. You will have to agree that that is not a burden if you're serious about catching up with the competition.

Are you listening to QS 4-channel stereo on someone else's airwaves?

Good, then you know what a quality sound it is.

Wouldn't you like to hear the same sound on your own bandwidth?

Good, we'd certainly like to talk to you.

*TM JVC Inc.

Sansui

QS 4-Channel Stereo. QS Are you listening?

*QS is a trade mark of SANSUI ELECTRIC CO., LTD.

SANSUI ELECTRIC CO., LTD. 14-1, 2-Chome, Izumi, Suginami-ku, Tokyo 168, Japan/Telephone: 323-1111 **SANSUI ELECTRONICS CORPORATION** NEW YORK: 55-11 Queens Blvd., Woodside, New York 11377, U.S.A./Telephone: 212-779-5300 LOS ANGELES: 333 W.Alondra Blvd., Gardena, Calif. 90247/Telephone: 213-532-7670 **SANSUI AUDIO EUROPE S.A.** ANTWERP: Diacem Building, Vestingstraat 53-55, 2000 Antwerp, Belgium/Telephone: 3-315663~5 LONDON: 39-41 Maple Street, London, W1P, 5FU, England/Telephone: 580-5353 FRANKFURT: Reuterweg 93, 6 Frankfurt Main, West Germany/Telephone: 590-700

Circle 137 on Reader Service Card

PRODUCTS

dc voltages, with 1 microvolt resolution. Model 3620A spans 10 mV to 1 kV full scale, has a 4½-digit liquid crystal display, overload protection to 1 kV, and typical accuracy of ±1% of reading +1% of full scale. $1395. BALLANTINE LABORATORIES. **320**

Opto-coupler has minimum 2000 v input-output isolation, 80% current transfer ratio. Model NCT-200 has 0.5pF isolation capacitance. $1.65 (in quantity). NATIONAL SEMICONDUCTOR CORP. **321**

MTV chassis is designed to expand capability of TT-200 series of tv transmitters. The single 5½″ rack panel holds the Dynair VS-206A video switcher, which switches any of up to six video inputs to one output; and the Shure M67 audio mixer which switches up to four audio inputs. ACRODYNE INDUSTRIES. **322**

FM antennas are rated at 1000 watts per bay. Model CP-1000 (circularly polarized) and HP-1000 (horizontally polarized) are parallel fed, so two

bays is rated at 2 KW, etc. Radiating elements are 1-inch OD stainless steel tubing. PHELPS DODGE COMMUNICATIONS CO. **32**

Mini-console for tv control has fo channels, four monitors. Mod AVX-500 has slanting front pane room for special effects equipme

on lower level. $295. With So Seg-2, PVM-400 and MX-90 wired, etc., $2365.00. AVONIX. **32**

New universal tv remote control, u able with any tv receiver, has a co verter, connected between antenn and set's antenna terminals, and cord-connected remote control uni with pushbuttons for all channe and functions. Model TRC-12 ope ates by adjusting voltage on a vara tor diode oscillator in converte which changes each channel to cha nel 2 or 3, whichever is unused area. $100. JERROLD ELECTRONICS. **3**

DC power supply series have ef ciency up to 85%, power outputs u to 2700 watts. DCR-B solid-sta power supplies have eight volta ranges to 600 vdc, claim mean tim between failures over 25,000 hour $400 to $1125. SORENSON CO D OF RAYTHEON. **3**

Programmable pulse generators ha eleven parameters controllable by s rial or parallel BCD input. Mode PX-30 and PX-31 provide pulse an plitudes up to 10 volts, into 50 ohm from 50-ohm source. Repetition ra is up to 9.99 MHz. PX-30 uses 8 input lines, PX-31 8 input lines a ASCII code. PX-30, $3750; PX-3 $4500. PHENIX ELECTRONICS. **3**

Powerline surge protectors use t

Continued on page

More TV Chief Engineers own RCA color TV than any other set.

Now you can get the same solid state color fidelity and reliability in a low cost studio viewing monitor.

It's a 100% solid state chassis. A big 25-inch color commercial receiver that handles RF or bridged direct video and audio feed lines. Live or taped programs. Color or black-and-white.

A tough, general purpose viewing monitor with Super AccuColor black-matrix picture tube quality and all the right studio connections. And no expensive adaptors.

The RCA General Purpose Color Monitor. More of what you're looking for — for less. Just ask us. Send us the coupon, we'll send you the details.

RCA Service Company K-143
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Commercial Products Sales, Bldg. 203-3.
Camden, N.J. 08101

Gentlemen: I want the details.

Name _____

Title _____

Station _____ Phone _____

Address _____

City _____

State _____ Zip _____

RCA

RCA GIVES YOU MORE OF WHAT YOU'RE LOOKING FOR.

Circle 139 on Reader Service Card

PRODUCTS

TII 3-electrode gas tube, which ionizes on leading edge of voltage surge, protects both sides of line. The series TII-410 are available for 110 vac and 220 vac, single or three-phase. TELECOMMUNICATIONS INDUSTRIES, INC. **329**

New two-track tape recorder uses digital circuitry, new logic, and new transport design. Model JH-120 is available in ¼" and ½" sizes. MCI. **330**

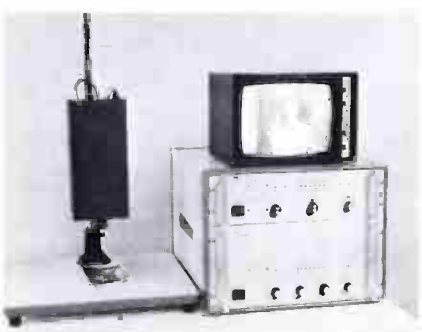
Zoom lens covers 24-480mm. Model T9 is supplied with follow focus and zoom gears, is for professional 35mm motion-picture use. $7500. CINEMA PRODUCTS CORP. **331**

Oscilloscope with 3-inch screen combines 5 MHz coverage with a transistor/diode tester, vectorscope functions, and a ringing test function. Model WO-33B includes a special probe for the built-in transistor/diode checker. The vectorscope function allows alignment of color tv automatic frequency phase control, and ringing test checks flyback transformers. $229.00. RCA. **332**

RF power transistor will deliver up to 100 watts in the 130-175 MHz range. Model ON495 has a power gain of 6.4 dB and collector efficiency of 82% at 175 MHz. $45.10 (in quantity); single, $65. AMPEREX. **333**

Camera control unit provides push-button remote control. Model V129-4PP causes camera to move to prearranged, preset position, while lens zooms, focuses, and iris adjusts. Any of four positions can be set anywhere in full range of each function by screwdrive front panel adjustment. VICON INDUSTRIES. **334**

Video system transmits still tv images over dial-up telephone lines. Televid sends a single medium-resolution picture in 60 seconds. System includes a CCTV camera, stand, 12" monitor and a Model 260 video compressor and 261 video expander. $9000. COLORADO VIDEO. **327**



NEW FALL TELEVISION SPECIAL

Starring CMX System/50 · Co-Starring CMX System/300

/V's newest "spectacular" will be pre-niered by CMX Systems in Hollywood nd New York in a few days.

he feature attraction is a full-blown emonstration of our new System/50 tand-alone computer assisted video tape diting system utilizing the new Sony 850 ¾" videocassette. *A show biz first!*

very special highlight of each presenta-on is a full "hands-on" opportunity for you to actually create frame accurate cuts, dissolves, wipes and keys. You can preview edits, or re-edit previously edited material and much, much more. These edit decisions may be auto-assembled on any on-line System/300.

SPECIAL NOTE: Each session will be limited to a small group . . . reservations are advised. For information:

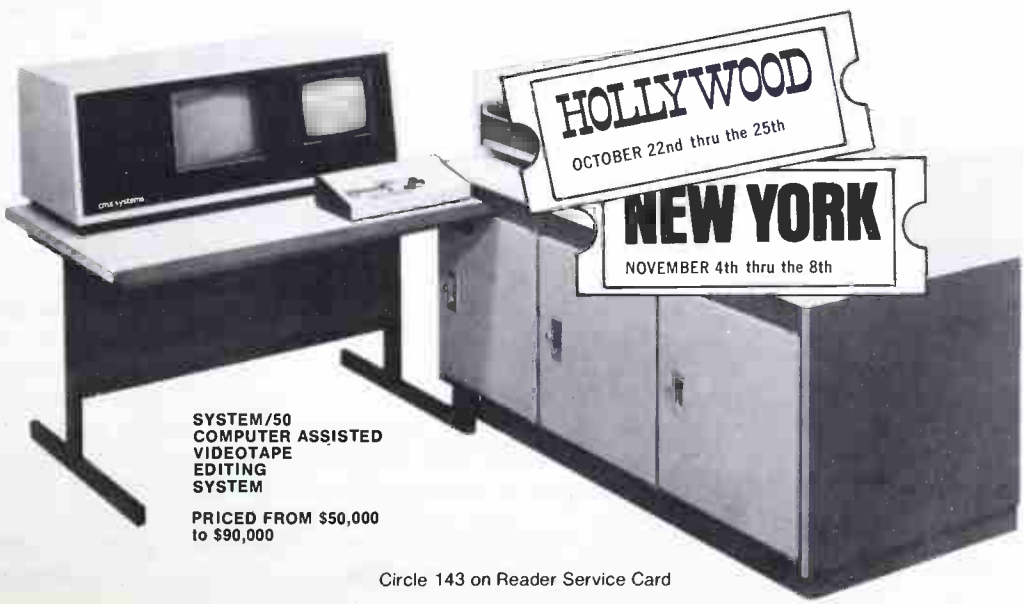
HOLLYWOOD: Call Bryan Hickox at (213) 980-7927

NEW YORK: Call Murray Bevitz at (212) 371-1122

HURRY! HURRY! HURRY!

CMX Systems, an ORROX company, 635 Vaqueros Avenue, Sunnyvale, California 94086, (408) 245-8450

cmx systems



SYSTEM/50 COMPUTER ASSISTED VIDEOTAPE EDITING SYSTEM

PRICED FROM $50,000 to $90,000

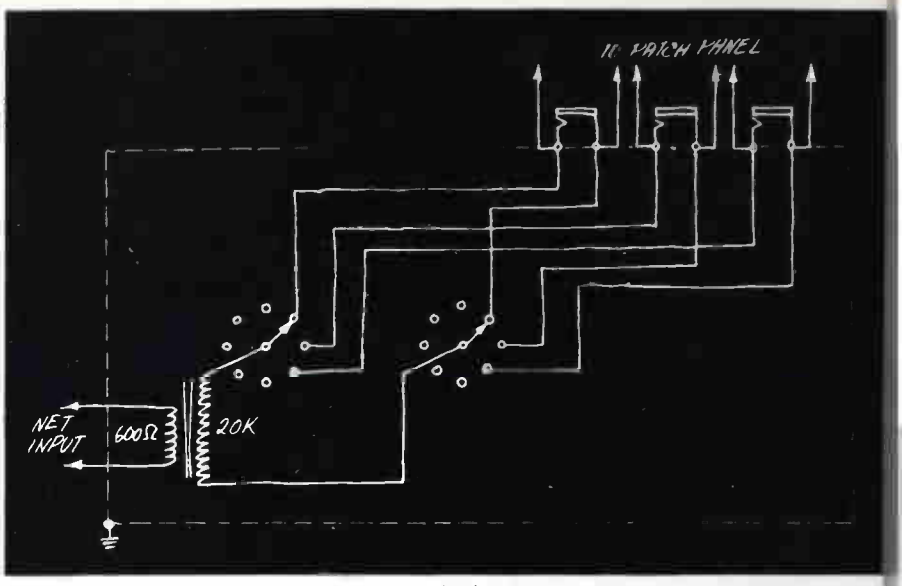
Circle 143 on Reader Service Card

puts & one net input).

Solution: First, the outputs of all the sources were run to a patch panel in the production room. Lines then were run to a transfer switch mounted adjacent to the console.

Each pair was run from the patch panel to an insulated phone jack, then from the jack to a two-wafer rotary switch. Connections from the switch were run to a bridging transformer; the 600-ohm secondary leads to the sole net input on the console.

The output of the receiver comes in on one remote line, and the second line is used to bring in a reel-to-reel recorder.



Jack Wilson offers a solution to too many remote inputs converging on an overtaxed board.

73. Inexpensive Multi-purpose Audio Equalizer.

Philip Sonksen, Chief Engineer, KLSS-FM, KSMN-AM, Mason City, Iowa

Problem: To equalize program lines, microphones or almost any audio source without spending a lot of money. The equalizer I have constructed is being used to tailor the response of our Telco program lines to the FM transmitter, which, at times, leaves something to be desired. The equalizer is also being used to adjust response characteristics of microphones throughout the station, such as in FM and AM control rooms and in news and commercial production studios. It also becomes invaluable when it is rack-mounted in the commercial production room, to be patched in between different sources on the patch panel for such purposes as tape dubbing or equalizing a poor-quality tape.

Solution: The following equalizer can be built for under $15 (mono; under $25 for stereo). The reasons the equalizer is so inexpensive: it has no power supply of its own and borrows power from other sources; it contains no inductors or transformers.

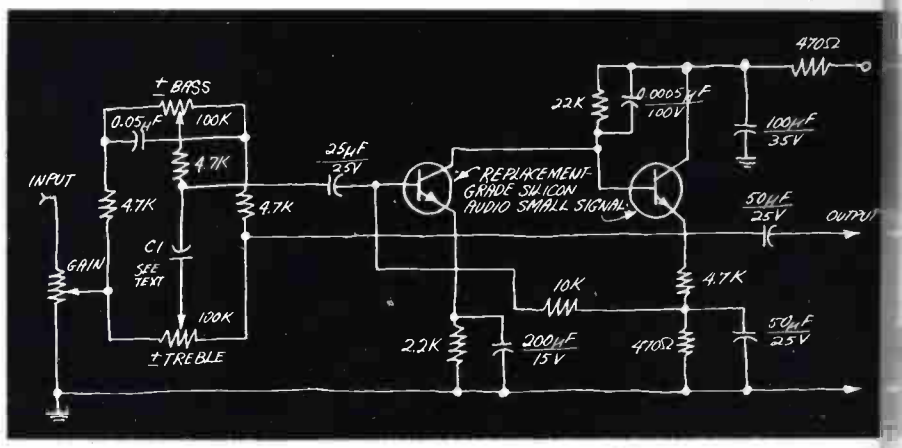
Power requirements run from 12 to 22 volts, or somewhat higher if a dropping resistor is used.

Gain is about unity. A few words of caution: anything much higher than 0 dB will overload the equalizer, and inputs of less than −35 dB will tend to produce white noise.

To use this equalizer for microphones, it must be inserted between the first and second stages of amplification in a control board. A microphone used directly on the input of the equalizer will produce excessive white noise at its output. Distortion from −20 dB to 0 dB, however, is low.

Noise level also depends on the power supply filter. Using a battery supply, for −10 dB input, noise level was −70 dB with no equalizing boost or cut. The input of the equalizer is medium-to-high impedance; the output is relatively low impedance.

Rf radiation does not affect the performance of the equalizer. By changing the value of capacitor C1 (0.001 uF), you can alter its frequency characteristics. By increasing the value of C1, you can move the high-frequency curve of the equalizer down to a high mid-range which works well with studio microphones. Without shunting any capacitors across C1, only the highest frequencies used for FM Telco line equalization will be affected. High- and low-cut or boost is in the vicinity of ±1 dB.



Low-cost audio equalizer built by Sonksen draws power from other gear.

74. Transmitter Switchover Relay Retains Continuity.

Dennis Feely, Chief Engineer, WTN Trenton, N.J.

Problem: To switch monito audio and antenna signals and cabi paths between the main and auxili ary transmitters without losing th versatility of individual control monitors. Since it was a problem t disconnect the RF monitors from th main transmitter to use on the auxi liary unit when performing on-a frequency adjustments, it was nece sary to develop a relay switching a rangement to have individual contr over the switching of the antenna audio and monitors. Also found nec essary was a remote control Maste

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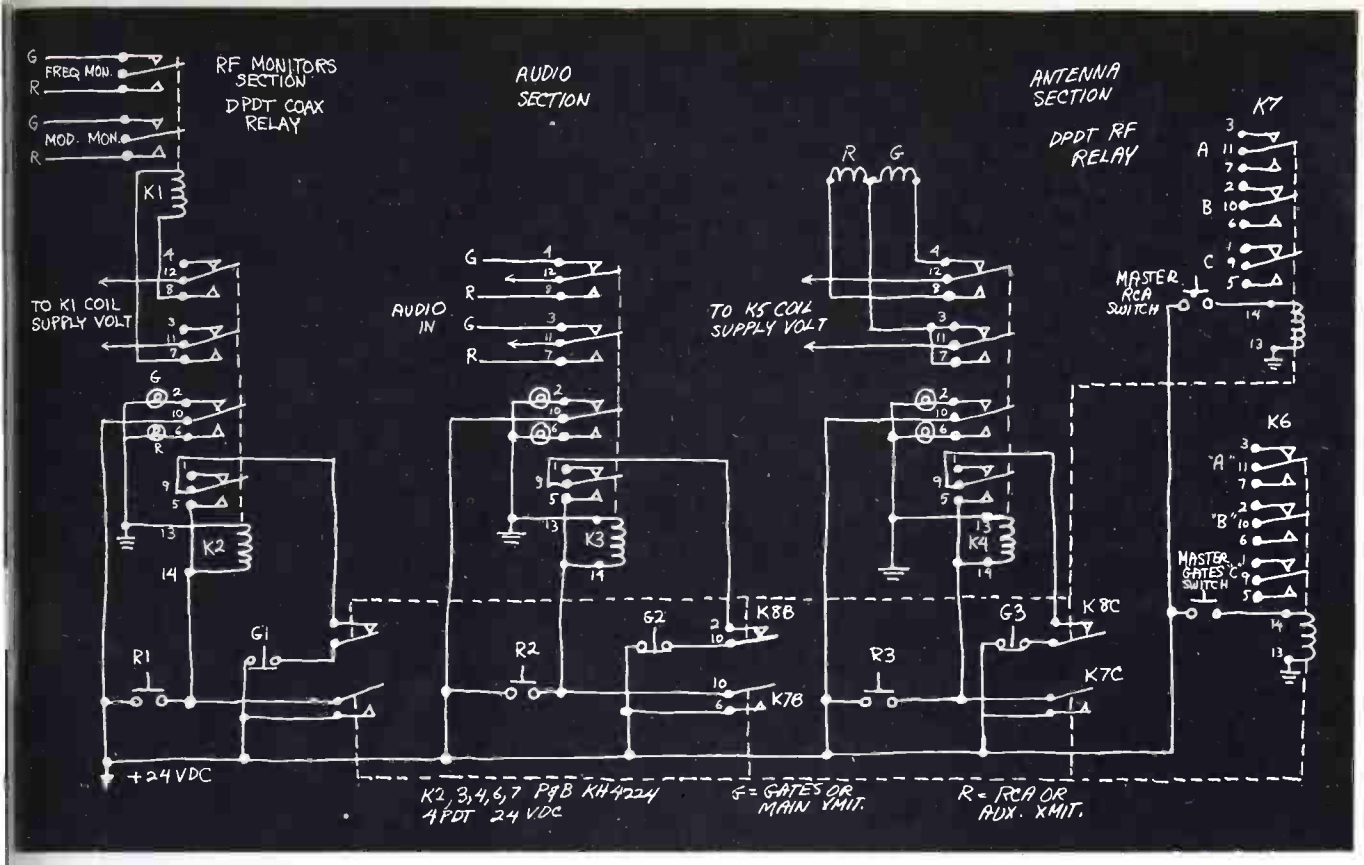


Dennis Feely's transmitter switchover retains flexibility of individual monitor control

switch to allow switching of all functions at once.

Solution: The schematic diagram shows the switching used. The rightmost section controls the switching for the modulation and frequency monitors. A DPDT coax relay takes care of the RF which is controlled by K1. Relay K2 activates K1 and, as in all the relays, it is connected as a holding relay by its own contacts. In the ON mode (or Main) K1 is not energized by K2; the monitors are connected to the Main transmitter. When switch R1 is depressed, this energizes K2 which is held in by its own contacts (9&5) and through contacts 3 and 11 of K8 and G1. If switch G1 or K8 is energized, the holding circuit will break and allow K2 to return to the Main position. Also, should power fail momentarily, K2 will return to the Main position.

The middle section switches audio. Ungrounded shielded cable eliminates stray RF or AC hum from being induced into relay K3. It also follows with the same holding circuits as the RF monitor relay.

The third section switches the antenna relay. It is equipped with its own disconnect switches; even though AC is continuously applied through K4, the antenna relay is connected so as to switch one transmitter into the phasor and the other into the dummy load. This section also includes holding circuits.

The last section contains the two master switches. Both are the momentary-contact type to allow easy compatibility with a remote control system. The master RCA switch uses the normally open contacts to activate all three relays simultaneously while the Gates master control switch uses the normally closed set and releases all the holding circuits simultaneously.

Tally lamps indicate the status of each relay. The system was mounted on a blank rack panel. Quick disconnect wiring via a terminal block provides switch and tally lamp accessibility for remote connections. The relays are plug-in types.

75. Random Access Storage Systems for Cassettes & Film.

Steve Smith, Dir. of Engineering, KCMO TV, Kansas City, Mo.

Problem: To upgrade a video cas sette and spot film handling system.

Solution: Standard office file stor age cabinets meet the requirement of storing large quantities of quad VTR cassettes and spot film reels Two office filing cabinets, manufac tured by Remington Rand, were in stalled next to the video cassette re corder. One cabinet, 8 ft. wide by ft. deep and 9 ft. high, holds 144 VTR cassettes. Fifteen of these fi perfectly in each of the letter-siz drawers. The second cabinet, a 10 foot model, holds 1620 cassettes.

A similar cabinet for tab card was installed adjacent to our film islands. The old spot film racks were cut into 14-in. sections. Two were placed in each drawer which provid ed capacity for 26 spot film reels The 8-ft. cabinet has a capacity o

Steve Smith uses office filing cabinets to house and keep tabs on his station's film & tape.

7840 reels. Thirteen spot reels are allocated to each drawer. A 10-ft. tab file cabinet will hold 10 080 spot reels.

Storage of media was only part of the problem, though. We devised an in-house numbering system; it is the same as the cassette or film number, and also as the location in the drawer of the cabinet.

A media inventory control program was created for use on an IBM System 3, Model 10 computer. Revised listings, by house number and advertiser, are produced every two weeks. Copies are distributed to Master Control, Projection, Traffic, Promotion, and Programming.

Traffic sends new media to engineering along with a check-in slip. Films are added to the inventory list and filed. Video tapes are dubbed to cassette and entered in the inventory listing. The original VTR spot reels are stored by house number in the Film department.

When the films and tapes are no longer needed, Traffic issues a release form which includes disposition information.

The traffic computer puts the in-house number on the program schedule. Engineers and projectionists make out daily pull lists which are in numerical order, instead of "at random," as on the log. All cassettes and spot reels can be pulled in less than one hour. We have not lost a film or tape since the new system was implemented. The engineers and projectionists now spend less time shuffling, sorting, and looking for media. Film department personnel who formerly routed film and tape were reassigned to screening movies.

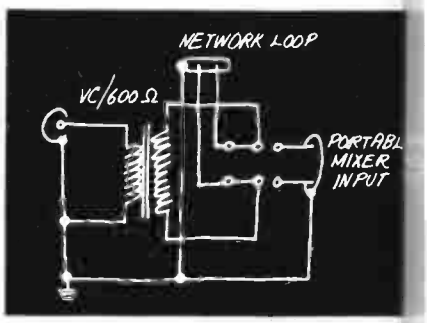
continued on page 62

GREAT IDEAS

76. VC-to-Line Xformer Simplifies Cassette-to-Reel Dubs.

Robert G. Purrington, Chief Engineer, KLLL AM-FM, Lubbock, Texas

Problem: To simplify the transfer of voice actuality material from cassette to open reel and cartridge tape machines. When I built our present news room, most actualities were recorded on portable reel-to-reel machines. Soon, however, portable cassette recorders became economically practicable to put into the hands of our news men. Present inventory of portable cassette recorders includes a machine costing less than $35; it even features automatic limiting. Not long after we bought the first



Bob Purrington's cassette-to-reel tape machine interface shows that sometimes the easy way out is also the best.

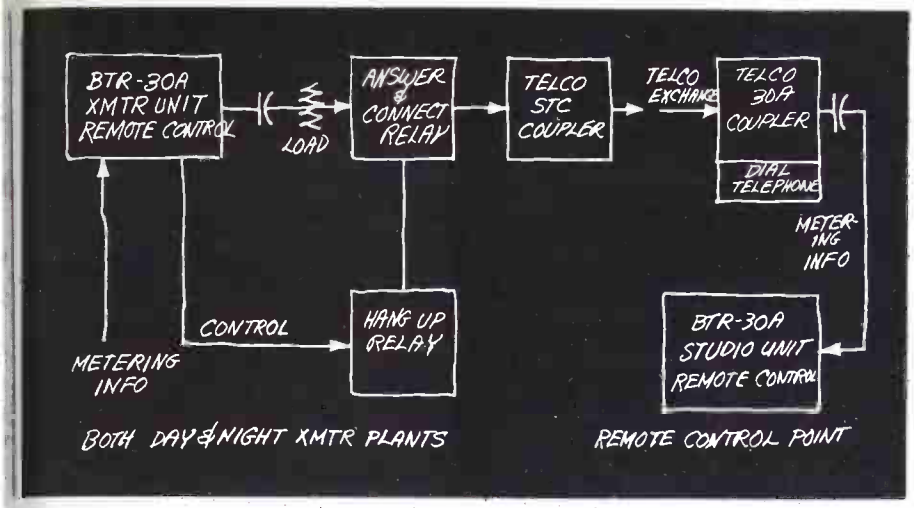
machine, we rediscovered a way to transfer material to reel and cartridge machines quickly, and with a minimum of news room noise (this ruling out speaker-to-mike transfer).

Solution: All that was required was to build on a 1¼-in. rack panel an input for the cassette machine. The panel is merely a simple audio transfer point, and consists of an audio impedance-matching transformer, DPDT switch for routing the audio to one of two net inputs, and an RCA phono jack. Cables plugged into this phono jack have, on the opposite ends, plugs which match the various cassette recorders used.

77. AM Remote Control and STL System Eliminates Telco Lines.

Al Hillstrom, V.P., Engineering, KOB AM-TV, Phoenix, Ariz.

Problem: To replace the telepho



STL replaces telco lines except for metering which uses a business phone.
** The day STL gets a sufficient signal from the night plant and vice versa.*

lines used for program and control circuits between transmitter sites. KOOL-AM operates dual-site transmitter plants (one day, one night) remote controlled from the manned TV transmitter site. The twin operation presented additional problems in designing a reliable system and entirely eliminating telco circuits (themselves a source of outages). We took advantage of the two-site operation to gain redundancy on the STL and remote control system. Redundancy was gained by adding an extra STL receiver at each plant.* The remote control function was put on a subcarrier on the STL, eliminating both the program line and control line. However, metering presented a problem; we wanted to know the transmitter status before the carrier was on. Therefore, a sub-audible tone system wouldn't suffice.

Solution: In order to eliminate the use of high-cost full-period telephone lines for metering, we derived a system where we could use a regular business phone coupled through a telephone company STC coupler which could be controlled by the remote control system. The system functions as follows:

The operator dials the private phone number at the transmitter plant;

With his remote control unit set, he activates the Raise function which operates and latches the answering relay, connecting the STC coupler to the metering information;

At the remote control point, the output of the 30A coupler is connected directly to the metering input of the remote control unit;

The operator now has a metering line connected and he reads his meters;

He then hangs up or disconnects the STC coupler from the metering circuit of the BTR-30A remote control unit;

He is now ready to repeat the function any time he so desires.

We monitor modulation at all times via a TFT-713 off-the-air monitor which also has a silent-sense alarm indicating loss of audio or carrier. Each remote control studio unit is wired to operate either transmitter.

invited by September 20 (a postponement in response to request from the United Church of Christ and American Civil Liberties Union), and reply comments by October 7th, considerably after this issue goes to press. With all parties affected by the rule invited to comment, including broadcasters, program producers, performers, the network, and consumer groups, a total re-airing can be expected in early fall.

TV Move to NY Trade Center Affirmed

Authority for the long-contested move of eight New York television transmitters to the new World Trade Center in downtown New York was reaffirmed by the FCC late in August, overriding protests from the Port Authority of New York and New Jersey, (builder of the Trade Center), the Association of Maximum Service Telecasters, Taft Television Corp. and T.S. Communications Corp. The Port Authority has contended that the move would cause undue expense and inconvenience to the public, from re-orientation of receiving antennas, and would cause other reception problems. The FCC said that hearing evidence indicated a general improvement from the move, and that, lacking operational experience, there was no point in further delay.

Three-Station Sale for $110 Million Approved

What is probably one of the largest sums paid for broadcast properties will accrue to Carter Publications Inc., of Texas, when that company consumated the sale of SBAP-AM and KSCS-FM, Fort Worth, to Capital Cities Communications Inc., and of WBAP-TV, Fort Worth, to North Texas Broadcasting Corp. The two radio stations went for $75,500,000 and the TV station for $35,000,000 for a total of $110,500,000. Both sales were approved by the FCC in late May, over the objections of competing applicants.

BUSINESS BRIEFS

RCA sold to the Post-Newsweek Stations four of the new film cartridge projectors for use in the group's four TV stations .... **Cinema Products Corp.** announced strong sales abroad of their new CP-16R reflex cameras introduced last March. Among them, three to the Australian Broadcast Commission six to the British Broadcast Commission, five to TV Globo in Brazil, and eight to the Turkish Ministry of Education.

C-Cor Electronics got the contract for turnkey installation of a 66-mile cable system in Shelbyville, Indiana for Shelby County Cable TV ... **Scientific Atlanta** will build a distribution cable system for Circleville Cablevision Associates, Circleville Ohio.

The Association for Multi-Image is a new professional organization concerned with multi-image productions in education and industry; president is Carl Beckman, University of Maryland, College Park, MD 20742 .... **National Engineering Consortium**, a group of 13 midwestern universities, will sponsor seminars on professional growth in engineering at the Doral Hotel, Miami, December 15–20, 1974. Info: NEC Registrar 1301 W. 22nd St. Oak Brook, IL 60521.

Catel will move all manufacturing and marketing activities from Synnyvale, Calif., to a new larger plant at Mountain View, Calif. ... **WFMT**, Chicago, will broadcast live all eight opening nights of the Chica-

go Lyric Opera, in the 1974–75 Season, in SQ quad .... **WDEF,** with top ratings in Chattanooga, joined the CBS radio network August 25th.

Turmac Electronics at Lachine, Quebec, will represent **C-Cor Electronics** in Canada .... **Telecolor Productions,** Alexandria, Va, has installed a Datatron 5050 tape editing system, modified to interface with both RCA and Ampex VTRs for faster editing services .... **Anixter-Pruzan** opened a new sales office in Dallas, at 303 LBJ Freeway .... **TeleMation, Inc.** installed a video retrieval system at the Spokane Worlds Fair, allowing visitors to "call up" on video monitors any of six different video cassette programs dealing with the environment, pollution, and related topics, presented by the U.S. Department of Commerce.

Boston Chapter of the **Society of Broadcast Engineers** will sponsor a New England convention at the Sheraton Yankee Inn, Auburn, Mass., November 1 and 2, 1974 .... **Gotham Audio** announced that they would sell in the U.S. the "Magnetophon" tape recorders made by AEG-Telefunken in Germany .... **Avtel** of Glen Head, NY, maker of automated video cassette programmers, has been bought by Anderson Laboratories, Bloomfield, Conn., already the parent of Television Microtime.

Intertie, Inc., bought the Hutchinson, Kansas cable system under construction by Larry and Cale Hudson .... **KEX,** Portland Oregon, won the Billboard "station of the year" award for excellence in news handling .... **Ampex Corp.** won two contracts totalling $1.5 million to supply four ACR-25 automated videocassette machines and three AVR-1 studio recorders to CBS stations in four cities.

Tri Com Productions is a new video tape and film production company, with complete remote capability, set up in Hilton Head Island, S.C. .... **Sterling Television Presentations,** which leases automatic news display equipment to cable television operators, was bought from Time Inc. by **Video Data Systems.**

Anaconda Electronics completed the first section of a turnkey cable system, using all bi-directional electronics, for Cable Video Communications in North Charleston, N.C. .... **Goldmark Communications Corp.** received US patent #3821801

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Business Briefs

on their automatic skew corrector, which offsets video tape horizontal time errors by adjusting tape tension.

Signetics Corp. has asked the Japanese Government for permission to set up a company to sell integrated circuits in that country.

Programming

"Earthwatch Radio" is a two-minute, five-per-week program on environmental affairs, produced jointly by the Institute for Environmental Affairs and the University of Wisconsin, free to radio stations from 1225 W. Dayton St., Madison, WI, telephone 608-262-5957.

"Last of the Wild" is a TV series on endangered species, shot at wild-life locations with Lorne Green as host and narrator, in 26 half-hour segments, available from Y&R Enterprises, 100 Park Ave, NYC: it is sponsored by the General Electric Appliance Division.

The five-program **"Digital Tutorial Series"** provides instruction for engineers and technicians on the behavior of digital circuitry; the 20-minute segments are available on ½-inch open-reel video tape or ¾-inch video cassettes, at $120 per tape, from Hewlett-Packard, 150 Page Mill Rd, Palo Alto CA 94304.

An 18-minute multi-media show, **"This Thing Called Multi Image,"** has been produced by Spindler and Sauppe to demonstrate the nature and advantages of this type of presentation. It requires three screens and uses six Kodak carousel trays, a reel of 16mm motion picture clip and a stereo/mono sound tape. Available with full instructions at $225 from Spindler and Sauppe dealers, or direct from 13034 Saticoy Street, N. Hollywood CA.

"The Commanders," series of seven one-hour programs on the top military figures of World War II (Eisenhower, Rommel, MacArthur, Slim, Harris, Zhukov, Yamamoto) was produced by Time/Life Films and the BBC-TV, and is being syndicated by Time/Life Films, Time & Life Bldg, New York 10020. **"Geography for the '70s"** is a series of 15 20-minute lessons in color, designed to create an awareness of socio/ecological world problems with a geographic background. It was produced by the Southwest Texas Edu

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BETTER AM SOUND

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fore, the only solution to them is *never* to put an equalizer after the limiter.

Conclusion

It is clear that a program director is beyond his depth when he tries to prescribe engineering improvements for a radio station. Far too many chief engineers, however, adopt an uncooperative attitude of "let-him-hang-himself-with-all-his-gadgets." The results are depressing.

The responsibility rests with engineering to educate the program director and the rest of station management about what it really takes for the station to sound good. Particularly they must be rid of the notion that a $600 box will provide some sort of apocalyptic cure for deeply-rooted problems elsewhere in the station.

The cynical statement, "there's nothing wrong here that money can't cure," may be all too true in a lot of cases. If the station management is serious about obtaining quality sound, it must be prepared to pay for that sound, all the way from consultant's fees to replacement parts for the transmitter, and overtime for the engineering staff if the improvements must be implemented in a hurry.

The biggest obstacle to overcome is that of convincing non-technical management that the station *is* an integrated system in which all components interact, but this obstacle must be overcome before any meaningful improvement can take place. Until then, no "miracle" audio device will solve your audio problems. **BM/E**

BETTER TV SOUND

cont. from page 50

system that will allow the TV audio to go over the same coaxial cables as the picture, where there is much more bandwidth. As this is written, AT&T's Long Lines Department is evaluating several experimental diplexer units developed under the sponsorship of the Committee. A report is due within a few weeks. If any of the systems proves to be acceptable, it could be the beginning of the breakup of the TV audio log jam. With a high-quality signal coming over the line, the set manufacturers would have the incentive to make sets with better-quality audio, offering them at least on an optional basis.

The Committee has six panels actively studying, respectively, the TV audio aspects of origination, distribution, broadcasting, reception, cable and MA systems, and "the state of the art." Reports are due at various dates in the next few months. Without any advance information on findings, we can still be certain that, with the present high capability of the technology and with the growing pressure for solid advances, some usable ideas will come forth.

One topic the Committee will certainly deal with is the use of satellites for networking. The Public Broadcasting System is already studying satellite transmission as a way of reaching its non-commercial affiliates around the country. Some sections of the ABC Midwestern radio net are actually starting to use satellite links (see news story on another page in this issue). Satellite capacity for TV networking is going to grow very rapidly during coming months and years, and this by itself may remove the network barrier to better TV audio.

However, these "main-line" approaches are obviously going to take some time. The existence of high grade stereo systems, with FM tuners, in so many American living rooms will undoubtedly stimulate more simulcast operations like those described at the start of this article. Cable operators can actually make some extra money at it. Here are some further details on the operations listed:

The ABC "In Concert" series, probably familiar to many readers, is based on a top-quality stereo tape of the concert audio, recorded when the video is put on video tape. The tape has a sync track which allows playback to be synchronized with videotape playback. Video and audio tapes go to the participating stations which need, in addition to both TV and stereo FM transmitters, an inexpensive sync circuit (details available from ABC TV network headquarters, NYC).

The listener puts his TV receiver between his two stereo loudspeakers. The regular TV audio gets an A&B signal (mix of the two channels, primarily for listeners who haven't got FM stereo equipment). The listener with stereo equipment can leave the regular TV audio on, as a phanton center channel, which is a genuine asset in many large rooms. Or he can turn it off. The program has proven to be extremely popular, especially with young people who like the predominately "rock" music of the concerts. But a variety of musical styles has been covered; the listenership cuts across many lines.

The FM simulcast-via-cable is a brand new idea based, so far, on a headend processor made by Catel, West Coast manufacturer of FM subcarrier and microwave equipment. Their Model RM-A is designed specifically for splitting out the audio on a TV signal, putting it on an FM carrier, and sending it via cable to subscribers with FM couplers. The processor also increases the maximum deviation from TV's 25 kHz to the standard FM 75 kHz. Several cable companies were preparing to use the system when this was written. It rates for them as an additional service which makes the FM coupler more attractive. For the coupler, of course, the cable operator usually gets an extra monthly fee.

The pay-TV system mentioned has been developed by Blonder-Tongue Laboratories. It includes a complete transmitting facility on channel 68, in northern New Jersey near metropolitan New York, with a scrambling system at the transmitter and unscrambling in the subscriber's decoders. The transmitted signal includes two high-grade stereo audio channels. They are available separately from the decoder for feeding directly to a stereo hi fi system. The audio skips not only the subscriber's TV set but his FM tuner as well; the two channels remain totally "discrete," with no matrixing.

The foregoing are obviously just samples of what can be done with today's technology. It is hard not to be strongly optimistic about an early breakdown of the barriers to decent TV sound, when there are so many routes around, over, even through, those barriers! **BM/E**

Programming

cational Television Council and is available for rent or purchase from Great Plains National, Box 80669, Lincoln Nebraska, in quad tape or ¾″ videocassette.

People

William H. Pettit, director of information for New Jersey Public Broadcasting, became a member of the five-person PBS Public Information Advisory Committee .... **Matthew J. Mulvihill** was appointed vice president and general sales manager of North American Philips Electronic Component Corporation .... **Tom Jennings** is the new vice president, marketing, of Sound West, Inc.

Alan B. Spurney is staff vice president of the solid state and tube divisions, Electronic Industries Association .... **James L. Gray** is the new regional manager, Great Lakes region, for Warner Cable Corp. .... **Ralph Kaplan** joined Signetics Corp. as marketing manager for RAM products.

Sidney Sternberg is the director of a new National Science Foundation Western Projects Office set up in San Francisco, to study research needs and oversee ongoing projects in the western states .... **Allan M. Simmons** became national accounts sales manager for the consumer products of National Semiconductor Corp.

Herbert S. Ornstein was named senior vice president and director of finance for Jerrold Electronics Corp. .... Terry Evans became director of engineering for the Donrey Media Group's broadcast division, which operates eight radio and television stations, with headquarters in Las Vegas .... Arman Mandell joined Shure Brothers as chief design engineer.

Norman F. Sharp was appointed director of public relations of the Electronic Industries Association.

Steve Wrath was elected vice president and general manager of Communico Oceanic Corporation, operator of stations KPOI and KHSS-FM in Honolulu .... **Earle Davis** became vice president of Cambridge Products, makers of CATV connectors .... **John Egan** joined Anixter-Pruzan as Northeast District manager.

Tom Benjamin was appointed district sales manager, midwest region, for GRT Music Tapes .... **Christopher B. Wright** became manager o sales for video projectors for the Ad vent Corporation .... **Mark Saltsberg** was named manager o calculator marketing for Novus, th consumer products division of Na tional Semiconductor.

Bert Wolf was promoted to th position of vice president and genera manager of the distributor sales divi sion, Jerrold Electronics Corp. .... **Gary Arlen** is public information manager for the National Cable Television Association .... **Claudi Allen** was named director of promo tions and development; and **J. E Sensenbach** was named chief engi neer, both for public radio statio KMUW-FM, at Wichita State Uni versity.

Martin Wingren was elected vic president of Kaiser Broadcasting Corporation; he will continue as con troller .... **Edward D. Matthews** was promoted to be vice president o the Calhoun Company, audio/visua service company .... **Edward Janov** joined Byron Motion Pictures Washington, as manager of custom er services.

Ben W. Forte will be Northeas regional sales manager for Theta Com, with headquarters in Nev

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NEW LIT

For copies of these literature offerings, circle number for appropriate items on Reader Service Card.

Theory, design, and operation of **voltage regulators** are covered in detail in pamphlet, Sola Industries. **250**

Directory of television stations; very numerous services such as VHF and UHF channel searches, current application data, proposals for new stations, with mileage separations, and much other data, supplied on a continuing basis by Dataworld, Inc. (Write 1725 K St NW Washington DC 20006 for complete catalog). Pamphlett (Application Note 174-5) describes use of frequency counters to determine **probability densities (histograms).** Hewlett-Packard. **251**

Data sheets show new, improved characteristics of **directional couplers** and taps for CATV. Magnavox CATV. **252**

New brochure on Mark IV series of single-cable bi-directional **CATV electronic units** shows new and improved characteristics. AEL Communications Corp. **253**

Fifty-five page catalog of **cable tv systems and products,** covering trunks, bridgers, extenders, passives, antenna siting, and powering equipment, also includes several pages of calculation aids for system planners. C-Cor Electronics, Inc. **254**

Technical data sheet, #60560, shows characteristics and applications of **Model 2810 CCTV camera,** which provides 900 lines of center resolution, full gray scale with 0.2 footcandles. Cohu, Inc. **255**

Catalog covers **continuous film processors and accessories,** and describes services in rebuilding or redesigning processors. Treise Engineering. **256**

Data sheets describe the **Model 815 A/D converter** and the **Model 817 D/A converter,** designed for digital time-base correction and digital transmission systems. Biomation Corp. **257**

New and expanded **MOS integrated circuit** catalog totals over 500 pages, covering not only broad line of MOS products but also extensive design and application notes. National Semiconductor Corp. **258**

"Tekscope" is a bi-monthly publication describing new products in depth and including exhaustive articles on **measurement technology.** Tektronix. **259**

New 72-page catalog, C-74, shows complete listings, engineering drawings, operating characteristics and technical data on whole line of **keyboards and switches.** Cherry Electrical Products. **260**

Data sheet covers **medium power silicon rectifiers** rated 3 amps, with 150 amp maximum surge current and peak reverse voltage of 1000 volts. International Rectifier. **261**

Data package describes the Optima-PAK instrument case, available in eight models, fitting standard 19″ and 17″ panel instruments. Scientific-Atlanta. **262**

Four-page brochure covers all **character generators** and **video titling systems,** with technical data and prices. Datavision, Inc. **263**

NOISE FIGHTERS cont. from page 44

phones in talk studios. He is also strongly in favor of having his primary program tapes, which come from a program supplier, produced with Dolby "A"; already about 50% of the program tapes the station uses are Dolbyized, and Losgar is aiming to make it 100%. The station has its Dolby "A" decoder so that the tapes can go on the air. Beyond that, he is one of those interviewed who is already using the new 25-microsecond Dolby "B" encoder.

At WWYZ-FM in Waterbury, Connecticut, engineer Mark Gilmore reports that a Burwen filter installed right at the output of the audio board and ahead of the limiter, has, again, improved greatly the quality of cart playback: the station produces its own carts. The station management, says Gilmore, is strongly interested in the new Dolby system.

AT WSHE, Fort Lauderdale, Lee Young, chief engineer, says that this "progressive rock" station gets the major part of its programming from discs—no carts are used. The main noise problem had been turntable rumble, with too many complaints from listeners with high-grade hi fi systems that their "great bass response" made the station's turntables "performers" in the aural sense. The Burwen filter knocked the rumble out of the complaint department (see story on another page in this issue for another solution to the rumble problem). The station now enjoys a reputation for super-quiet program; many listeners noted that the turntables were no longer adding low-frequency "notes" to the music.

WVUD, station of the University of Dayton, i Dayton, Ohio, furnishes us with a sample of a statio using both Burwen and Dolby "B" encoding. Chie Engineer John Fudge has been Dolby-encoding h broadcasts for more than a year—he belongs to th small band of "pre-25-microsecond" Dolby enthu iasts. He said that the combination of the Dolb (without pre-emphasis reduction), plus that station Audimax, brought the highs up so much in low pa sages (roughly 20 dB) that hiss from studio amplifie and other in-station sources became obtrusive. Th Burwen knocked it out. Fudge is now using the ne Dolby "B" system.

Burwen has two other bandpass filters, DN 1500A and DNF 1500D, which are much less expe sive than the model 1000 and are not designed f wide-range music, but for cleaning up remotes. Th 1500A is moderately wide range; the 1500D is "tel phone quality" and is intended only to make very lo grade and noisy voice feeds good enough to broadcas

The only danger in the swing to noise reduction broadcasting, said one of BM/E's interviewee's, that engineers will ease off on the maintenance turntables, cart machines, phono pickups, etc.—a those units in which an error in adjustment, or equi ment aging, often signals itself by a rise in the noi level. Only time will tell. Maybe it will work the oth way: when he gets used to having extremely low noi in his program material, the broadcaster might more eager to run down the slightest increase, fig noise back into the cellar when it is only a few ste up the stairs. **BM/**

✓Checklist of Radio & TV Broadcasting & CATV Books

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LETTERS/FEEDBACK

Multicart Access Time —A Correction

In BM/E's tabulation of the available radio automation equipment in the August issue, a printing error (regrettably not caught in proofing) transformed the access time of the SMC Carousel from its true average of around 24–26 seconds to an erroneous 6 seconds. Access times of the other major multicart machines are, as we reported in the August issue, under 7 seconds *per stack* for the Schafer Audiofile; approximately 6 seconds *per stack* for the IGM Instacart; 6 seconds typical, 10 seconds maximum for the Control Design CD24R.

BM/E also regrets the omission of Aitken Communications, Taft, California, from the list of automation equipment suppliers.

AVR-1 End-Of-Tape Action: A Clarification from Ampex

Dear Editor:

I read with interest the article in your July issue of BM/E by Mr. Demers entitled, "Watch Out: Super VTR at Work." In general, this was a good article and the author is to be complimented on his coverage of the AVR-1.

There is one point in the article, however, which could be misleading to your readers, and I feel this should be clarified, at least for the record. This has to do with reference to the possible lack of an "end-of-tape sensor" on some AVR-1's.

Due to the specific problem mentioned by the author, i.e., possible tape damage during high speed shuttle, Ampex decided shortly after its introduction that all AVR-1's should have this protective feature. As a result, in addition to incorporating this in standard production, field installation kits were sent free of charge to all AVR-1 owners worldwide. Due to this retrofit program, there should be no systems in use today without this feature unless an owner has, for some reason, seen fit not to install the kit.

The "end-of-tape sensor" digitally compares simultaneously the relative rotational speeds of the supply reel, take-up reel, and the capstan. Thus it is able to sense when the tape i near or at the end of the tape, an the reel servos can be slowed accord ingly. The customer has the optio of having the reel slow to a complet stop just as the tape comes off th reel or just before. This feature i necessary because of the extremel high shuttle speeds and the powerfu reel drive servos on the AVR-1.

I trust this clarifies the situation and I am sure you can understan my concern in this matter. I will ap preciate any effort on your part t clear up this point with your readers.

Frank B. Thompson, Sr.,
Product Manager
Audio-Video Systems Division

(Editor's Note: Mr. Demers has ac knowledged the receipt of the end of-tape sensor kits by his station an others he polled in the Boston area but reports that his station, and a the others polled, have failed to in stall them, mainly because of th long down-time involved. He adds ". . . I wrote the article based on ho things really are . . . (and) to sho readers that haven't installed the kit what they are missing.").

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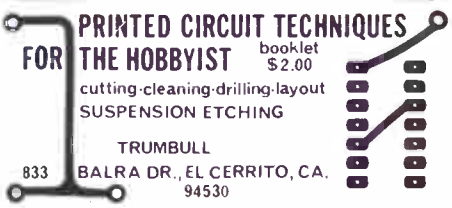

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PEOPLE continued from p. 68

York .... **Jason Goldman** became operations supervisor for WPSX-TV, Pennsylvania State University .... **John W. White** was named southwest regional sales manager for International Video Corp., with offices at 6400 W. Park Drive, Houston.

Leon A. Wortman was named manager of distributor product sales, audio—video systems, for Ampex Corp. .... **Keneth A. Simons** left his position as director of research and development for Jerrold Electronics Corp. and will form, with Walter Wydro Consultants, a new firm to be called Simons and Wydro Associates, Inc., to supply a full range of consulting services to cable tv.

William R. Krehbiel was named vice president and general manager of the Scully/Metrotech division of the Dictaphone Corp. .... **Don Godfrey** became engineering administrator for S.C. Electronics, subsidiary of Audiotronics Corp. .... **Gene Lothery** was appointed vice president of the CBS radio division, and general manager of the CBS-owned WEEI in Boston.

Bernie Roscetti joined the Maine Public Broadcasting Network as television production manager .... **Herbert More** retired from the vice presidency of Kliegl Brothers after 25 years of service, specializing in tv lighting; sales to U.S. tv stations will be taken up by **Larry Nelson.**

Anthony P. Cunha became vice president and chief operating officer for Capital Magnetic Products, a division of Capitol Records, previously known as Audio Devices, Inc., and recently moved from Glenbrook, Conn. to Los Angeles .... **Harry J. Smith** joined the New Jersey Public Broadcasting System as director of public information and editor of the *Jersey-vision* magazine.

FINANCIAL BRIEFS

Meredith Corporation's board declared a 17½ cent quarterly dividend, payable Sept. 13 to shareholders as of August 23rd .... **Tracor, Inc,** for six months ended 6/30/74: sales, $45,518,000, net income, $2,018,000.

National Semiconductor Corp., for year ended 5/31/74: sales $213,398,000, net income $16,372,000 (1973: $99,028,000 and $3,719,000) .... **Altec Corporation,** for nine months ended 6/30/74: $42,884,000 sales, $1,837,000 net income (1973: $38,140,000 and $953,000).

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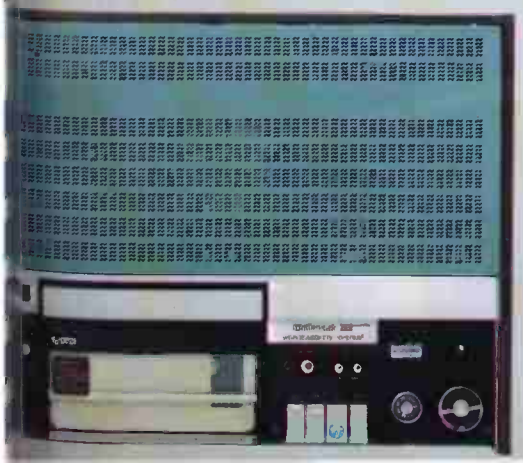

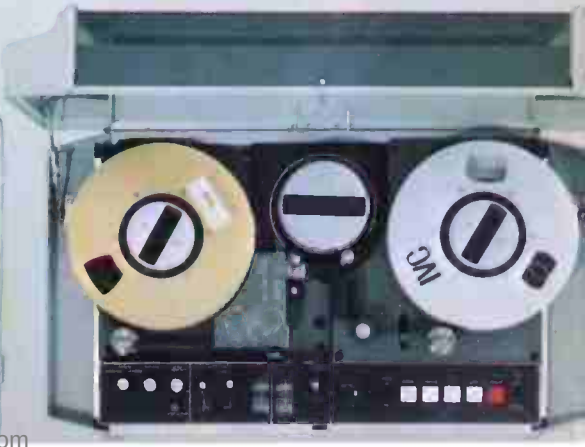

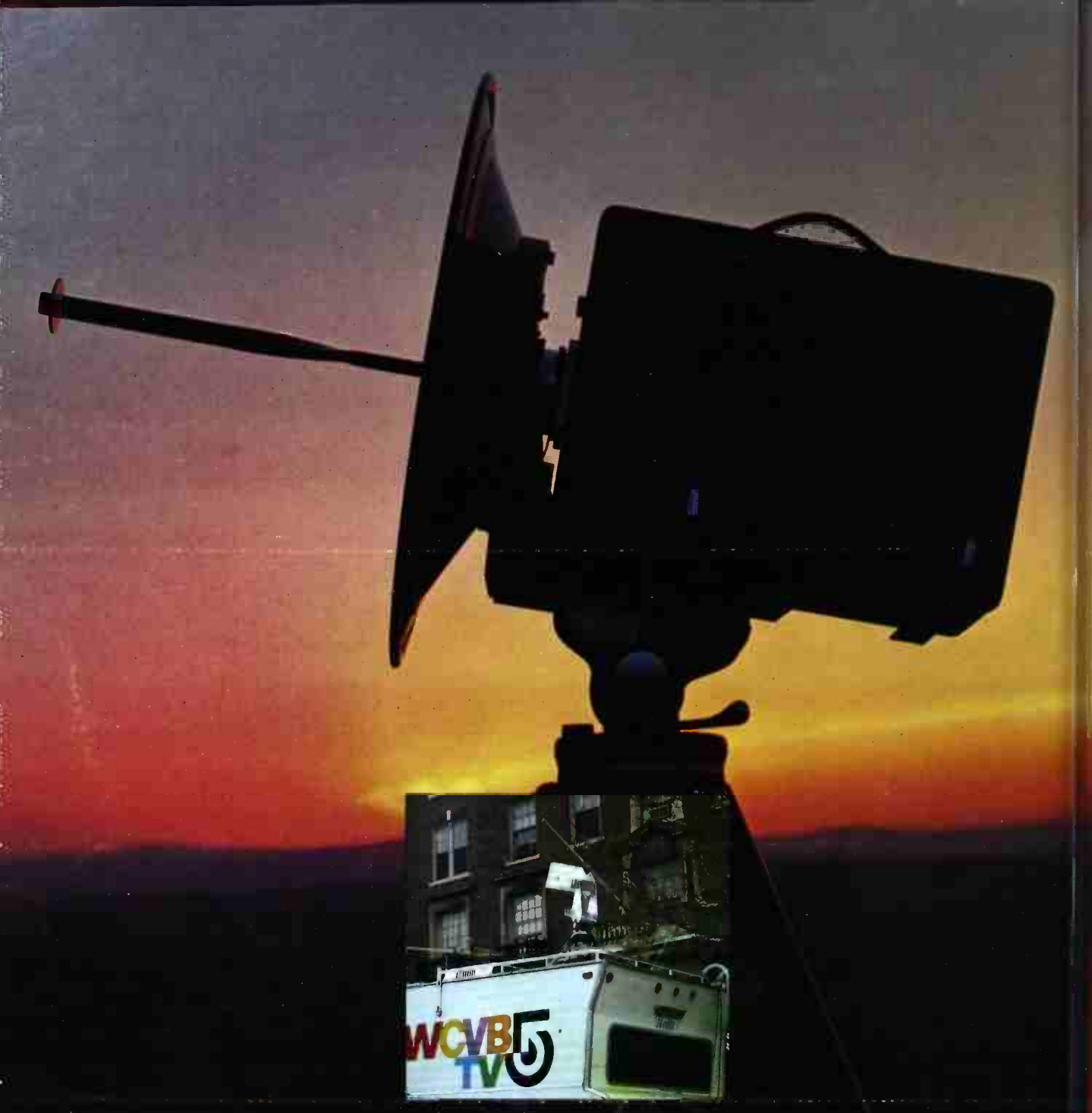

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