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the technical journal of the broadcast-communication's industry

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WTAQ's All Talk Studio page 30

Emergency Broadcasting
CATV System Reliability
Planning The New York Net

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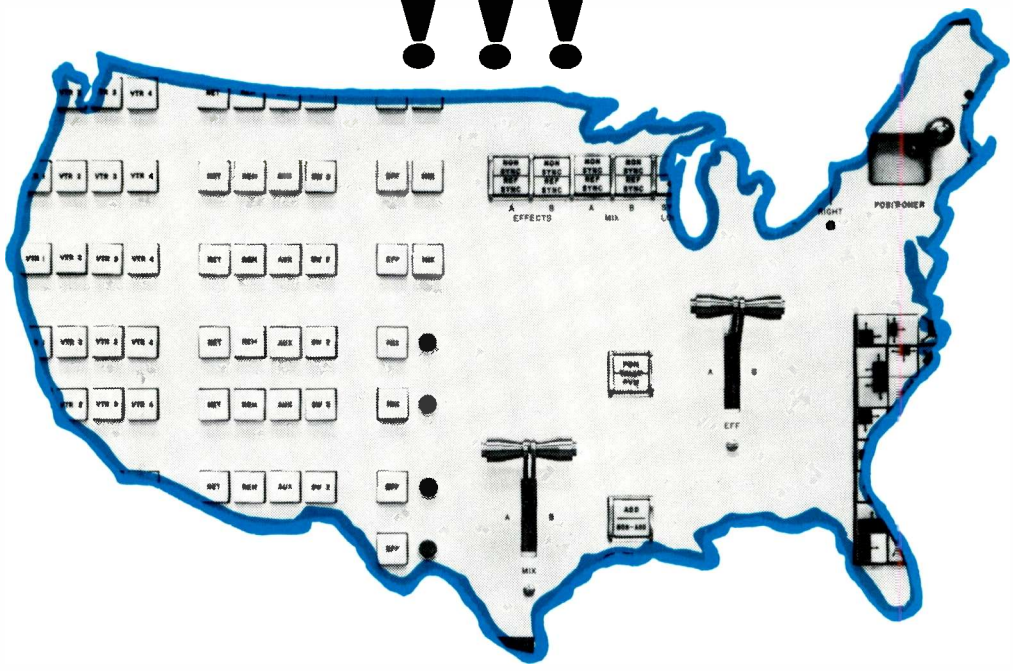

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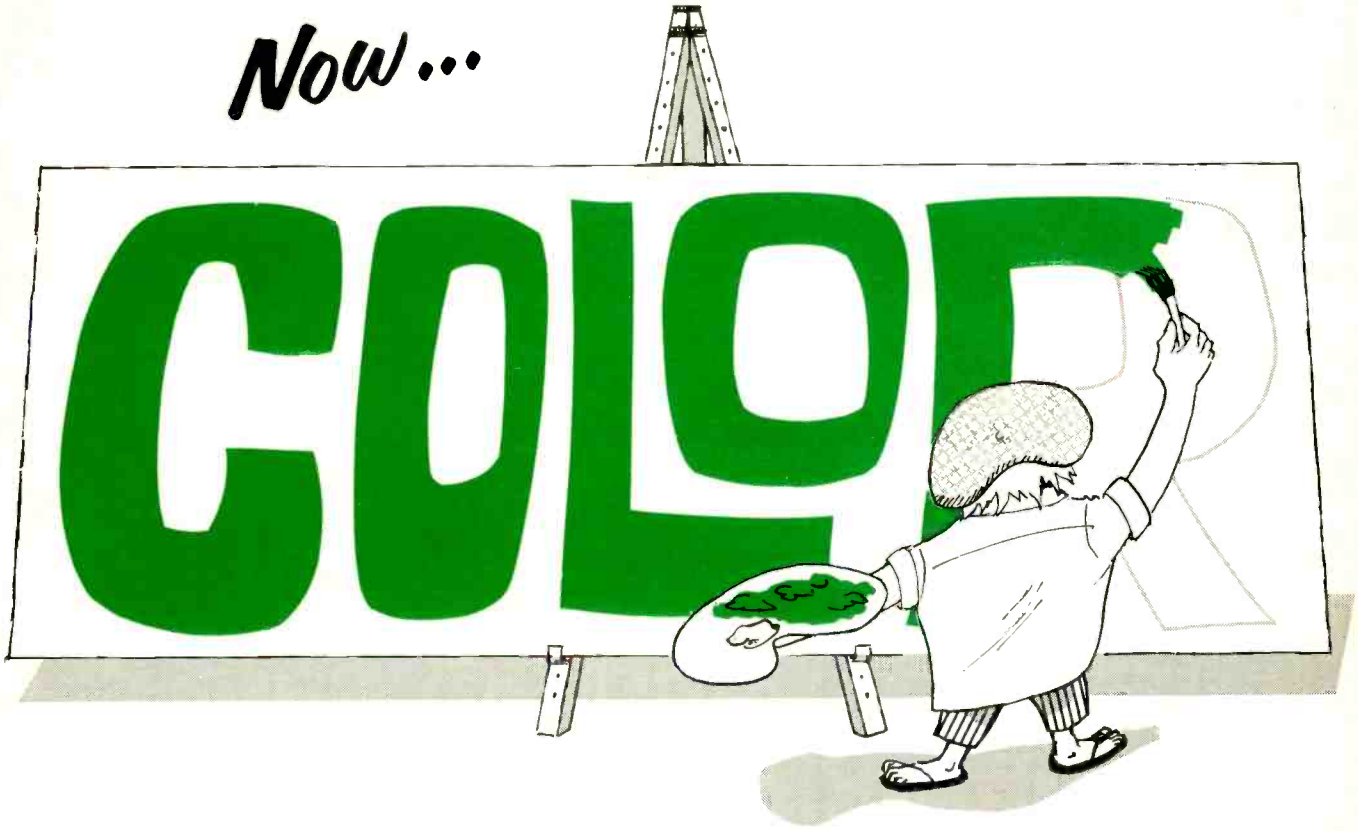

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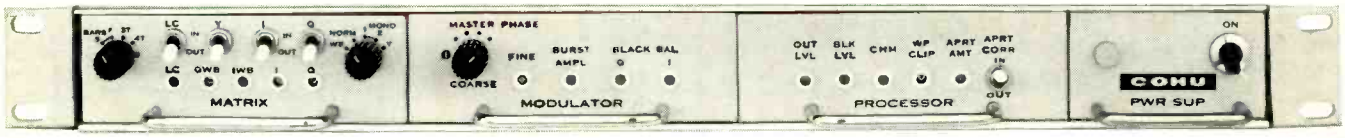

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November, 1969 • Volume 11, No. 11

Broadcast Engineering

The technical journal of the broadcast-communications industry

in this issue...

ABOUT THE COVER

The cover picture this month shows a functional studio designed with the "all talk" format in mind. For hidden features and construction details, see the article on page 30.

DEPARTMENTS

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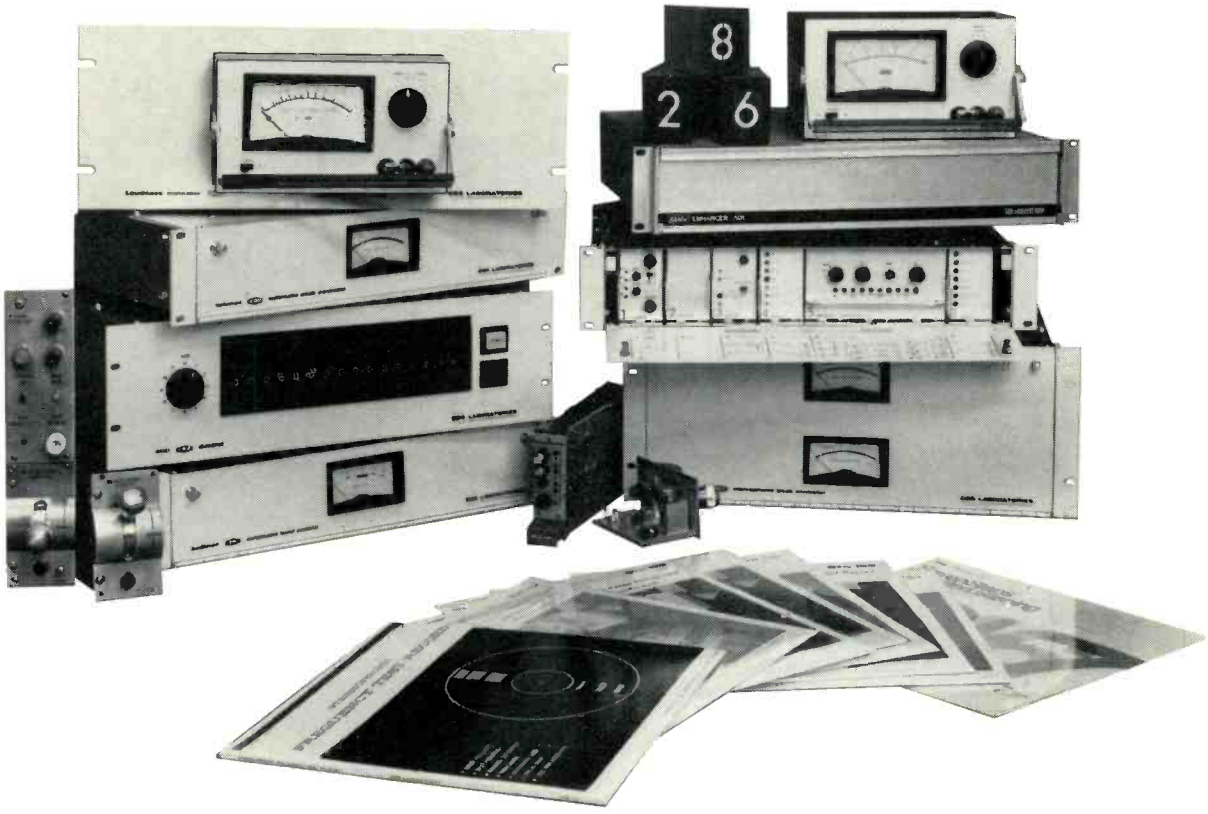
BUILDING BLOCKS FOR BETTER BROADCASTING



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DIRECT CURRENT FROM D. C.

November, 1969

By Howard T. Head

Lift Of AM "Freeze" Proposed

The Commission has proposed the adoption of new Rules which would lift the current "freeze" on applications for new and changed standard broadcast stations. This freeze has been in effect since July 17, 1968, when it was imposed in order to permit the Commission to develop policies in the AM area.

The new AM assignment policies would require applications for the new or changed AM facilities to provide primary service to at least 25% "white area" (areas not now receiving any primary aural service) in terms of either area or population. For the first time, AM and FM broadcasting would be considered as a single aural service and the 25% determination would take into account both AM and FM reception availability.

A new AM application would not be entertained where an unused FM channel assignment is provided by the Commission's rules. Thus the new proposal would essentially prohibit the authorization of new AM stations except in very unusual circumstances.

An exception is made in the case of existing 250 watt Class IV stations on the local channels, which would be given a one-year period within which to apply for daytime power increases from 250 watts to 1 kw.

Technical Standards Established For Subscription TV

The Commission has adopted new regulations establishing technical standards for subscription television (STV) systems. Precise technical details for the operation of individual systems are not spelled out, but simply the general criteria which must be met by any STV system proposed to the Commission.

The principal features of these criteria are requirements that the system operate satisfactorily with standard receivers within the regular 6 MHz TV channel, requirements against spurius emissions, and requirements that the proposed system cause no more interference to nor receive no more interference from regular TV broadcast stations than would be the case with conventional operation.

In adopting the new technical standards and other regulations governing STV, the Commission announced that no grants would be made until pending cases had been decided by the Court of Appeals. The Court's approval, how-

(Continued on page 6)

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(Continued from page 4)

ever, came hard on the heels of the Commission's notice; unless further stays are granted, the new STV regulations will become effective on November 30.

VHF Improvements Face Tough Sledding

In numerous recent cases the Commission has withheld approval of applications for coverage increases by VHF TV stations where it appeared that these increases might have adverse impact on the future growth of UHF TV. In most instances these delays have stemmed from protests filed by existing or authorized UHF TV stations. In one recent case in Florida, however, a VHF station was required to install a directional antenna to protect the coverage area of a UHF station, even though the UHF station had never operated and the construction permit had actually been cancelled by the Commission.

NAB Proposes New Restrictions On CATV

The National Association of Broadcasters (NAB) has proposed that Congress modify the Communications Act and Copyright Act to spell out the rights and obligations of CATV systems. This proposal follows a breakdown in negotiations between NAB and the National Cable Television Association (NCTA) to arrive at a mutually acceptable agreement.

Under the NAB Proposal, all CATV systems would be licensed. They would be required to provide carriage and non-duplication protection to television broadcast stations, and would be restricted in their carriage of "distant" signals. Three distant commercial TV signals would be permitted in the top 25 markets, two in the next 25, and one in all other markets.

CATV systems would be prohibited from selling advertising or for charging for service on a per-program basis. Technical standards would be set up by the FCC to control the quality of cable signals.

Revision Of FCC Technical Standards Proposed

A committee of the National Association of Broadcasters (NAB) is laying plans for a full-scale revision of Part 74 of the FCC Rules and Regulations.

Hearings on VHF applications are placing an increasing burden on the applicants, who are being required to show that the proposed expansion of service will not adversely affect either specific UHF stations or UHF development generally.

This part of the Commission's rules specifies both engineering and non-technical standards for the so-called "broadcast auxiliary services".

Howard T. Head

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LETTERS TO THE EDITOR

MBA President's Message

Hurricane Camille—Mississippi's greatest disaster . . . Mississippi Broadcasting's finest hour. The hurricane alert and early build-up of high winds and tides by the Gulf Coast stations—the broadcast by other stations who remained on air all night long to advise of the path and preliminary reports of destruction—the compassion and trauma of the reporting of death and damage by the most destructive hurricane in history followed by the reports of emergency relief provided to the Coast—broadcasters of Mississippi and surrounding states rallied to the cause.

The all night efforts of all of the Coast stations to return to the air with makeshift antennas, transmitters, emergency generators and patched together equipment (which provided the only communications on the Coast via transistor radios when telephone lines and electricity were out for days in many areas) is a tribute to the dedication and stamina and ability of those Gulf Coast broadcasters. The stations throughout the state, who rallied to the fast changing emergency needs on the Coast and assisted in the early days in gathering and sending water, ice, milk, nonperishables and clothing, helped to provide emergency relief.

Stations rushed into the stricken area to provide relief, not only for its victims but for their broadcasting comrades. Transmitters, turntables, transmitter supplies, antennas, generators, cameras and much needed moral support were given to the Gulf Coast stations by fellow broadcasters. The public service efforts are countless.

And then came "We Care." Never before has such a state-wide emergency committment been made by broadcasters to coordinate the concern and the desire to help of all Mississippians. The cooperation and, indeed, the above-and-beyond effort will be legend. Stations cancelled all other public service announcements, directing relief to the victims on the Coast. Stations preempted commercial commitments to to provide special assistance and information pertaining to the relief effort and reporting the wreckage and wrath of Camille. Multi-station markets cooperated in preparing for the "We Care Sunday" program throughout the state to raise money in each community in the name of "We Care." Only through responsible and immediate reaction by broadcasters could this effort have attained the success it did.

Through cooperation with the Mississippi Municipal Association, utilizing existing administrations, pick up points (city halls, fire stations, etc.) and transportation to the Coast via municipal vehicles, "We Care" provided the instant non-duplicated direction through which emergency efforts could be channeled. The news services, Associated Press and United Press International cooperated whole-heartedly in keeping broadcasters informed of the plans and policies regarding "We Care."

The state-wide FM Network provided entertainment and participation by state officials to all Mississippi radio stations. The Jackson program, which had grown to unexpected proportions with the addition of many top name talents, was carried by many stations at their own expense, including: Biloxi; WREC, Memphis; and Mobile. Stastations in New York; Washington, D.C.; Topeka, Kansas; Detroit, Michigan; St. Petersburg, Florida; New Orleans and others carried video tape portions of the telecast. The highlight of the state-wide broadcast occurred when Bob Hope spoke directly with the President of the United States live from the stage of the Mississippi Coliseum. "Where there is need . . . there is Hope."

Now the reporting of the courage and heart of the Mississippi Gulf Coast must continue to be told . . . for certainly that part of our state is as vital as any. Its rebuilding rejuvenated by President Nixon's visit can and must be assisted by those

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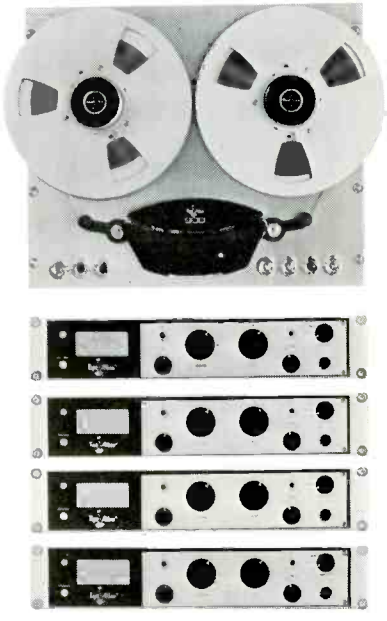

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in broadcasting. I recall a sign over the stage at our last convention . . . "It's Great to be a Broadcaster." It's great to have the opportunity to be of such service at a time of need for the people of Mississippi. We should all be grateful and ever mindful of that responsibility. Because we, as broadcasters, cared, we were able to make a lot of other people care—and that's a nice thing to remember.

Bob McRaney, Jr.
MBA President
WLBT, Jackson

Dear Editor:

Although New Orleans had winds of 80 miles per hour in gusts from hurricane Camille, there was no damage suffered by any radio station in the city. Daytime stations like us and KPBC in Port Sulphur, La., which is south of us, remained on the air throughout the night under a "state of emergency" conditions. We operated with our own generators and handled all night special bulletins and orders from Civil Defense, Red Cross, the Mayor's office, etc. Both our FM and AM stations rendered this service on a sustaining public service basis, for which we have received many expressions of appreciation from many sources by phone, telegram and mail.

There is no doubt that thus far this hurricane has proved to be one of the worst in our history having, completely devastated the Mississippi Gulf Coast area, just 60 miles from us. We were lucky beyond words. New Orleans suffered broken trees, downed power lines and broken communications, but no major damages. Radio and TV stayed on to render as good a service as possible and we were proud to be part of it.

George A. Mayoral, Pres.
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Camille Coverage Continues On Page 38 Of This Issue

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INDUSTRY NEWS

New Application Rules Proposed

New, more restrictive rules governing acceptance of applications for new standard broadcast stations and for major changes in facilities of authorized stations have been proposed by the Commission. In a combined Notice of Proposed Rule Making and Memorandum Opinion and Order the Commission also proposed to regard both commercial FM and AM as part of a total aural service; and to accept Class IV request for power increase for a year from September 4, 1969, regardless of domestic interference.

The proposed rules would require that applications for new daytime stations, or major changes in daytime or nighttime facilities, provide a service to 25 percent of the proposed service area or 25 percent of the population within the area. The existing FM service of 1 mv/m or greater intensity, as well as AM service, would be taken into consideration in determining whether a substantial area or population would receive first primary service. Applicants for new facilities, but not for major changes, would have to show that there is no FM channel available and unoccupied that could be used by an FM station which would serve substantially the same unserved area proposed to be served by the AM station.

The Notice of Proposed Rule Making and Memorandum Opinion and Order terminates Docket 18138, a pending rule making proceeding dealing with the handling of applications for new Class IV stations, and consolidates it into the present proceeding. In a separate order the Commission amended Note 2 of Section 1.571 of the rules to lift the "freeze" on applications by existing Class IV stations for power increases and on applications for new or changed facilities in Alaska. (A Class IV station is limited to 1 kilowatt power daytime, 250 watts power at night, and can operate full time if desired.)

The Commission proposed that for one year, effective immediately, existing Class IV stations should be permitted to seek increases in power to the permissible maximum without regard to domestic interference caused or received, subject to the provisions of Section 316 of the Communications Act. Afterward, they would be governed by the same rules as other stations. Applications for new Class IV stations would be also governed by the same rules as other stations. Unlike the existing Class IV power increases, the "freeze" on new Class IV applications would continue pending rule making.

It was also stated that Alaska has few AM stations in relation to the large area involved. The only interference tests for Alaskan applications would be whether the proposed facilities would cause objectionable interference to existing stations, as prohibited in Sections 73.37 and 73.182(0) of the rules, and would meet "certain standards as to interference received necessary to insure reasonable efficiency of operation".

On July 17, 1968, the Commission amended its rules to bring a limited halt, or "freeze," to the acceptance of AM applications pending rule making, noting a continuing proliferation of new AM stations, a consequent depletion of remaining AM spectrum space, and an increasing demand for new FM facilities. They explained that the present rule making notice contains the revision of AM assignment rules discussed in the "freeze" order.

Also cited was the present im-

(Continued on page 14)

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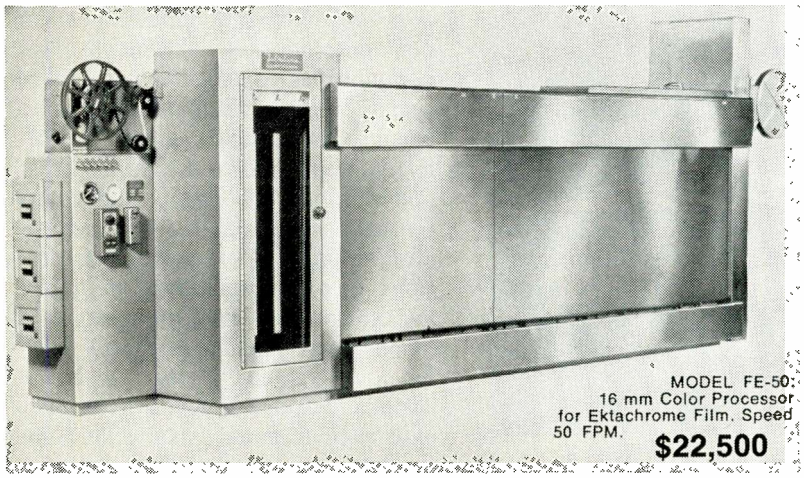

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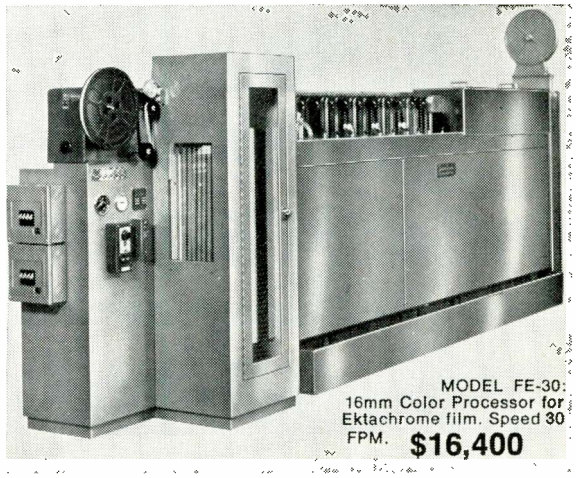

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(Continued from page 12)

New Application Rules For AM Stations

portance of FM and the desirability of encouraging its development by channeling into it the capital and interest available to aural broadcasting. They found compared to additional daytime AM facilities (which most AM applicants seek), FM provides a fulltime service which the daytime AM outlet cannot provide. Compared to new nighttime AM proposals, FM has a general greater range and stations can be assigned without adding to interference on the channel as nearly all nighttime AM facilities do. FM technically provides better service than AM, because it is freer from interference, and with stereo and Subsidiary Communications Authorization capability the FM assignment process is more orderly and cheaper for both the Commission and the applicants. FM does not require laborious individual evaluation of interference and design of expensive directional antennas.

Several shortcomings were found in the present AM assignment process. It was stated that the great majority of applications pending and recently granted "are for new or increased daytime facilities which do not provide nighttime service to any of the areas they propose to serve, and preclude use of this and adjacent frequencies in the community and area by fulltime stations. . ." Less than three percent of the applications pending before the 1968 "freeze" proposed to serve the appreciable unserved area, and while a majority of the applications for new daytime-only stations are for communities without a local AM outlet. Less than half can be granted because of mutual exclusivity between applications. Many of these communities are small, and many of the applications for larger communities that will require considerations as to whether they are really applications for the community specified or for stations primarily serving a larger nearby city. Most AM applications are for communities with two or more existing stations.

They also believe that the proposed rule changes will permit acceptance, consideration and grant only those applications which will make a substantial contribution to improving aural radio service, and will permit fuller utilization of available spectrum space.

FCC May Give Okay To Use Of CB'ers

Amendment of the Citizens Radio Service Rules (Section 95.83(a)(14)) to permit citizens radio station licensees to transmit information on highway conditions to broadcast licensees or organizations (such as American Automobile Association or a REACT organization) furnishing such information to broadcast facilities, has been proposed in a Notice of Proposed Rule Making (RM-1388).

The Commission pointed out that the communications would involve the transmission of road condition information only, and directed attention to Section 95.38(a) (7) which prohibits the carriage of program material by a citizens radio station for live or delayed retransmission by a broadcast station.

Study Shows Ownership Limits Will Not Affect Competition

To prohibit ownership of more than one radio or television station or newspaper in a single market would be "detrimental to the public interest" and contrary to objectives of the Federal Communications Commission, a study conducted for the National Association of Broadcasters reveals.

Such limitation would not increase balanced competition, nor encourage diversity of news and program sources and in-depth public service programming as the Commission desires, the study concludes. It also revealed that the mass media "have less influence on thought and behavior than is popularly believed, and are more likely to reflect and reinforce existing attitudes than to change them."

The study, "The Effects of Common Ownership on Media Content and Influence," was commissioned by NAB following the FCC's proposal to limit common ownership of mass media outlets in the same market.

The findings show that in the vast majority of cases, particularly in medium and large markets, common ownership of several media outlets is favorable to the public interest.

In markets where there is influential competition and where no common owner can achieve a dominant position, "the substantial resources available to commonly-owned media enables them to provide better service to the public and to maintain higher standards of business ethics and public service." Balanced competition, the study shows, will not be achieved by limiting ownership to single media outlets.

"Rather, it is important to consider the particular media operating in a market, and to encourage the growth of singly- or commonly-owned media which have sufficient resources to provide effective service, and yet are comparable in media influence and audience share."

It is said that in many cases, limiting common ownership or forcing divestiture "would lead to a decrease in both diversity and validity of news and information, and a reduction in the quality of entertainment and public service programming."

The media then would be forced to rely very heavily on the same few news and program sources, such as networks and wire services, and would not have resources sufficient to develop meaningful local origination programming. The result would be concentrated in fewer hands, rather than more hands.

The study recommends that the Commission or Congress develop flexible guidelines which would take into account particular market conditions, the nature and influence of present and anticipated competition and economic and organizational resources of media owners.

Regarding influence of the mass media on public thought and behavior, the study reported that "the popular myth that a strong media message by itself can change attitudes or behavior is not supported by the evidence."

It said the audience predisposing attitudes combined with their opportunity for choice and their economic behavior gives them significant influence over the content of the media. "The content of the media," the report stated, "to a great degree reflects and reinforces public attitudes and behavior rather than molds them."

The report was prepared by George H. Litwin, assistant professor of the Harvard Business School and William H. Wroth, research director of Intermedia Systems Corp. They were assisted by Neil M. Moss, managing director of the Motivation Research Group, a division of the Behavioral Science Center of the Sterling Institute.

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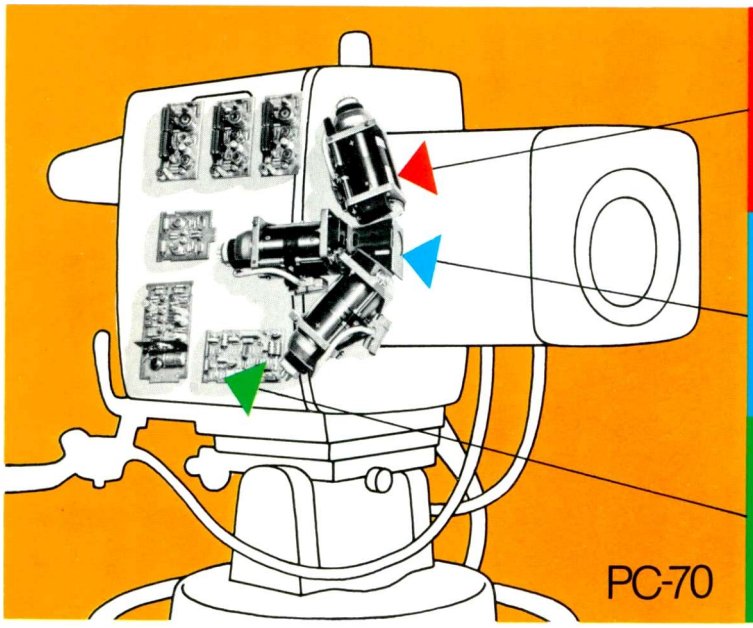

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Film chain color was never so good before. The Norelco PCF-701 Color Film Camera gives all films, of any color balance, the color fidelity that the PC-70 studio camera gives to prime-time shows!

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With its PC-70 inside, the PCF-701 is easily the most advanced color film camera available today. If you already have a PC-70 outside, in your studio, it's even better. Because you already have a complete maintenance set-up for the PCF-701.

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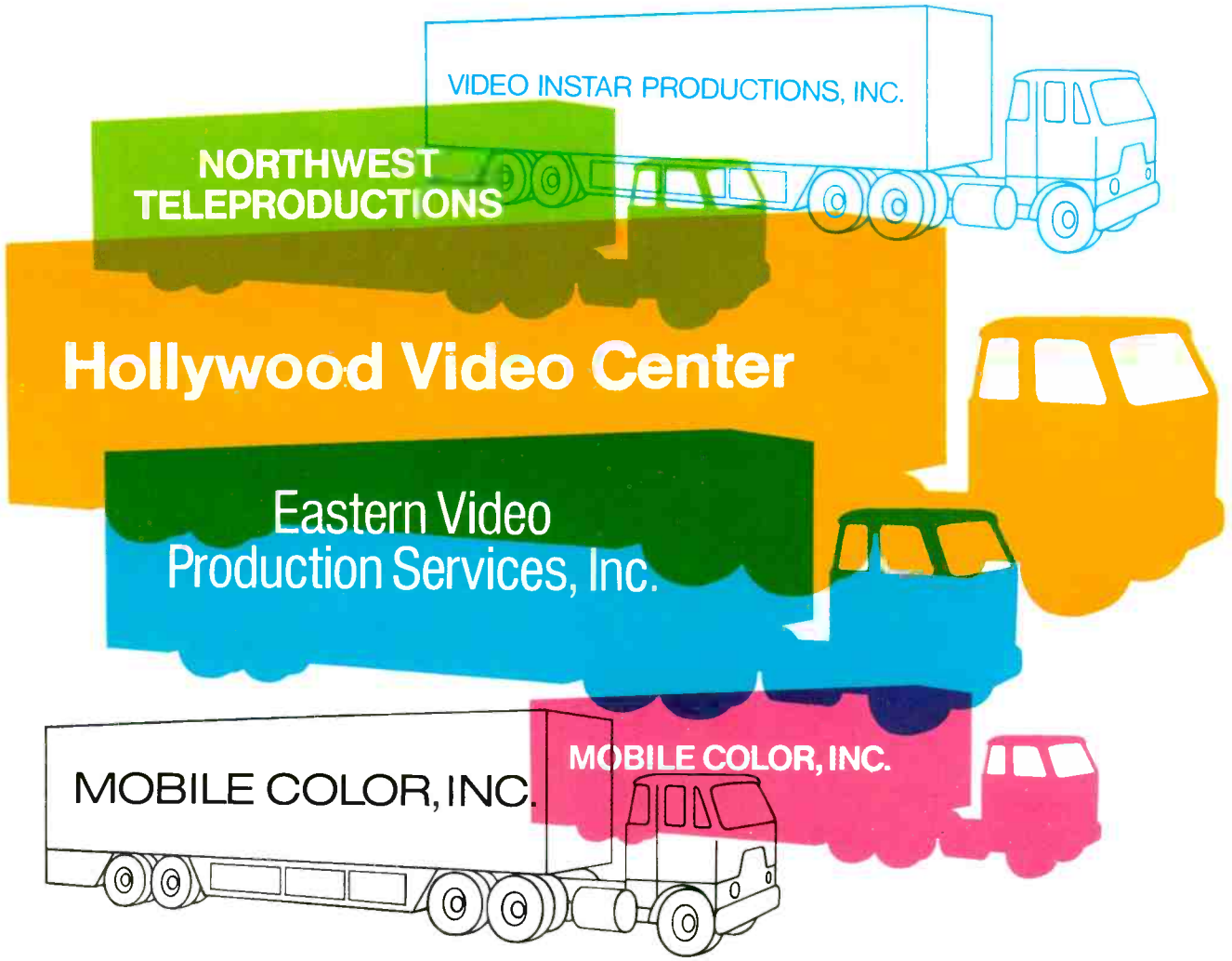

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Since Philips Broadcast delivered its first turnkey 40-ft. color unit last year—*ahead of schedule*—other forward-looking producers have turned to Norelco for full vans as well as studios. This does not include the scores of vans already using PC-70's.

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NAEB Institute Scheduled For January 25-28

The professional success of two recent Educational Broadcasting Institutes on the maintenance and operation of helical scan video recorders-reproducers has prompted the National Association of Educational Broadcasters to schedule another Institute on this subject in Raleigh, N.C., January 25-28. The meeting will be held at the Sir Walter Raleigh hotel. The EBI concept was launched last year by the NAEB to provide training in specific areas for persons working in educational radio and television.

The Institute on video tape recorders is an intensive 30-hour course designed by the NAEB primarily for the audiovisual technician who is responsible for the operation of such equipment. The course, according to James Fellows, NAEB director of Research and Development, assumes no prior training in video recording on the student's part and only an elementary knowledge of television systems in general. In addition to the helical scan video recorder course, past EBI's have been conducted on the principles of supervisory management. Future Institutes are in the planning stage at NAEB to accommodate a variety of professional subjects and meet the needs of increasingly effective professional development, Mr. Fellows said.

FCC Consolidates Ed. Applications

Mutually exclusive applications for construction permits for a new noncommercial educational FM station in Washington, D.C., filed by Pacifica Foundation (BPED-896) and National Education Foundation, Inc. (NEF), (BPED-1012), have been designated for consolidated hearing by the Commission.

Pacifica is the licensee of noncommercial educational stations KPFA (FM) and KPFB (FM), Berkeley, Calif.; KPFK (FM), Los Angeles and is sole stockholder of WBAI, Inc., the licensee corporation of WBAI (FM), New York, New York.

EDUCATIONAL BROADCASTING

Looking Inside Non-Commercial Broadcasting
By Mike Smith

Colorado Finds ETV Answers In Narrow Band TV System

Television pictures and sound via telephone voice and data grade circuits are the objectives of experiments around the United States. One such experiment is taking place at the Colorado State University in Fort Collins, Colorado where narrow band television signals are being transmited over about 150 miles of leased telephone circuits to Northeastern Junior College in Sterling, Colorado.

A schedule 3003 data conditioned line was used for the video signal and conventional voice-grade lines for audio. The voice channel was open from the lecturer to the students and the channel was reversed for questions by throwing a switch at the remote location.

The video transmitting equipment consists of an industrial grade television camera with a positive interlace. The composite video signal is fed into a Colorado Video Industries model 201B video converter, which samples the real time, 10 MHz, video signal and compresses the bandwidth down to 1,000 Hz. The narrow band video signal then modulates a simple FM transmitter to provide a frequency variation between 2,000 and 2,500 Hz in a manner very similar to that used by "desk top" facsimile machines. The modulated audio carrier is then connected to the phone lines for transmission.

The receiving terminal in Sterling consists of a small demodulator which recovers the narrow band video signal and applies it to a CVI model 220B video convertor. The 220B converts the 1,000 Hz information back upwards to standard 525 line television rates and stores the resulting signal in a magnetic disc memory so that pictures may be reproduced indefinitely on a conventional TV monitor.

The picture transmission time of one minute provides a reproduced image with about 220 lines of resolution. The one minute per picture transmission time is due to the telephone line characteristics used, and with wider band circuits, such as the schedule AA broadcast service (50 to 8,000 Hz) six second picture transmission times are practical.

Colorado Video Industries, manufacturer of the hardware, states that the narrow band system is readily adaptable to color.

Another system is currently in service between the River Forest State Bank & Trust Company and the local police department in River Forest, Illinois. The system transmits pictures over a single pair of 22 gauge voice grade telephone lines from the bank to the police station by utilizing a scramble—unscramble technique, and special input/output amplifiers. The signal from a vidicon camera is split, and the two signal halves, 180° out of phase, are sent over a single pair of 22 gauge telephone cable wires. No cross-talk is created between the TV transmitting pair and the other phone lines, and the system retains high video fidelity. The resolution is reported to be as high as 875 lines.

The system, utilizing Grundig Electronics, was installed by Hiett Electronics, Inc. of River Fores, Ill. Other Grundig systems utilized and tested in Canada have proven themselves over distances ranging from 11,000 to 15,000 feet.

The key factor in these developments is the possibility of substantial reductions in transmission line costs by utilizing existing telephone voice and data circuits as opposed to specially installed coaxial cables.

SCS Service At KSJR-FM Aids Minnesota Blind People

Educational FM station KSJR and KSJN FM, near Minneapolis and St. Paul, Minnesota, are utilizing SCA frequencies to program a service exclusively to a growing portion of the nearly 8,000 legally blind people in Minnesota. While the utiliaztion of subcarriers is not novel, this application has some very meritorious objectives.

One of the chief advantages of this radio service is elimination of the time lag between the reality of today's fast paced news and the conversion to an dissemination of the braille stories. The blind person can cope with braille digests about 80 words a minute, while listening to radio and to specially prepared transcriptions enables him to absorb 175 words per minute. Experiments with speech compression will begin soon so that even more information can be packed into a minute in an intelligible fashion. Additionally, a telephone exchange of ideas and solutions to problems which are peculiar to blind persons can become a reality through radio.

Nearly 1,000 special sets, manufactured by Sarkes-Tarzian, are in use in the St. Paul-Minneapolis area. The sets are equipped with an earphone jack, a whip antenna, an external antenna terminal and a fine tuning control, and receive both the subcarriers and the main carriers of KSJR and KSJN FM. These are made available without charge to qualifying individuals by the Minnesota State Services for the Blind.

Copyrights cause little problem because the audiences are pre-selected with subcarrier transmission, and the Radio Talking Book has been able to avoid federal copyright restrictions in the presentation of newspapers, magazines and books.

The costs of station overhead and the use of transmission relay equipment have been calculated at $6.00 per hour, and have been borne by the Minnesota State Services for the Blind.

Campus Station Jumps To 5000 Watts

Thousands of Monroe County residents will have greater access to the intellectual and cultural resources of the University of Rochester this fall when WRUR-FM, the campus radio station, increases its transmitter output power from 10 watts to 5,000 watts and its effective radiated power from 12 watts to 20,000 watts. When its power goes up, the station will become stereophonic. It will be the third stereophonic station in Rochester. It will also operate at a new frequency—88.5 megacycles.

Senior Jeff Portnoy, WRUR station manager, received permission from the Federal Communications Commission to install the necessary equipment. He expects the power boost to go into effect by Thanksgiving.

The station, which broadcasts at 90.1 megacycles, currently reaches only persons living within about two miles of the River Campus. The increased wattage will allow it to cover all of Monroe Country.

Portnoy said that the more powerful station will benefit area residents as well as campus listeners, since WRUR will be able to attract more community leaders and professors for its interview, discussion, and lecture programs. The station's programming also includes a wide range of classical, jazz, folk, and rock music and all UR football and basketball games.

New Viewpoint—WRCJ

Providing "a new viewpoint to the operation of an educational radio station" is the aim of FM station WRCJ in Reading, Ohio. What makes WRCJ's viewpoint unique is the station's staff—all but three of the staff positions are held by high school students.

According to Jeffery Fritz, senior chief engineer, the primary responsibility for operation of the station rests with the students. Fritz, Dennis Richter, programming assistant, and John Perin, general manager, generally serve in an advisory position.

British Study Is Critical of U.S. Ed. Broadcasting

A three-month study of educational technology in the United States by David Smeeton, education correspondent for the British Broadcasting Corporation, has left him with the impression that American innovations and ideas in education are not being communicated effectively to ordinary people, parents, and even teachers. Smeeton's evaluation was published in the August issue of the "Educational Broadcasting Review". He maintains that "there is a wealth of lively and intensely interesting information to be communicated to people, not only about educational changes themselves, but why they are taking place."

Stressing the necessity that all people be informed about their educational system as it progresses through constant evolution, Smeeton proposes a method for establishing a continuing dialogue among educators, factual reporting on innovative projects and the availability of information on education to the general public in language it can understand.

According to Smeeton, "The ETV/PVT stations and the national NET organization should pool some money to hire two skilled television-cum-radio reporters with an understanding and enthusiasm for the world of education, and the broad spectrum of social change." The reporters, backed by a production staff, would travel the United States to gather information about changes in education. The information could then be reported to the public on a national basis via educational television and radio in short time spots or as full-length programs.

In his opinion such a project could result in "bringing together parents and teachers, it could show teachers in one part of the country experiences and efforts in another part that bear directly on their own problems . . . it could stimulate a positive debate on education by providing an educational marketplace for ideas."

SCANNING THE CATV SCOPE

By Harry Etkin

Ford Proposes Satellite Usage— NCTA Planning Training Centers

Frederick W. Ford has proposed the use of space satellites for the purpose of transporting non-entertainment programs on an inter-connected basis to CATV systems throughout the country. This proposal would be in complete compliance with the joint proposals of the staffs of the National Cable Television Association and The National Association of Broadcasters. It would be an established fact that the proposals indicate that there shall be no inter-connection for entertainment type programs.

How does satellite communications technology relate to the CATV industry and is there a future for CATV in this exploding communications technology? The answers to these questions are of concern to every CATV operator and to all potential investors in the industry. The CATV industry should definitely take immediate advantage of this new technology and become involved in the satellite technology by participating with the existing framework of authorizations. The Communications Satellite Corporation is authorized to receive and deliver signals from other authorized carriers. Therefore, it is proposed that the CATV industry become one of the prime users of the satellite capability in order to bring more program options and a diversity of service to home television viewers across the nation. The CATV industry should contract for part of the domestic satellite service to the extent that it would provide the backbone of a trunking system that would eventually interconnect several million CATV subscribers to provide a selection of program options that only CATV is designed to fulfill.

The available service will provide six additional channels of programming that would be designed primarily for CATV subscribers. The cable industry can better serve the communication industry because of the additional dimension of time availability, and offers much greater programming flexibility through the extensive channel capacity of cable. A service with excess channel capacity can devote time to exploring new or different subject matter.

CATV Plans Satellite Center

As the cable television industry grows in both size and sophistication, it is apparent that trained personnel will be needed to support the manpower requirements of that growth. Recognizing this need, the NCTA has established National Cable Television Centers. At present NCTC is almost ready to establish regional training centers for CATV personnel. They intend to open the first of the planned "satellite centers" by mid-1970 at college's which currently have adult night school programs. The first "satellite center" will probably open in the West although the exact site has not yet been selected.

Having Trouble With System Reliability?

BE's CATV Editor Discusses Tests And Schedules For CATV Systems

See Page 58

Telcos Asks Review Of FCC 214 Policy On Lease-Backs

Telephone companies have asked the U. S. Supreme Court to review and reverse the decision of the U.S. District Court for the District of Columbia upholding the FCC's policy of requiring Telco's to file 214 applications when offering to lease-back CATV systems. The companies contend that "The Common Carrier facilities used for this service are very similar to and in some instances are identical with other facilities long used by the carriers to provide similar services for which FCC approval under Section 214 (e) has never been required."

Action by the FCC's CATV Task Force and Common Carrier Bureau shows the Commission's concern over the urgency of the Telco problem, the gravity of which NCTA has been stressing since 1966. The apprehension of the Department of Justice concerning the local monopoly position of the Telco's serves to underscore the seriousness of the Telco problem. In many actions directed against Telco's, the FCC Task Force designated that Telco's purpose was to "use its established position and control over utility poles to extend its monopoly into the CATV distribution facilities area."

New Watchdog System Ready For Cablecasting

Advance Research Corporation, Atlanta, Ga., has announced the development of a performance monitoring system which is intended to increase system reliability in order that CATV subscribers will receive uninterrupted service. The system includes monitoring devices, telemetry, receivers, signal carriers and display panels. Remote monitors situated at strategic amplifier locations throughout the distribution system continuously analyze signal quality and transmit data to a centrally located display panel. The monitoring station operator then has an audio-visual presentation indicating the location and nature of the fault. The operator can then take immediate action to remedy the malfunction.

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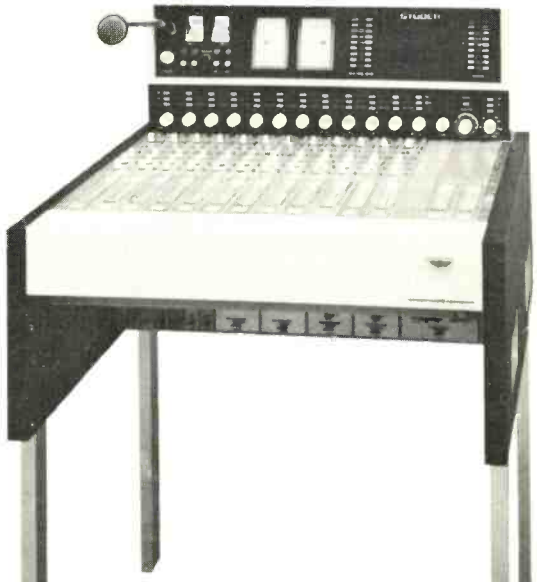

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CBS Demonstrates EVR System for Cable Association

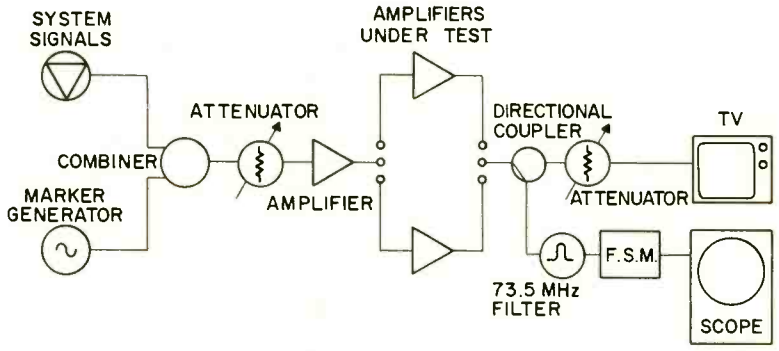
A special demonstration of the CBS Electronic Video Recording System (EVR) has been shown to NCTA staff members and guests. Although CBS plans to market EVR in several fields, NCTA was concerned about the CATV industry's future need for standardized software capabilities. They were primarily interested in the applicability of EVR to cable television systems.

NCTA made several observations. EVR has many obvious advantages. They are the miniaturizations of the package and the self-threading, sprocketless film. Video material is recorded on two sets of frames, side by side, with audio on two parallel strips of magnetic coating. Video material is recorded with an electron beam producing fantastic resolution. Since there is no scattering of light there is much more resolution. In the playback mechanism all of the resolution cannot be realized because of the random interlace of the scanning system. The interlace is not a standard EIA 2:1 interlace.

The photographic image is read by a flying spot scanner technique. A special flying scanner tube for this purpose has been developed by CBS. The RF output of the player was double-sideband amplitude modulation. This is not a standard NTSC waveform but CBS indicated that there is no reason why EVR could not be driven externally with standard NTSC drive signals.

Cross-Modulation Measurement in CATV Service Shop

Comparison Technique for Equipment Tests



The test setup above is an excellent method of checking on cross-modulation in a CATV system. For tips on other standard system tests, be sure to read the system reliability article in this issue (p. 58) and part two in December.

FCC Offers Cable Test Case

The Federal Communications Commission has at least come up with a test case to determine whether or not a CATV system can successfully operate under the FCC's retransmission policies.

In 1965 the city of Owensboro, Kentucky, which was only able to receive three Indiana television signals off the air and one Kentucky UHF station, granted a franchise to Top Vision Cable Co. A month before the system began to provide Louisville and Paducah TV signals, the FCC, at the request of two Evansville, Indiana, television stations, directed Top Vision to show why it should not be prohibited from carrying the Kentucky signals.

After Top Vision's petition for waiver of retransmission, the FCC refused to consider the distant signal waiver request for 22 months. The FCC finally acted. It rejected the CATV Task Force's recommendation that interim relief be granted but it did set up a hearing.

Top Vision Cable Company desired to provide its subscribers with local and syndicated Kentucky programming and did not wish to duplicate network programs offered by the Indiana stations. Finally the FCC granted authority "to carry certain distant signals of Louisville, Kentucky stations WLKY-TV and WHAS-TV".

CCTV For Congress Could Be Plus For Satellite CATV

Legislation was introduced which would permit a closed circuit television system in the House of Representatives permitting legislators to view sessions from their offices. Estimated cost of the closed circuit system is $254,000.

It is conceivable, although this matter has not been discussed with the Congressmen, that this legislation could forge the part for implementation of one of the proposals made in the "CATV Via Satellite" presentation at NCTA's San Francisco Convention. This would provide a channel devoted to full time coverage of Congressional "Capital Hill" activities.

CATV May Require New Comm Rules

Vincent T. Wasilewski, president of NAB, in a letter to John L. McClellan, chairman of the Senate Copyright Subcommittee, said that since negotiations involving a lot of "give and take" still are in progress it would be "premature" to try to delineate preliminary agreements already made and accords to be hoped for the future.

It is generally recognized that the problem of regulation of the CATV industry cannot be achieved solely via a copyright bill. In order that CATV fit into the existing national free television system, amendments will be required to the Communications Act of 1934 and to the FCC's Rules and Regulations.

Studio design for 'all talk' programming

By Robert Jones and Kenneth Steininger*

Many stations today are engaged in broadcasting "all-talk" programs or are contemplating this type of programming. To be properly and efficiently done, some new concepts in studio design and layout must be used. Old studios that worked well for D.J. operations are not adequate for the all-talk program.

With a change in programming at WTAQ to more "talk" programming, the necessity for change was obvious. This article deals with how we redesigned the WTAQ studio and how the results have confirmed our beliefs in the need for studios specifically designed for all-talk programming.

Most studios constructed or designed in the past 20 years have incorporated the orange-crate or "U"-shaped desk with two turntables and a large console. This arrangement made it impossible to interview guests and did not lend itself to a comfortable, relaxed operation. Telephone type talk shows require room for seating several guests, additional microphones and telephones. At WTAQ we based our design on a seating capacity of eight guests. (This may seem like a large number, but on occasion we have used all seating positions.) A careful study of existing commercial desks and consoles reveals that nothing is being made that fits this specific need.

*Robert Jones is a BE Field Editor. Kenneth Steininger is the Chief Engineer at WTAQ.

Major Considerations

There are four important areas in connection with the construction of such a studio. First is the area of accoustical treatment of walls, floor, and ceiling. Second are the design considerations given to the console desk-interview table combination. Third, the area of electrical and electronic circuits must be studied. And fourth the connections of the telephones are important. Our approach was also based upon the idea that we should build this unit so that one man (the announcer or moderator) could handle the entire operation.

Figure 1 is the layout of our new studio "A" table. Only the former outside walls of the D.J. studio were retained. This studio consists of a basic room, 13′ x 16′. The desk is mounted so the operator or announcer faces a window in the main WTAQ control room. As noted, we were limited by the floor space dimensions of an existing studio. Because space was limited and since we needed to construct a large enough desk to accommodate eight persons, we chose to mount the desk against the wall. By so locating it, we can now provide the necessary space for guests and operators.

We also found that this configuration does not make the room appear "crowded". If the operator has a larger studio to work with, he might consider locating the console desk away from the wall, or possibly in the center of the studio. If this were done, it would make access to the rear of the equipment wing much easier for the technical staff. Because of our desk location, we had to construct our equipment wing so that it could be serviced from the front.

Accoustical Treatment

One fact the reader should recognize in connection with a talk studio is that it must be very quiet. This means no echoes, outside noises, loud ticking clocks and no humming motors or tape machines. In many ways the approach here is not unlike that used in studio design prior to World War II. You may ask why an all-talk studio should be so quiet. The reason is that many participants do not talk loudly. Often a guest will "wander" away from his mike. All this spells trouble for the operator who must ride a high-gain level if the room is noisy.

The walls are lined in the usual staggered-stud method. This means every other stud attaches to the inside wall with the alternate studs

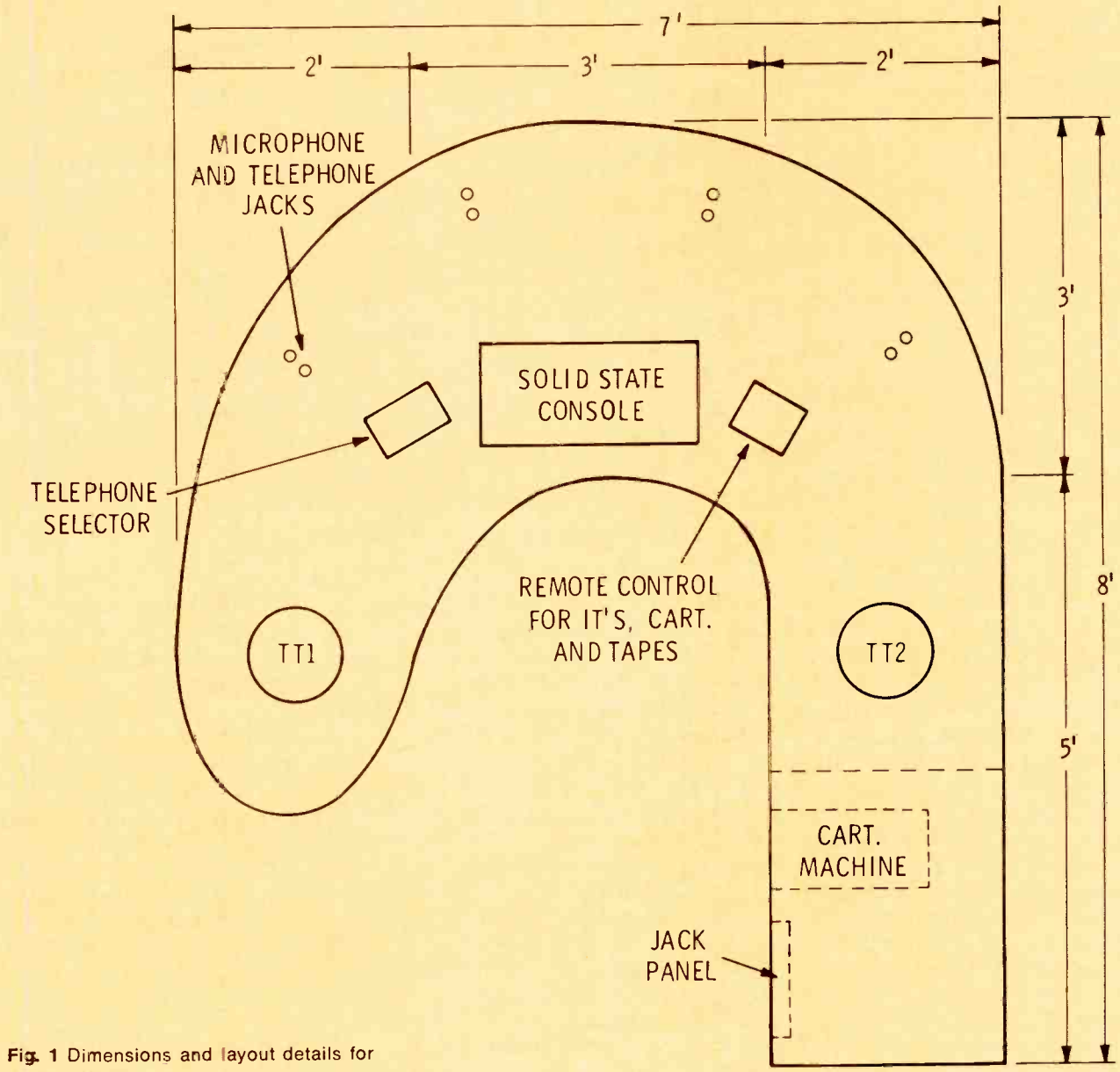


Fig. 1 Dimensions and layout details for desk-console.

Fig. 1a Interview program underway using twin mikes.

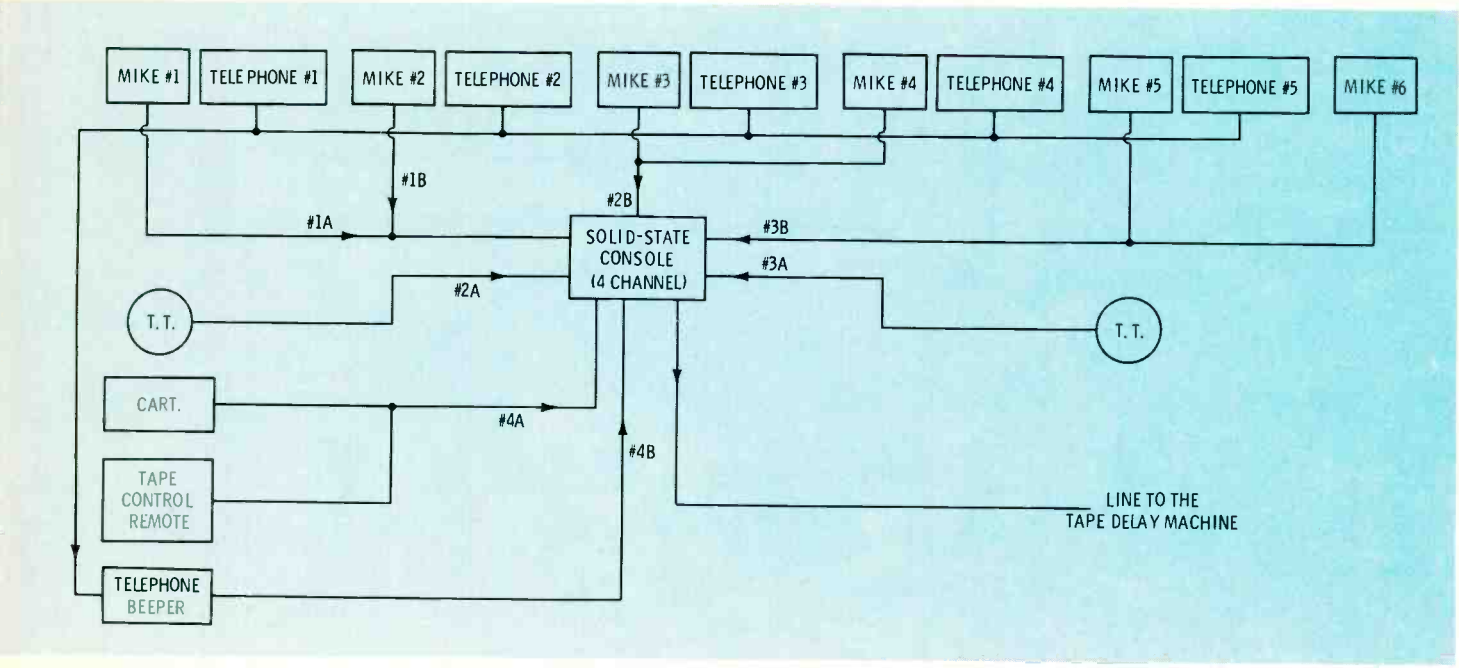


Fig. 2 Block diagram of the WTAQ 'all-talk' studio setup.

attached to the outside walls. The dead air space beween the walls was filled with a thickness of two-inch open fiberglass. (Open fiberglass does not have paper on one side.) This fiberglass was mounted to the outside wall. By doing so, it gave us a two-inch air space between the fiberglass and the inside walls. There was nothing special about the make or type of fiberglass used. Any lumber yard could supply similar material.

The inside walls were then covered, as shown in Figure 1a with 4′ x 7′ sheets of quarter-inch veneer plywood. This plywood was ordered with pre-drilled eight-inch diameter holes based upon half-inch centers. This yields a total of slightly over 14,000 holes per sheet. These holes were custom-drilled by the United States Plywood Corporation. (Any local lumber yard that handles U.S. Plywood products could supply similar sheets.) A total of 16 sheets were needed to panel the WTAQ studio. These plywood panels were purchased pre-finished with a light coat of varnish.

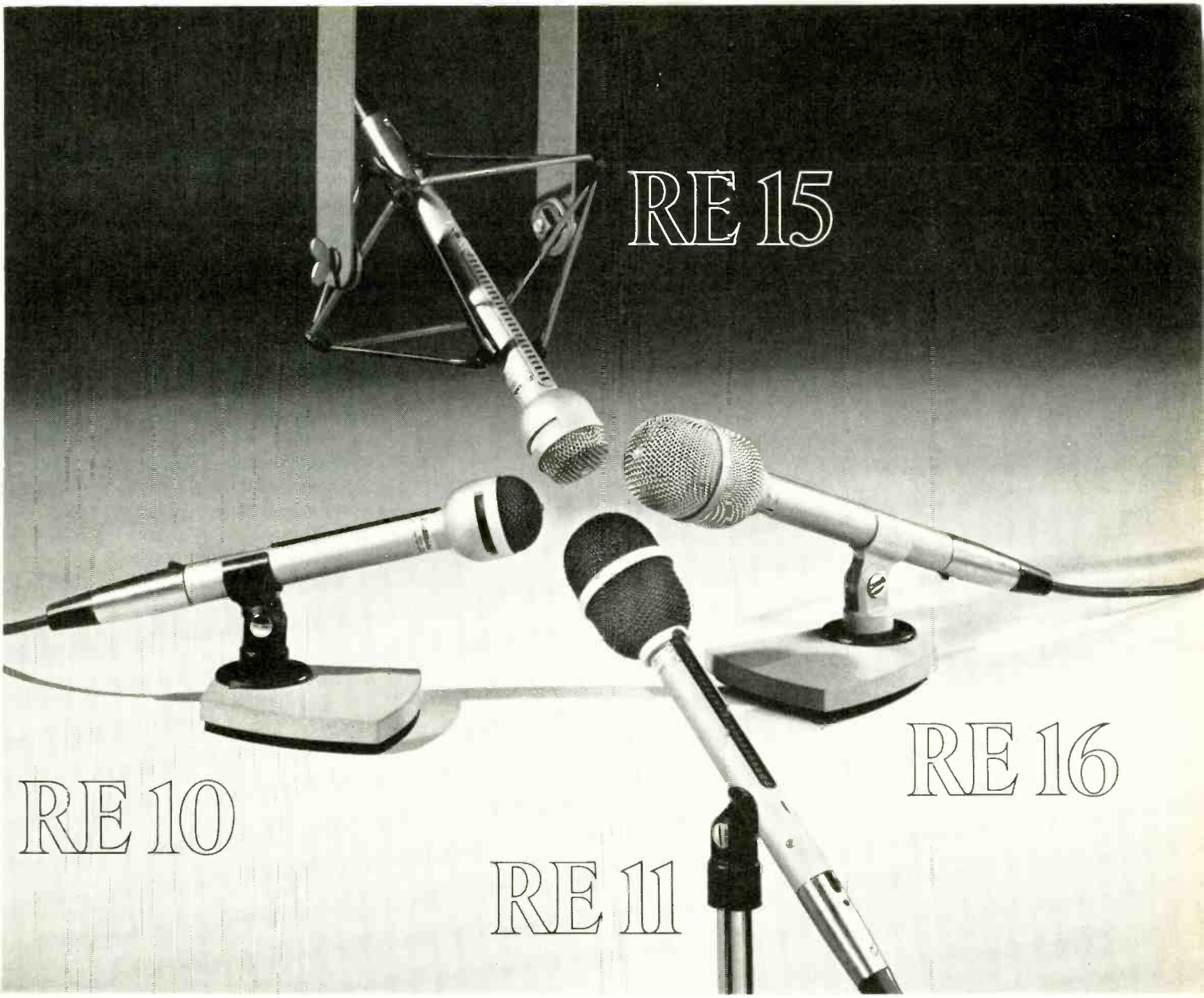
The ceiling was constructed upon the existing stringers, or beams. The same thickness of fiberglass was used between these beams. Approximately eight inches below this an Armstrong suspended ceiling was hung. Instead of the usual accoustical panels, we chose fully illuminated panels. The panels were 2′ x 4′. These were hung by use of metal strips, common to this type of ceiling construction. In our case we used a type of panel wtih a rough finish to defect the sound waves into the walls or into the floor. The particular trade name for the type we used was "Starfleck". A total of twenty-eight panels were used. Since an even number of 2′ x 4′ panels cannot be installed in a room 13′ x 16′, we cut the outside panels to give balance form to the ceiling strips. Above this fully illuminated ceiling we installed flourescent lights. These were mounted in six rows running the length of the room. A total of four 4-foot fixtures were mounted in each row. Thus a total of 24 fixtures were used. These were installed up next to the stringers so that a constant light fills the room and no individal lamps stand out.

The floor of this studio is concrete covered with a thick carpet. No other treatment was felt necessary in this area.

Another feature of this room is that the walls are 8 feet high, yet we used only 7-foot panels. The reason for this is that around the base of each wall we have a 1-foot removeable panel. This is made out of the same ¼-inch plywood, and blends in perfectly with the rest of the wall. These panels are mounted with magnetic latches for easy access to the wires and cables mounted behind them. At each corner of the room and around the doorway and window "California" wood trim was installed. This trim was picked to match the color of the plywood panels. No baseboard was used since it would hamper the removal of the 1-foot panels around the base of the room.

Console Desk-Table

The console desk we designed worked out very well. The general concept was to create a working area for each participant, yet to group them; whether there be one, two, or up to eight in a close circle. We also had to keep in mind that the console control panel and other operating devices should be inconspicuous. They should certainly not create any feeling of separation between the announcer and the guests. As the reader can see from the photos, we achieved this with a low silhouette console. The ideal setup would be a single round table with no projections. We believe our final design comes close to this and is practical.



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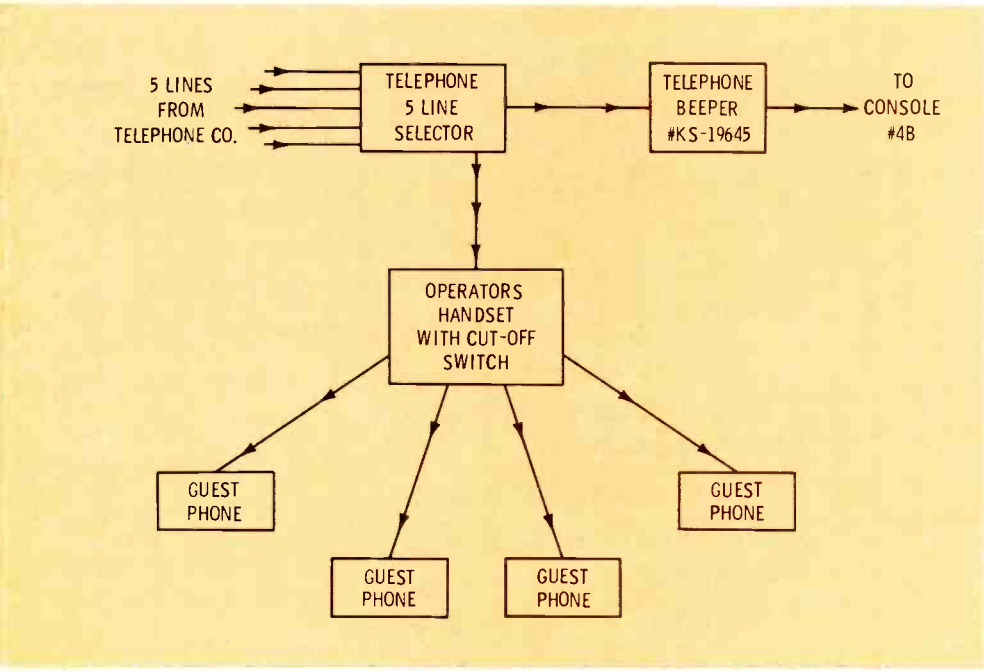

Fig. 3 Telephone input circuits to the console.

Construction Details

The basic shape of our table can be described as semi-circle with one wing. The overall length of the desk is eight feet and the width from side to side is seven feet. The width from the outside to the inside of the arc, or wing, at any one point was kept fairly uniform. The width is felt to be adequate for separation between guests and moderator, and sufficient to place papers, telephones and microphones. A desk that is too wide would weaken the feeling of closeness between participants in any program, while a desk too narrow would not provide enough working room.

The top of this table was constructed out of three-quarter Flake Board. The entire top is cut out of one piece. A 2-inch lip was installed around the edge of this desk. A light birch grained formica was used to cover the top and lip so that it would blend in with the plywood walls. The height above the floor was 30 inches, which is the standard desk height. This top is supported in two places: the boxed-in part of the wing, and a center post mounted near the left end of the semi-circle. The box part of the wing extends for a distance of three feet. This is sufficient to hold the cart machine and one jack panel. We also mounted the telephone company beeper in this wing.

Fig. 4 When desk panels are open, there is easy access to all cables.

No cables can be seen from either side of the desk. However, Figure 4 shows the easy access to the cables that do exist. In fact, all cables are so located that they cannot be touched by talk show participants. By using only one central support post along with the concealed cables, there is more than ample leg room under the desk.

While desk appearance was a consideration, access to the equipment was given a high priority. Two doors were mounted on the wing, allowing an easy entry to the equipment area. Each door closes on a magnetic latch.

Note in Figure 5 that one of the doors has a cutout that gives full access to the front of the cart machine. Another innovation here is the use of a sliding shelf to allow quick inspection or maintenance of the machine. In the WTAQ layout this was a necessity. Used in a larger room where the wing need not be placed against a wall, the sliding drawer is not mandatory.

Desk Top Arrangement

For maximum operator convenience the solid state console is directly in front of the operator. All cables terminating at the rear of the console are covered by a small plywood box. The turntables are located so that they are within easy reach of the operator and do not clutter the participants area of the desk top.

Four pairs of mike and telephone jacks are located around the outer edge of the desk at conveniently spaced intervals. In addition, two flexible mike arms are set up to the right of the console. In this way, the desk can be used for many types of talk shows. When not in use for a talk show, all telephones and mikes are removed.

Electronic Circuits

This studio, like those in many smaller stations, must double for

other than talk shows. For this reason we used circuitry that allows an all-talk format with one announcer, a talk setup with several guests or a panel, a standard D.J. program, or for use to produce program or cut spots.

The block diagram in Figure 3 shows the basic circuit functions. What the diagram does not show is that all controls and switches have been removed from the participants area. This eliminates accidental knob twisting and gives the desk a more spacious appearance.

The console is a commercially built four channel solid state unit. Each input can be switched to one of the two inputs available per channel. The input setup goes like this. Two mikes are conneced to input number one. These mikes are those located on the flexible arms near the console. The second console input is set up to offer a choice of two mikes in parallel or a turntable signal. The third input gives the same kind of choice, but wtih different mikes and another turntable. And the fourth input is used to insert a signal from either the cart machine or a remote controlled reel-to-reel tape machine located in the main control room.

Fig. 5 The WTAQ design allows full access to the cart machine via the cutout in the panel door and the sliding drawer.

Fig. 6 View of construction details before custom walls and ceiling were installed.

Immediately to the right of the console is a small panel with eight control buttons showing. The five across the top are the standard five for remotely operating an Ampex tape recorder. The three across the bottom are for starting and stopping the two turntables and the cart machine.

All five telephone jacks are in parallel. These are connected across any one of the five incoming telephone lines after making the selection on the telephone selector unit. The output of the unit connects to a standard telephone beeper. From there, the connection is to input "B" on channel number four of the console. The telephone selector switch is mounted to the left of the console.

The output from the solid state console then goes to the main control room where it is fed into a seven second tape delay unit. The protection tape delay time may be lengthened or shortened, but seven seconds seems to work well at WTAQ.

Summing Up

We believe that WTAQ has developed a compact, efficient talk setup that can be duplicated economically. While we concede that there are other possible designs that might provide more elaborate circuits, we think it is well to keep in mind the old axiom which says, "simplest is best".

Author's note: The cost of designing and building such a talk show desk is not high. The greatest investment is in the time spent building the desk. But here is a design reminiscent of human engineering. The desk is not only functional, but it also shows attention to the participants, the announcer and the technical staff.

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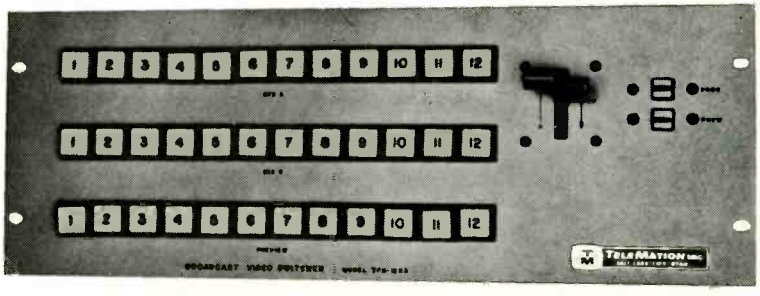

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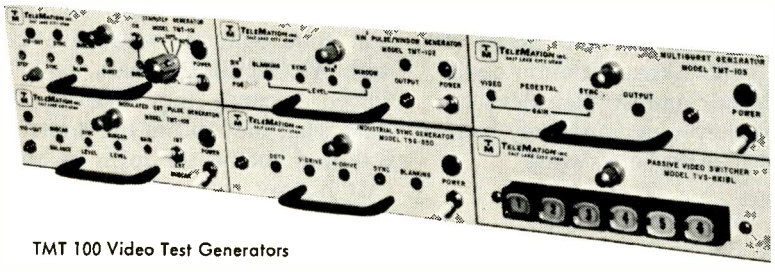

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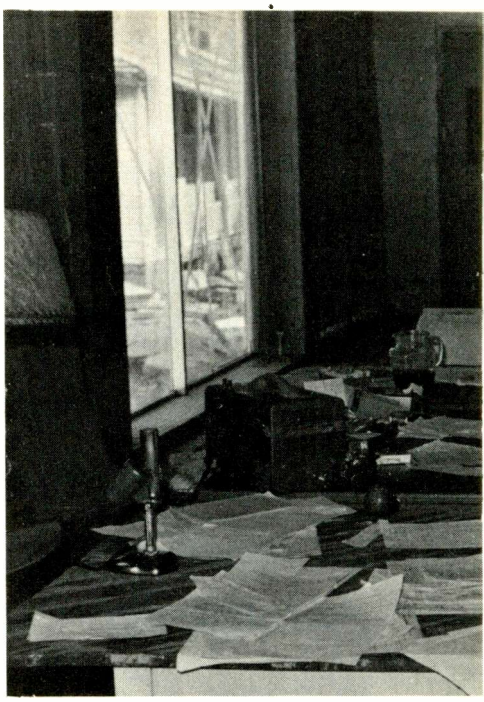
A Reason For Planning Emergency Broadcasting



By Ron Merrell

Before running headlong into further discussions of how to set up for emergency broadcasting and how to get back on the air after your station is struck by a storm or natural disaster, it is necessary to put some meaning behind emergency broadcasting.

Not too long ago I drove along the Gulf Coast and saw for myself the terrible damage hurricane Camille worked upon the state of Mississippi. The intent of my trip was to visit with the staff of WLOX in Biloxi, not just to view the wreckage of homes, boats and ships that made Mississippi a disaster area.

The once proud and majestic Buena Vista hotel, the home of WLOX AM and TV, took the brunt of the storm . . . including a 31-foot tidal wave. This wave ripped the beachside front of the Buena Vista motel section away and washed several rooms clean of furniture and decorations. A professional wrecking crew couldn't have done a more thorough job.

Across the street, and in the hotel section of the Buena Vista, I searched for WLOX. What I found was studios that had taken in about seven feet of water and tons of debris. Finally, I found someone who could tell me where WLOX had relocated. They were in that wrecked motel section in a room rebuilt with plywood.

As I climbed over the rubble and sand toward the stairs that led to the second floor of the motel, I couldn't believe that a station could be on the air amidst such devastation. But they were, and they were proud of it. And here's why.

WLOX Stays On

Before the hurricane hit, WLOX AM and TV were relentless in their efforts to warn the people and to give them the pre-storm information that might save their lives. That is what was required of WLOX. But there was that time, say one hour before the storm hit, when they could have loaded their stations into vans and moved out. General manager Ray Butterfield and CE "Blue" Majure didn't budge.

They sandbagged the TV studio walls and windows, sealed the doors and waited for the storm.

Then the water and the low pressure cell tumbled into Biloxi. All over the city, car windows burst from the pressure. And inside the WLOX studios, the pressure soared until the concrete walls buckled, sandbags were sucked out of the windows, water surged in as the wreck began to take shape. Cameras and tape machines were dumped, video tapes sailed across the water and, with the help of 200 mph winds, wound around twisted cables. In the chaos of wind and water, WLOX was inundated . . . a colossal and sickening wreck.

But why stay? Ray Buterfield and Blue Majure, who have been with WLOX for 22 years, said they stayed because they had to stay. And what they did in the hours that followed should go down in broadcast history as the most heroic effort of any American commercial station.

As the water receded, but while the winds were still blowing at a gale force, the staff of WLOX regrouped with one thought in mind: get the AM station back on the air. It was some hours later, but they did get back on with a low power transmitter and a PA amplifier, using a portable tape recorder microphone to pipe these messages to the people who were still in the area and to those who were already coming back:

1. Where people could get medical aid
2. Where shelter could be found
3. Where food was being distributed
4. How to purify water
5. Where water was available
6. Calling for trucks needed to move supplies
7. What roads and bridges were open
8. Call for volunteers to assist at food and clothing distribution points
9. Control information on pests
10. Sanitation details

Fig. 1. WLOX on the air during their eight day marathon broadcast.

Fig. 2. When the new transmitter arrived, WLOX moved into what was left of the Buena Vista motel. The studio and transmitter are located in the room in the upper left.

11. Collection of stray animals
12. Where and how to contact insurance agents
13. Foods to eat and foods to avoid
14. Funeral service information
15. Scores of direct messages

The list could go on. But it must be understood that when WLOX was giving this information, outside agencies had not been able to get into Biloxi to assist the Gulf Coast residents. As one woman put it, "I felt all alone in the world until I heard the local station come back on the air."

Rebuilding

For eight days and nights, the staff of WLOX labored to keep the AM station on the air and to keep the people informed. But as Ray Butterfield explained it, something more was needed. "Every statement on the air had to be positive. No negative statements. They needed a psychological lift." And to this day, you can hear station breaks that sound loud and clear, "WLOX, Biloxi, helping to rebuild the Gulf Coast."

And while the Gulf Coast is rebuilding, so is WLOX. It will be a long, uphill battle for survival; but the people of Biloxi and surrounding towns will not likely forget. Some few days after the storm, one man left some money and this message at the desk in the soggy Buena

Fig. 3. Inside the motel, the WLOX DJ overlooks the inconvenience of a temporary lashup. "WLOX, Biloxi, helping to rebuild the Gulf Coast."

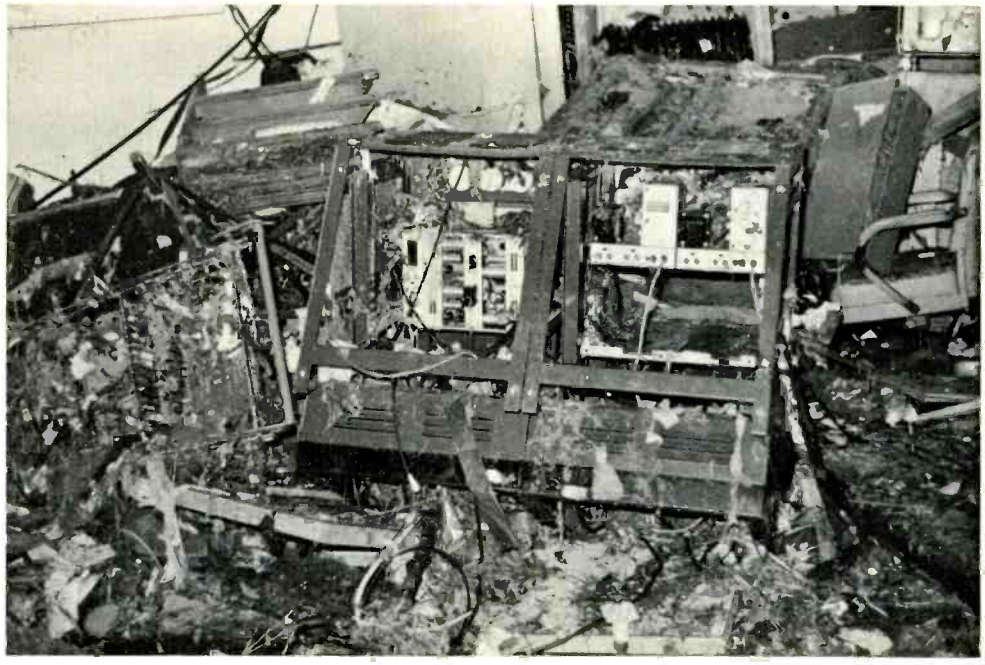


Fig. 4. WLOX-TV after the water receded. Barely recognizable equipment was buried under debris and mud.

Vista: These are my last three dollars, but I give them to you for saving my life. I hope they will help in rebuilding your station.

People along the Gulf Coast had been advised that they should listen to WLOX for news direct from the disaster area. By doing this, confusion was avoided. And in order to inform the people outside the disaster area. WLOX-TV presented a picture of Biloxi in the midst of what could have been chaos.

What had happened was that WLOX stayed on the air to (1) give vital information needed by people in the disaster area, (2) had given a picture to the outside, thus helping to avoid sight-seers, while detailing what was needed, (3) gave the people hope when there was little reason for hope, and (4) helped to prevent what could have caused widespread epidemics.

Surveying their great losses today, Ray Butterfield and Blue Majure agree on this: given similar circumstances, they would do it all over again.

Across The Nation

"It can't happen here." "It won't happen to me." In broadcasting these are two terrible assumptions. Dangerous too, because they usually exist as a rationale for not suitting up for a total committment of the commercial broadcast field. Stated another way, how can you best serve the public interest when your effective radiated power is zero?

Fortunately, the Mississippi Broadcasters Association was prepared to meet most of the needs of that state's broadcast audience before, during, and after hurricane Camille hit the Gulf Coast. Those who worked so hard to continue broadcasting in the face of station and personal losses deserve an ovation from their listeners, their viewers and from the industry. At a time when there are so many question marks afloat in broadcasting, the industry rose up out of the muddy waters and heaps of rubble to provide a public service not possible through any other media.

But while we are giving recognition to those who served the industry so well, we cannot afford to forget the communications blackout that existed immediately after the hurricane hit.

Telephone lines were all down. Power lines were lifeless. Transmitting towers were twisted and toppled. Ground level transmitter sites were awash. Major highways and bridges were blocked by boats and debris.

"That can happen in Mississippi, but not in my state."

It is true that hurricanes lose their force as they travel inland. But since the early 1920's, natural and man-made inland disasters have been potential plunderers and wreckers of broadcast stations.

If admission of the possibility causes a reaction in the form of revised facilities and new emergency power plant equipment, a great step forward can be taken. But it requires a lot of planning to become totally committed.

For every city, county and state there should be an emergency broadcast plan. Admittedly a gargantuan task in the main, the idea has enough merit to warrant planning and footwork along a path toward public service.

On the local level, the emergency plan first demands an inventory of all available communications. What agencies have what kind of equipment available for portable and/or mobile operations? Is there a local CB and amateur radio organization?

When power lines and telephone lines are down, how will you coordinate with existing stations? A station without a general communi-

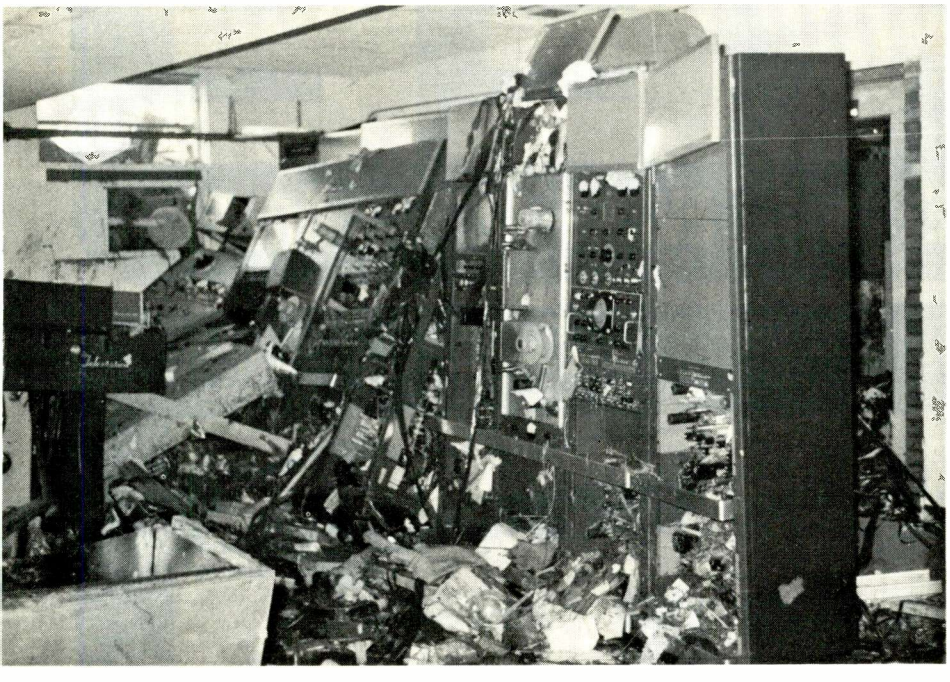


Fig. 5. The equipment shown here had been under seven feet of water. Inside each piece there were layers of silt and dirt at least a ¼ of an inch thick.

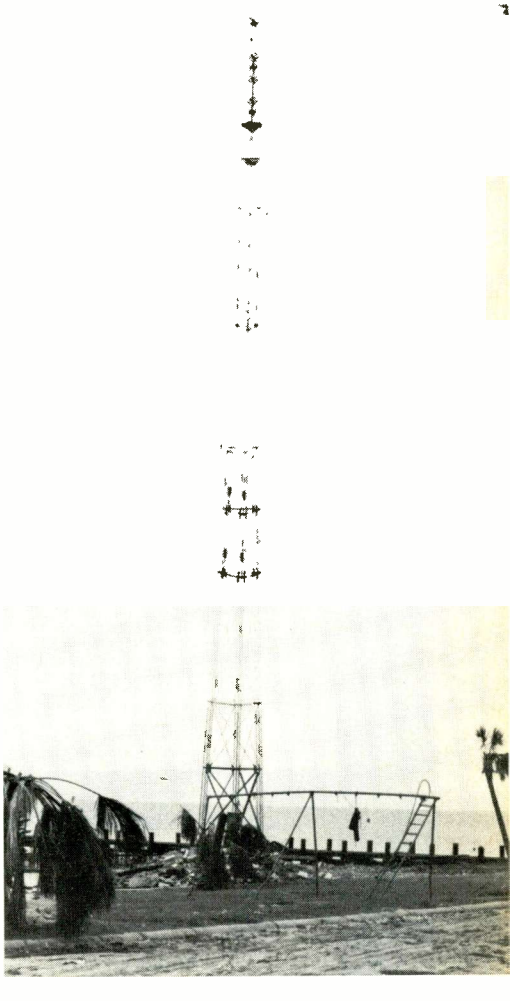


Fig. 6. Although most of its paint had been blown off by the high winds, this AM tower was left standing. Most other stations along the coast lost their towers.

cations receiver cannot monitor, much less help to coordinate, local communications for maximum effectiveness.

Police, Highway patrol and fire department monitors are also of more than passing interest in the communications picture. In fact, beyond their emergency uses, a station's total communications capability can have a great effect on news coverage. Backed by either the AP or UPI wires and agency monitors, a station can ride the crest of the news as it occurs on the local, state or national level. And news always has been an important asset to commercial broadcasters.

From city to city, the specifics run the gamut. The fewer the number of local stations in existence, the greater the responsibility of those stations, as was the case at WLOX. And the higher the number of stations available, the greater the need for cooperation and coordination. In a time of emergency, competitive bickering cannot be allowed to shunt the potential communications chain.

The Mississippi Plan

The key to the Mississippi emergency plan is an emergency network of FM stations. The state is divided into six districts. Each member of a board of directors is responsible for contacting stations within their designated districts. In some cases, more than one director may be assigned to a district.

The state is also alerted by the MBA via teletype bulletins sent to the attention of station managers. In addition, the station weather wire alerts stations of pending weather conditions.

Normally activated by the MBA president, Bob McRaney, Jr. of WLBT, the FM network provides information to AM and TV stations. All of these stations are aware that once an emergency condition exists, the FM network will be activated and that all they need do is monitor and air the information it provides.

Within And Without

Someone within the disaster area must take charge of communications, giving coordinated information to the public. Chaos could develop if several stations attempting to communicate with disaster victims burdened them with conflicting information.

Beyond the disaster area, the state must be informed as to the needs of the people as well as the station(s) on the air. WLOX received needed equipment from various sources outside the stricken area. Emergency water supplies, gasoline, medicine, food, and clothing were sent into the disaster area as a result of the needs made known through the network.

The seemingly endless hours of emergency work that followed after hurricane Camille hit would have been ineffective without coordination. There was a plan, and it worked. But equally important, there were people who dared to get involved. There were people ready to sacrifice. It has been said that there are no great men, only great challenges which ordinary men rise to meet. Isn't it time to ask, how will the rest of us ordinary people rise to meet the challenge?

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Color film processor installation ideas Part 2

By D. Khalil Jones*

Part one of this article covered the problems involved in selecting a color film processor and choosing an installation site. The actual installation of a processor intended for use with the Kodak ME4 process will be covered in this part.

After the installation site is selected, draw a simple floor plan of the area and make scale cut outs of the equipment to be installed. The best equipment layout can be determined by moving the cutouts around on the floor plan. Keep in mind the venting requirements make it desirable for the processor, mixer and chemical storage room duct work to be kept to a minimum.

*Engineer, KID-TV, Idaho Falls, Idaho

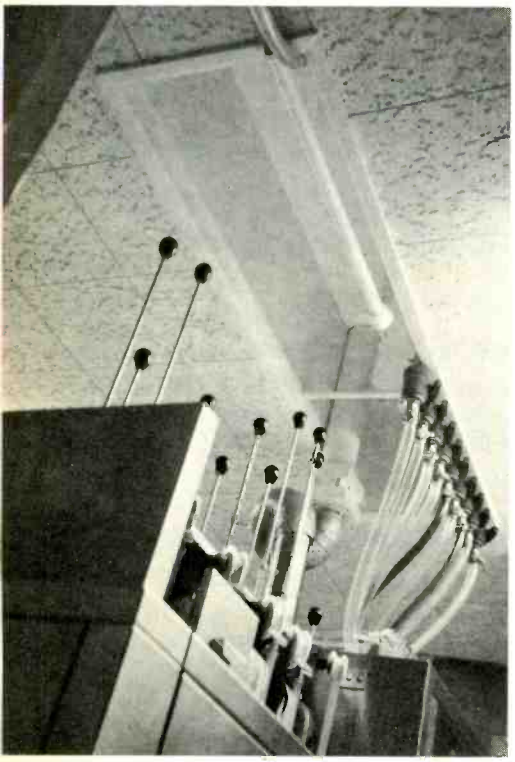

Fig. 1. Note cutout in ceiling for film transport rods.

Plumbing and work space should also help determine the processor location.

At KID-TV we put the processor in the same room that had been used for our black and white processor because of the existing plumbing and film handling facilities. There were a few problems. The ceiling was about 9 inches too low to allow for removal of the film rollers from the new processor. What's more, the room above the processor, where we had planned to put our storage tanks was the master control room for our AM radio station. Fortunately, the control room was large enough to allow a 6-foot partition for chemical storage without drastically affecting the area needed for AM control operations.

We built the small storage room, but not without considerable complaining from our DJ's. We placed the processor directly below this room and made a cut-out through the floor to accommodate the processor transport rods. (Figure 1.)

With a definite floor plan in mind, we started with our AC power requirements and found our present wiring was adequate for our water heaters, room heaters and lighting, but would not handle the added burden of the processor. Therefore, we had an additional electric service installed for the processor.

Then we installed an AC outlet to operate the chemical mixing tank. A three-way switch was put on this outlet to give us control of the mixer from both the chemical storage room and the processor room. This was done so the operator could mix chemicals in the processor room, change the mixer valves from the mix position to the pump position and go upstairs and put the hose in the proper tank, and then control the pump from the storage room to fill the tank. The mixer and chemical storage room ventilating blower is wired the same way to give control from both rooms.

Ventilation

The next step was the installation of the ventilating system. After we had chosen the location for the mixing tank, we had a stainless steel hood made to fit over it. The head was constructed with a telescoping duct so that it could be raised or lowered over the mixer to allow for both proper ventilation and for filling the tank. We found later that a hood without the telescoping duct would have been sufficient because the mixer was on casters and could be rolled in or out.

Stainless steel was used in the hood because of the splash and condensation problem directly over the mixer. From there on, galvanized ducting was used. The duct was run from the mixer hood up through the chemical storage room to a blower which was exhausted through the roof by means of a rotating weather cap which turns with the wind to prevent it from blowing fumes back down the duct. In the chemical storage room an adjustable vent was installed in the duct work to allow ventilation whenever the blower was turned on. This vent was adjusted so there was approximately equal exhaust from both mixer hood and chemical storage room.

Ventilating the processor should be done in a separate duct to prevent residue from the mixer line getting back into the processor. If this happened through condensation or any other means it would contaminate the chemicals in that section affecting the quality of processed film. The effect would depend on what chemical has been contaminated and what contaminated it.

Our processor requires a ventilation of only 50 cubic foot per minute, so we ran 3-inch PVC pipe for

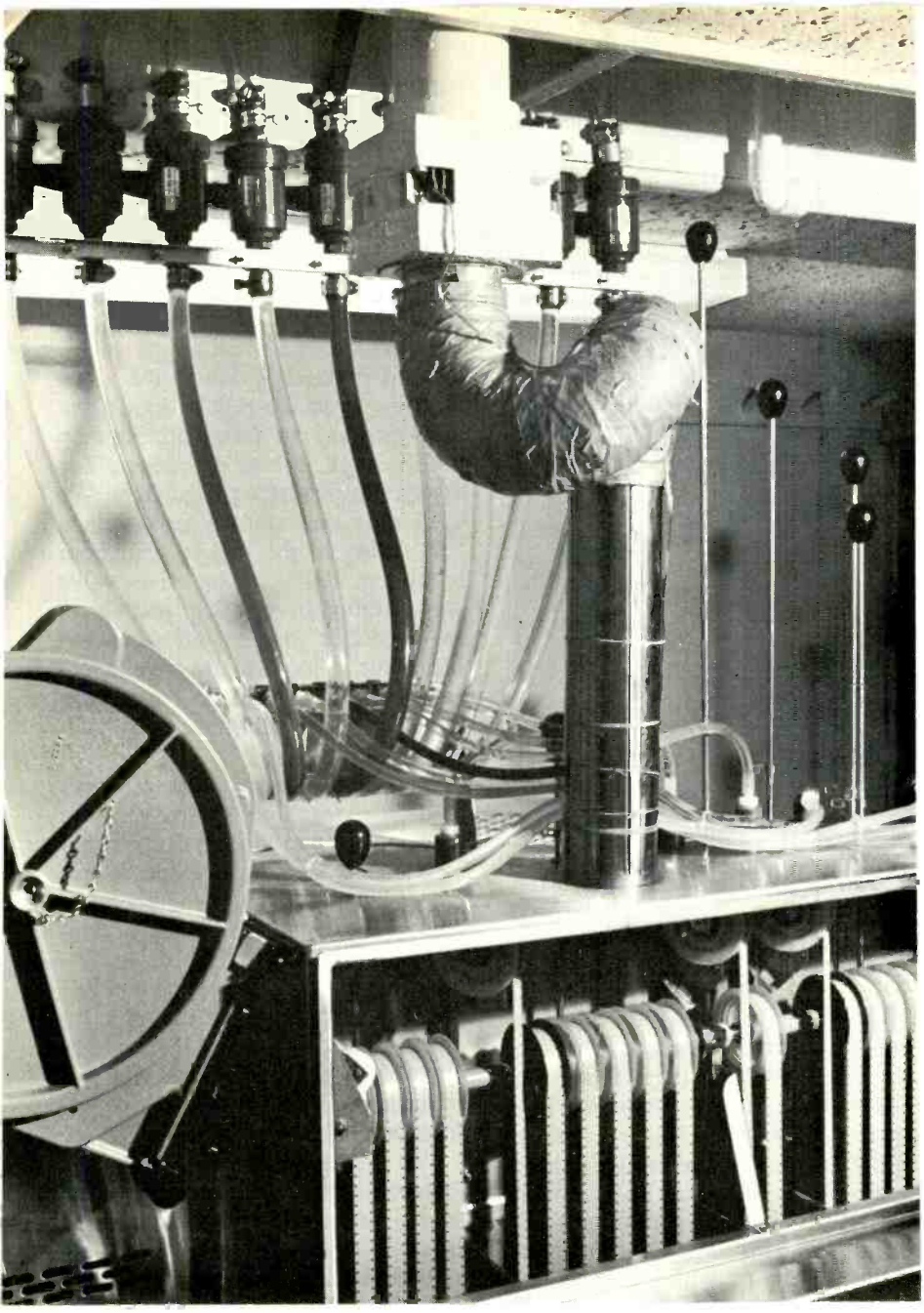

Fig. 2. Blower at top center is a 100 CF/min. muffin fan. Wooded blocks were fitted to the PVC exhaust ducting and bolted to the fan. Note the moisture and light trap between the blower and the processor.

this duct. This went up into the chemical storage room. Then two 90° bends were put in it for a light trap. It was then routed out through the roof. It is important to use dark, non-reflective material for this duct with a couple of bends in it to prevent light from getting into the processor. It is also important to put an "S" in the line (similar to a water trap in a sink drain) where the duct couples to the processor. This serves as a light trap, and it collects consendation from the line preventing it from re-entering the processor.

It is also necessary to provide a means of draining this section of line. We used a 100 CF/min muffin fan as a blower in the line to aid ventilation. We made two wooden blocks the size of the muffin fan with a hole cut in the centers. One block was bolted to each side of the fan and the duct connected to the blocks. This was inserted in the line between the moisture trap and the duct. Power for the blower was taken from the processor so that whenever the processor was turned on the blower would supply forced ventilation.

Electric Heaters

Next we installed electric heaters in the chemical holding room and the processor room that would maintain a temperature of at least 75°F. The pre-hardener used in the ME4 process will start to crystalize at 68°F, making it unusable unless reheated and mixed again. This is very difficult to do once the pre-hardener is in the storage and processor tanks.

Water Supply

The water supply was the next thing to prepare. In our installation we had most of the plumbing already installed for our black and white processor. That system used a filtered supply. The filter is a cloth yarn type used to remove solid particles such as sand and rust. After the filter, the water goes through a water softener to remove dissolved minerals. We felt both of these systems were required for quality film processing.

We had installed one 50-gallon hot water heater for our old processor. However, during prolonged use the color processor required more hot water than one water heater could supply, so we installed a second 50-gallon water heater in series with the original. Both heaters were of the quick recovery type. This arrangement supplies enough hot water to operate the processor continuously.

The next item installed was the water mixing valve. It is important to use one with check valves to prevent mixing of cold and hot water when the system is not in use. If the mixing valve does not have internal check valves, an external check valve should be installed in the hot water line.

Chemical Storage

The chemical holding room was then prepared. In our case it was directly above the processor. The chemical storage tanks should be non-corrosive and air tight. If the chemicals are exposed to air, their storage life will be reduced due to

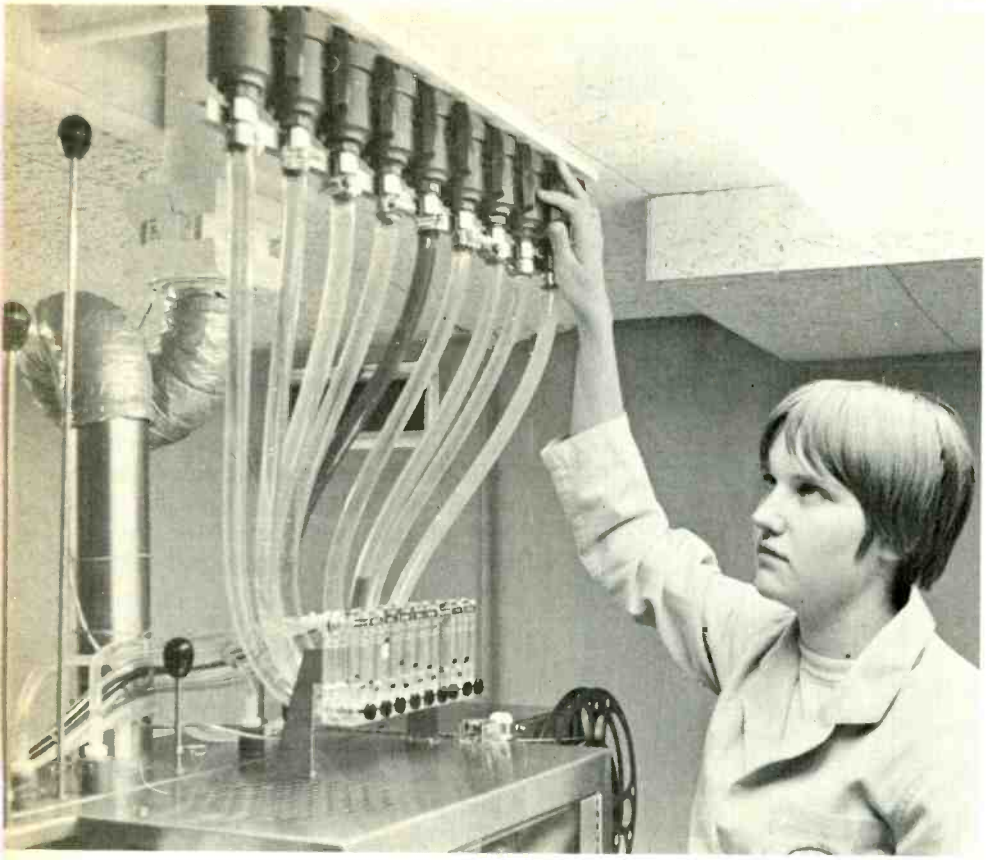

Fig. 3. Operator shown turning on chemical replenishment valves in preparation to start processing.

oxidation. The remedy to this problem is the use of floating lids that keep the solution covered at all times. Chemicals for Kodak's ME4 process are only supplied in quantities for 100 liters. The smaller packages are economically prohibitive so storage tanks must be at least a 100 liter capacity. Most processor manufacturers supply storage tanks as an accessory which can be purchased with the processor. Our accessory consisted of eight 30-gallon plastic barrels with both floating and conventional lids along with the necessary fittings and plastic hose.

To mount the storage tanks we built two shelves 8 feet long and 2 feet wide, located one above the other, and mounted them against the wall. We built a lip around the shelves and fiberglassed them along with the wall, forming two long trays 2 inches deep. The wall works as a splash plate. The trays were fitted with a clear drain hose running down into the processor room so the operator can see anything coming through the drain and make necessary corrections. The fiberglassed wall and trays have made cleaning the tanks very easy. Everything can be washed with water.

Plumbing

The plumbing for the storage room was simple. We chose to use one line of PVC pipe from the mixer to the storage room for filling the tanks. The discharge fitting on the mixer is connected to a short hose to allow the mixer to be moved out from under the ventilating hood for filling. This hose is connected to the PVC pipe which runs up to the storage room. A drain valve is placed in the line just above where the pump hose connects so the pipe line can be drained and cleaned between chemical mixings. The pipe should be installed without any low places so there is adequate draining of the line between mixes. This line and the mix tank is always flushed with water several times between the different chemical mixes.

In the storage room the PVC pipe is connected to a hose which is long enough to reach all of the tanks for filling. Both of the hoses used to couple the mixer to the line and to fill the tanks should be high grade and acid proof. This filling system has worked very well for us and was simple and inexpensive to install.

The discharge lines are connected to the storage tanks through valves supplied with the storage tanks. The hose from these tanks is fed through a hole in the storage trays. This hole has a 2-inch lip around it to prevent spilled chemical or wash water from running down the lines and onto the processor.

Care is needed to be certain that there are no high places in the drain lines which could cause air locks. The lines need a downward slope all the way to the regulators. In the ME4 process the same formula stop bath is used in two places and has separate replenishing regulators. We used only one storage tank with a "T" fitting in the line to feed both regulators. A non-corrosive valve was installed in each line just above the regulator for shut-off when the processor is not in use. We could have used the valves on the storage tanks but this would have been awkward.

After the necessary changes were made, the machine was moved into place. This was no small task because of its size and weight. It was placed in position and the chemical lines were connected to the replenishment regulators. The drain line was attached, and the water line connected to the water mixing valve outlet. The AC power line was plugged in and the exhaust fan was connected. This completed the installation of the processor.

We used hoses as well as a flexible pigtail for the power so some degree of movement could be tolerated. Next we made final leveling adjustments to the processor and calibrated the tank heaters and the flow meters. A field representative for the processor company made the initial calibrations and adjustments on the processor. We then started to process our own color 16mm film on a regular basis. We have been using our processor approximately six months and have had very little trouble with the installation.

Hopefully this article will be of some help to those planning a color film processing installation. This installation has worked very well for KID-TV, but each station's situation is unique and will present new problems. Planning the installation is as important as the selection of the processor.

I would like to thank the KID Staff, photographers, Quincy Jensen and LaVon Reed for their assistance in preparing this article. ▲

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Circle Number 28 on Reader Reply Card

Transistor Service Tips

By Carl Babcoke

How Critical is Forward Bias?

The forward bias of a transistor is the **most** critical factor that determines the performance of transistorized circuits. Without some forward bias, there can be no collector current (except undesired leakage), and since a small transistor typically operates with about .2 volts of forward bias for a germanium type and about .7 volts for a silicon, small voltage changes are significant merely because the bias is small. Logic and reason tell us that a 10% change in forward bias should have the same effect on gain and output current as a 10% change in tube bias. This is not so! In some transistor circuits a bias change of far less than 10% can increase or decrease the gain 30 dB, for example. This is far more critical than the bias on a high-gain sharp-cutoff tube.

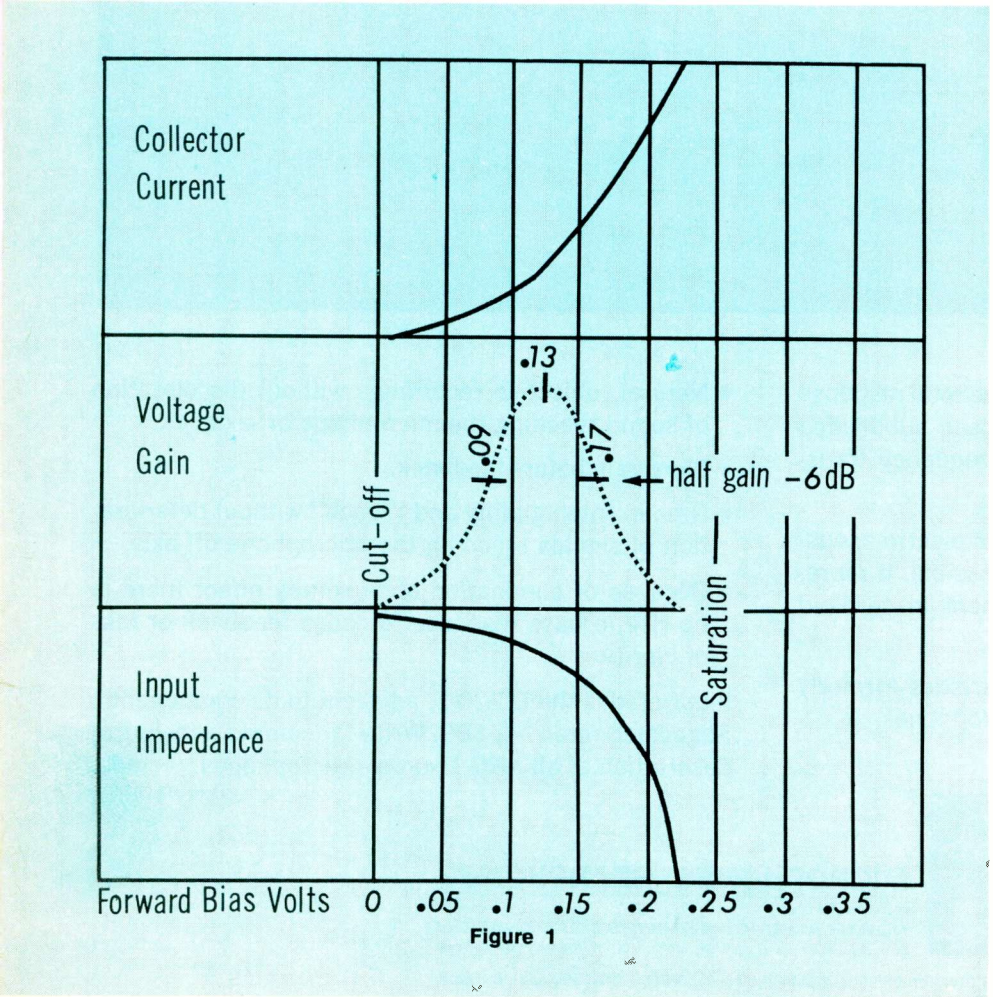

Figure 1

It is poor design and practice to apply a fixed bias even from a well-regulated supply, for the optimum bias will be different for each individual transistor and will vary widely according to the junction temperature. For stages such as power output that are difficult to stabilize, a bias-regulating diode may be used if it is made from the same type of material as the transistor so it will have a similar temperature coefficient. Even applying a constant base current is not enough stabilization. If it were, a large source of voltage through a large base resistor would be sufficient. Two methods of stabilizing a single stage were given last month. One is to use a large emitter resistor, and the other is to take the bias from a source (such as the collector) that varies in voltage according to collector current. Later we will explore how multiple direct-coupled stages are stabilized.

Gain Control by Bias Variation

Every transistor has an optimum forward bias that gives maximum gain. Either more or less bias decreases the gain. There is no precedent in tube circuitry for this characteristic. The graph in Figure 1 is not intended to be accurate, but only to illustrate general transistor functions. The forward bias is increased at a linear voltage rate. The collector current increases and the input impedance decreases at a logarithmic rate, while the gain peaks at one definite bias voltage. Starting at the bias for maximum gain, a decrease in bias uses the "cut-off" mode, and in increase takes advantage of the "saturation" characteristic for gain reduction. Either method can be made to give about the same degree of gain reduction. Current consumption would dictate use of the cut-off type of

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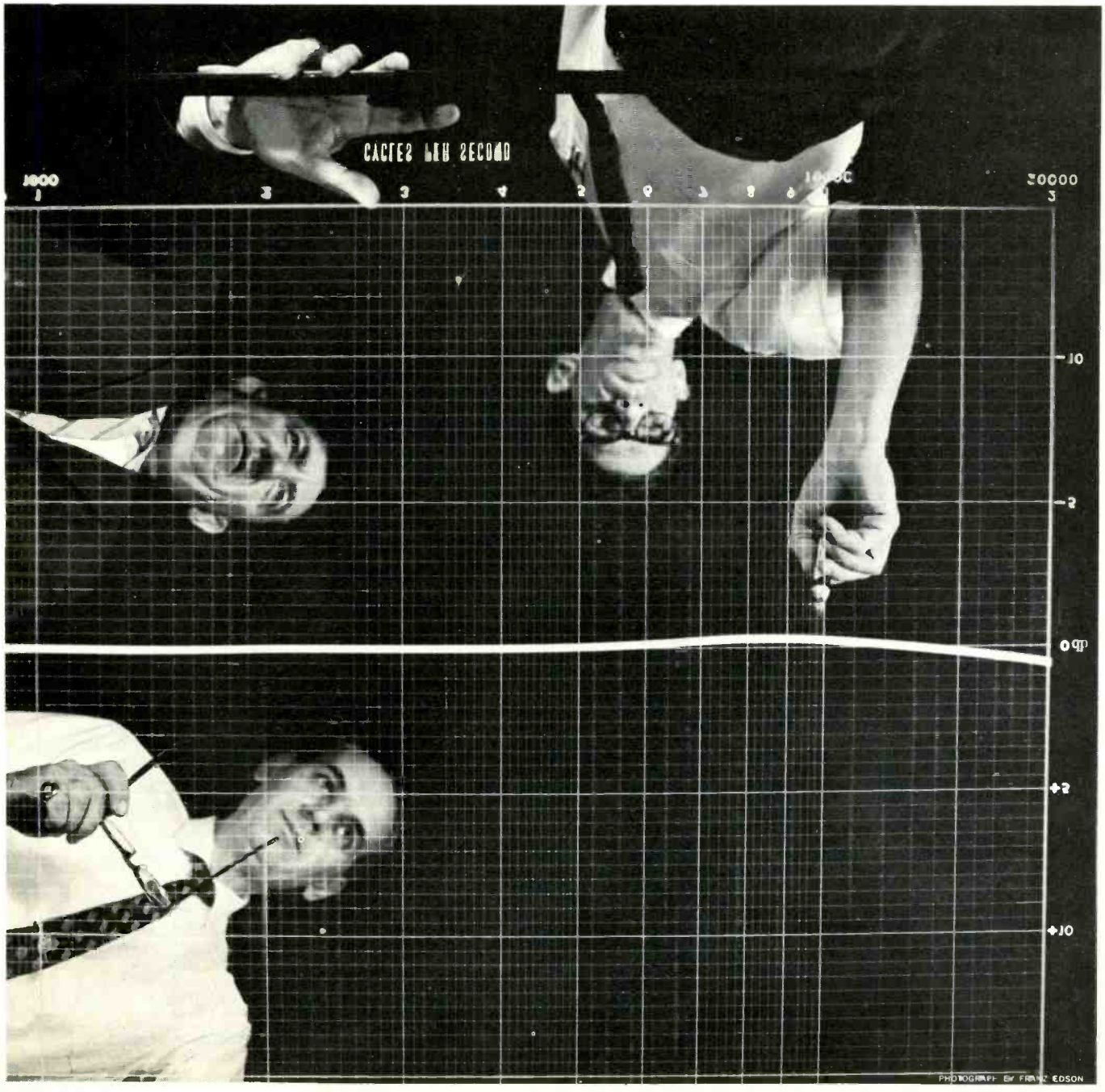

Circle Number 29 on Reader Reply Card

AVC for battery-operated equipment such as portable radios. AGC in television receivers usually employs the saturation method, for the lower input impedance obtained on stronger signals widens the bandwidth of the tuned circuits.

Silicon transistors used for IF and RF amplifiers in color TV receivers appear to have an extremely sharp cut-off when saturation biasing is used for AGC. Actual measurements made on several brands of receivers indicate that a bias increase of only .04 to .05 volts over the no-signal bias of about .7 volts will accomplish adequate gain reduction for a very strong TV signal. Translated, this means a bias increase of 7% will reduce the gain to virtually zero.

Pulsed Signal Operation

The preceeding statements apply to AF, RF and IF amplifiers operated in class "A". Class "C" amplifiers (including oscillators, sync separators and power output stages) usually show reversed bias measured on a meter. This does not contradict facts on forward bias already given. Diode action of the base-emitter junction rectifies the incoming signal to produce reversed bias that is overpowered by the highest amplitude tip of the incoming waveform to become forward bias. Thus the base has reversed bias most of the time, and forward bias for a very short time during each cycle. A meter will average these voltages to read as reversed bias.

Load Impedance vs Gain

Load impedance in the collector circuit has a large effect on transistor gain. At the usual transistor impedances (under 50,000 ohms) the gain is in direct proportion to the load. If the collector load impedance is doubled, so is the gain (+6 dB). If the impedance is decreased 20%, the gain is reduced 20%. Remember this when analyzing some of the beginer circuits where the collector resistor is about 1.5K.

Other Factors Affecting Gain

Collector voltage is not a critical factor in determining gain except when the collector-emitter voltage drops to a few tenths of a volt, then the gain drops to nearly zero.

Negative feedback or degeneration in the emitter circuit from unbypassed resistors reduce gain with transistors the same as it does in tube equipment.

Next month, we will discuss the characteristics of some simple amplifier circuits and the reasons why they are high or low gain, desirable or undesirable. This information can be the basis for effective troubleshooting techniques.

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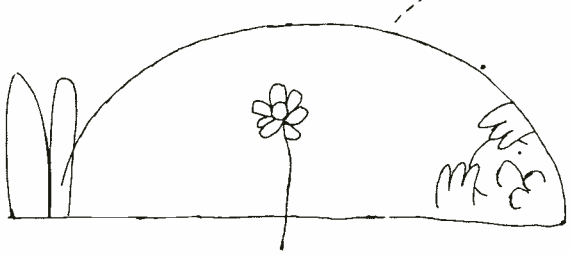


Circle Number 31 on Reader Reply Card

Equalizing telephone lines Part 2

By David Talley*

In the first part of this two-part series on equalizing telephone lines for remotes, transmission line defects and theory were covered. In this part, we get down to the answers needed to overcome the problems that often occur in remote systems.

Attenuation

The properties of the telephone line can cause a gradual decrease or attenuation of the magnitudes of the instantaneous current and voltage amplitudes as the speech or other audio waves travel along the cable pair. The principal reasons for this attenuation are the shunt capacitance between the cable conductors, the voltage or IR drop due to the conductor's series resistance and the leakage effect, which prevent some of the current from traveling the entire distance. As a result, the signal power will gradually diminish after a distance from the transmitting end of the telephone line.

In order to better understand this attenuation effect, the particular telephone line may be divided into a number of equal line sections. For example, a 5-mile line can be divided into five sections, each 1-mile long, and a 15-mile line into five sections of 3-miles each. A line section comprises the finite values of the line's electrical properties, that is, C, L, R and G as illustrated in Figure 2.

The attenuation in each line section will be the same only if these electrical characteristics have uniform values. If line sections have different electrical properties, the characteristic impedance, Z_0, of each line would be changed. Consequently, the rate of decrease in the input and output current and voltage values in each line section will be different. Therefore, the program signal would not decrease uniformly along the telephone line. Also, amplitude distortion would result because certain frequencies will be attenuated more than other frequencies.

Characteristic Impedance

The characteristic impedance, Z_0, is a very important operating trait of a telephone line. It depends upon the physical construction of the cable and its conductors. Thus, Z_0 is not affected by the impedance of the terminal equipment connected to the line and is entirely independent of the length of the line.

These properties of the line (C, L, R and G) determine its characteristic impedance from the general formula:

$$Z_0 = \sqrt{\frac{R + j_w L}{G + j_w C}}$$

We may assume, for practcal purposes, that there is negligible power loss in the dielectric material surrounding the cable pair and that there is very little I^2R loss in the cable conductors. The characteristic impedance, therefore, may be considered as mainly resistive and approximately equal to:

$$\sqrt{Z_0} = L/C$$

where L and C are the inductance and capacitance, respectively, per unit length of the line as previously explained.

The nominal impedance of the usual cable pair utilized for program transmission from a remote pickup may be presumed to be 600 ohms at 1000 Hz. The shunt capacitance (C) and the inductance (L) of the cable pair would cause the Z_0 to vary slightly with frequency. For instance, Z_0 may measure 600 ohms at 1000 Hz, 650 ohms at 2500 Hz but about 500 ohms at 600 Hz. These differences normally would not be sufficient to degrade program transmissions in the 100 to 8000 Hz range.

The principal importance of Z_0 is that it imposes specific requirements upon the equipment connected to each end of the telephone line. For maximum transfer of power to and from a telephone line, the connecting equipment must have the same Z_0 as the telephone line. Therefore, it is necessary that the Z_0 of equalizers, amplifiers and other devices, including instruments, that are used as terminal equipment be equivalent to the line's Z_0.

Velocity of Propagation

In previous paragraphs we noted that amplitude distortion is not the same for all audio frequencies transmitted over a telephone line, and that the speed of propagation or phase velocity of these audio waves depends upon the electrical properties (C, L, R and G) of the line. For instance, the propagation velocity of a radio wave is 300 x 10^6 meters per second or approximately 186,000 miles per second. In telephone cables, the velocity varies considerably with frequency as shown by the velocity curves in Figure 3 for a typical cable pair.

Referring to Figure 3, at 100 Hz, the velocity is about 16,000 miles per second, increasing to 45,000 miles per second at 1000 Hz and to about 105,000 miles per second at 8000 Hz. For frequencies above 50 kHz, the velocity of propagation in the cable will become almost constant at about 125,000 miles per second. In contrast, the velocity of propagation on an open-wire telephone line (now almost extinct) is almost equal to the speed of radio waves for frequencies above about 4000 Hz.

*Telecommunications Consultant, New York City.

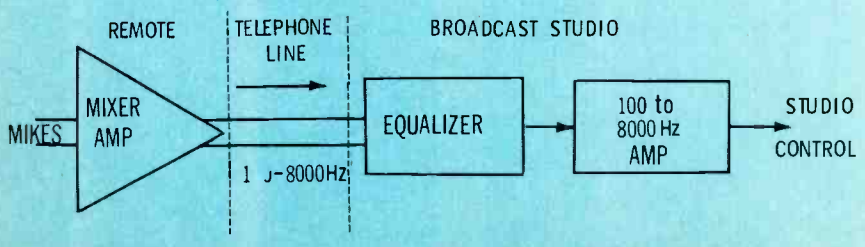


Fig. 1. Basic circuit elements of remote radio pickup.

Purpose of Equalizers

Considering the foregoing theoretical explainations, the following pertinent principles are applicable to the proper use of telephone line facilities for the transmission of remote radio program pickups:

(1) The higher audio frequencies are attenuated to a greater extent than lower frequencies by a telephone line.

(2) This condition, unless corrected, will cause distortion to speech and music sent over telephone facilities.

It is not feasible to amplify the high frequencies more than the low frequencies in the 100-8000 Hz band to overcome this situation. The most practical solution is to attenuate the low frequencies more than the high frequencies in order to compensate for the characteristics of the telephone line. The device to accomplish this purpose is termed an attenuation equalizer or just an equalizer.

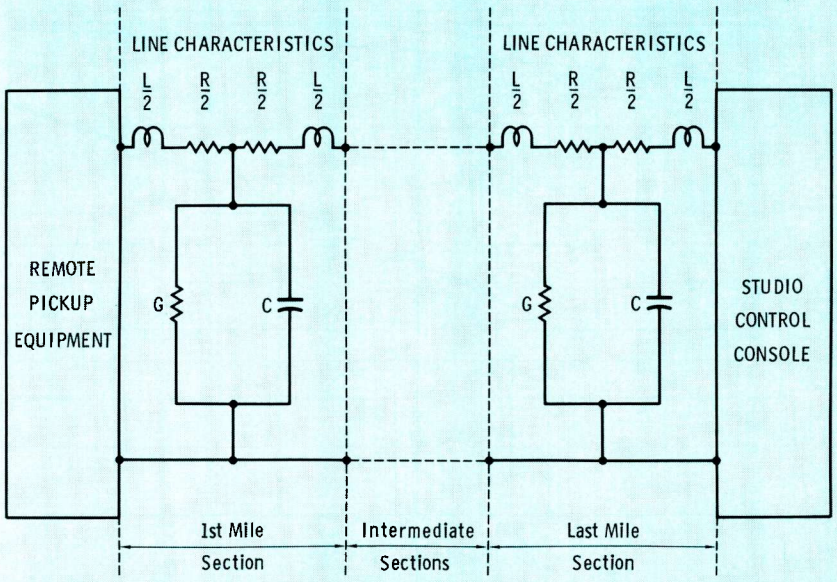


Fig. 2 Each line section comprises the finite values of its electrical properties: C, L, R, G.

Equalizer Principles

An equalizer essentially is a filter. It uses a combination of capacitive, inductive and resistive components as a network to correct the unequal attenuation to program signals in the telephone pair. An equalizer adds frequency selective attenuation into the telephone circuit so that the total loss or attenuation will be about the same for all frequencies in he particular band that is transmitted.

The curves in Figure 4 illustrate the design principles of an equalizer. Note that the loss in the equalizer is designed to compensate for the telephone line loss with frequency. It is desirable that the total line and equalizer loss should be flat over the frequency range being transmitted. This should be in the 100-8000 Hz range for radio program pickups from remote locations.

Equalizer Design Concepts

The basic elements of a typical equalizer for use with a non-loaded cable pair in connection with remote radio pickups is shown in Figure 5. This equalizer, because it is shunted across the cable conductors, effectively decreases the nominal 600 ohm impedance of the cable pair. It is desirable, therefore, to provide a 150:600 ohm repeating coil or transformer T-1, to properly terminate the cable pair for impedance matching purposes. This arrangement is shown in Figure 5. The associated line amplifier is designed to equally amplify all frequencies in the 100-8000 Hz or 100-15000 Hz range as may be required for program transmissions.

The design of an equalizer, like other filters, can be very involved. For instance, in the ideal equalizer the attenuation should decrease with an increase in frequency. This requirement implies that the impedance of the equalizer would increase with an increase in frequency. By designing capacitance C and inductance L to form a parallel resonant circuit at the higher frequencies, this desired impedance change can be accomplished. The following are some typical design values for program transmission with respect to Figure 5:

A. For 100-8000 Hz
   C—0.110 to 0.115 microfarads.
   L—2.4 to 2.6 millihenries
   R—25 to 325 ohms (variable)
B. For 100-15000 Hz
   C—0.02 microfarads
   L—4 millihenries
   R—25 to 50 ohms (variable)

Equalizer Operation

Let us follow the action of the equalizer, shown in Figure 5, in making the transmission loss of the combination of the cable pair and equalizer constant over the 100-8000 Hz range. At low frequencies, such as the 100-1000 Hz band, the inductive reactance is small so that the equalizer acts as a resistance shunted across the cable pair. The current flowing through resistance R will increase and considerable power, which is equal to I^2R, will be dissipated or lost in R. At higher frequencies (the 1500-5500 Hz range) the inductive reactance becomes greater and less current will flow through R, thereby reducing the power loss. For the highest frequencies in the 6000-8000 Hz

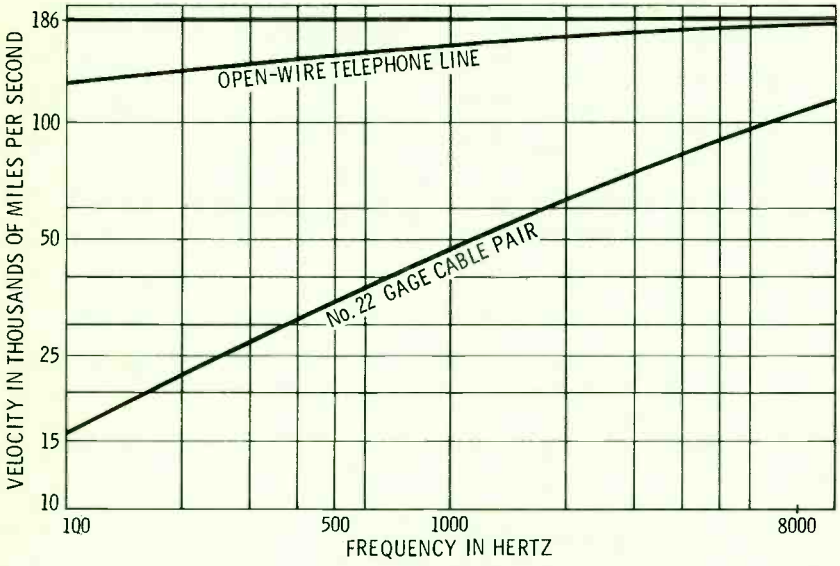


Fig. 3 At 100 Hz the velocity is about 16,000 miles per second. For frequencies above 50 KHz, the velocity of propagation will become almost constant at 125,000 miles per second.

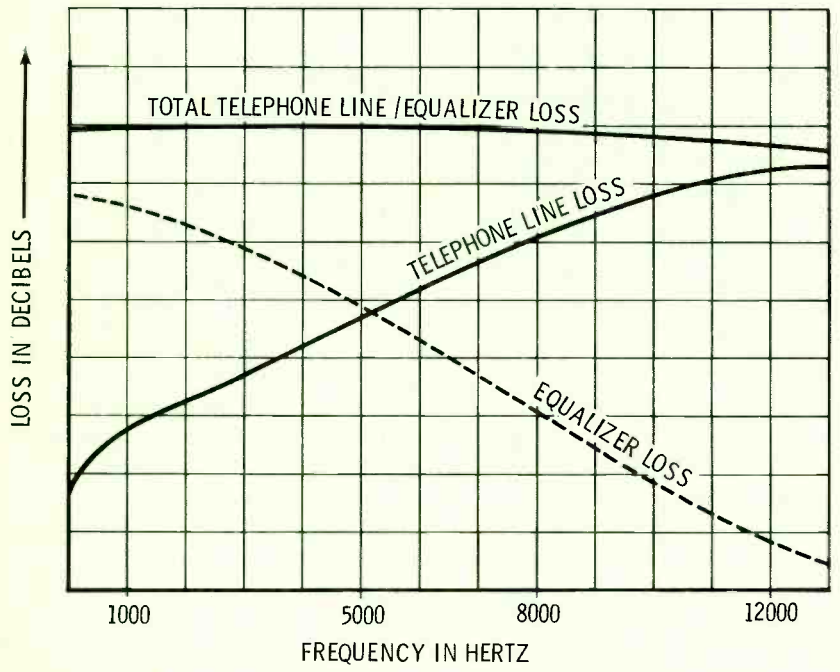


Fig. 4 To illustrate the design principles of an equalizer, note that the loss in the equalizer is designed to compensate for the telephone line

range, C and L will form a parallel resonant circuit resulting in a very high impedance. Consequently, little current would flow through R and the equalizer would introduce very little loss at these high frequencies.

Above this resonant frequency range, the reactance of C drops and the loss caused by the equalizer will start to increase. By changing the value of resistance R, the amount of dissipated power can be raised or lowered. In this way, the equalizer can be adjusted for the correct attenuation that may be required for different cable pair lengths or impedance conditions.

Several types of equalizers are commercially available to equalize non-loaded cable pairs for program transmissions. They include the following types:—

Western Electric #23-A Equalizer (For 8 kHz and 15 kHz)

Altec #17224 Equalizer (For 8 kHz)

Altec #17249 Equalizer (For 15 kHz)

Equalizing Procedure

A definite line-up procedure should be followed in equalizing a telephone line circuit for radio program transmissions from a remote pickup point. In this connection, it is assumed that the Telephone Company has made available a good non-loaded cable pair and that all or most bridged taps have been removed from it. It is also presumed that the cable circuit length is not over about 10 miles of #22 gauge conductors.

Before installing the equalizer, check out the particular cable pair's program transmission capability by making a frequency run. The following test equipment would be needed for this purpose and for the subsequent equalization procedure:—

(1) At Remote Pickup Point (Sending End)

One Western Electric #19-C or #21-A Oscillator, Northeast Electronics #TTS-43A Oscillator or equivalent audio-frequency oscillator in 50-15000 Hz range.

One Repeating Coil—West-

ern Electric #111-C, #119-E, Altec #15036 or equivalent 150:600 ohm repeating coil type of transformer (T-2).

(2) At Broadcast Control Studio (Receiving End)

One Repeating Coil—Western Electric #111-C, #119-E, Altec #15036 or equivalent 150:600 ohm repeating coil type of transformer (T-1).

One Transmission Measuring Set—Western Electric No. 2B, 3A, Northeast Electronics model TTS 4A, TTS 25A or a VTVM to provide equivalent dBm measurements.

One 600-ohm non-inductive resistor (R-1).

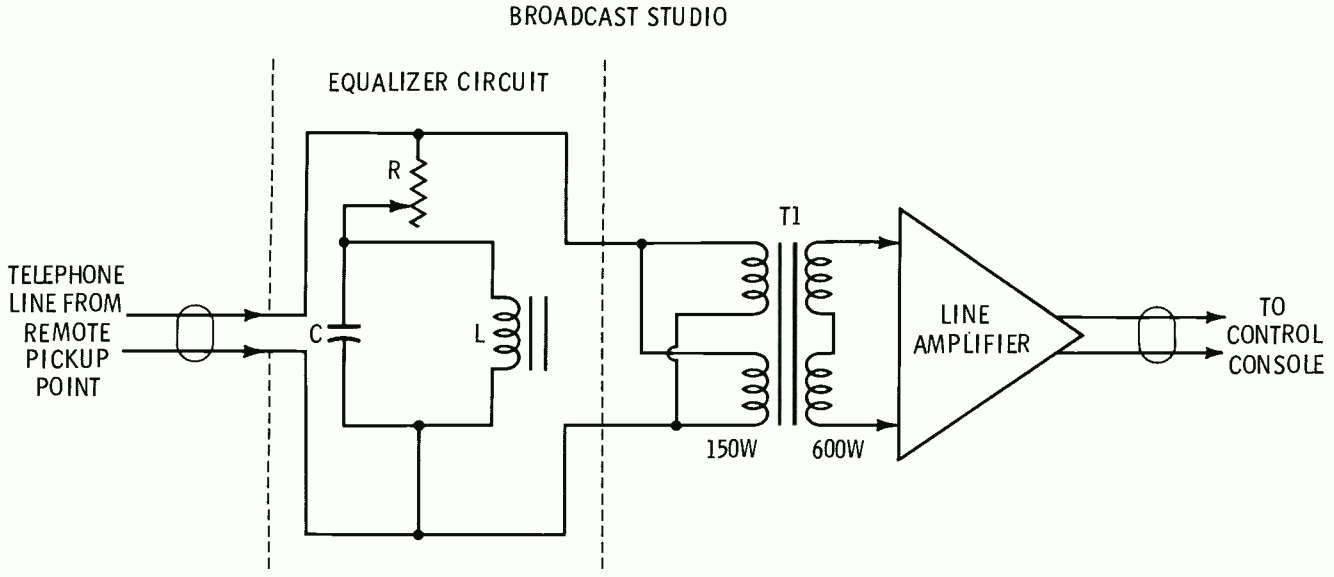
These test equipment items are connected as indicated in Figure 6. It is also necessary to provide a telephone at the remote pickup point for communicating with the broadcast studio for the equalizing procedure and for program control purposes. This could be another leased line circuit or a temporary business telephone line.

To check the cable pair's transmission capability, the oscillator at the sending end (remote pickup point) is arranged to transmit, at O dBm level, a series of tones in the range of 100 to 2000 Hz, in increments of 100 Hz; and then from 2000 to 8000 Hz in increments of 500 Hz. At the receiving end in the broadcast studio, the received tone levels are measured on the transmission measuring set or equivalent VTVM device and recorded.

The resultant data that is recorded may be plotted as a curve of received signal strength in—dBm against frequency in the 100-8000 Hz range. It is probable that the received levels in the 3000-8000 Hz band will be considerably lower than those in the 100-3000 Hz portion.

An 8 kHz equalizer, such as the Altec #17224, next is installed across the cable pair at transformer T-1 in Figure 6. The oscillator at the sending end is adjusted to transmit 8000 Hz tone at 0 dBm and the received level in the broadcast studio is measured. Then, the oscillator is adjusted to send 1000 Hz tone at 0 dBm. The potentiometer R in the Altec equalizer is adjusted until the received 1000 Hz level is approximately the same as the previous 8000 Hz tone. This procedure should be repeated several times to insure optimum adjustments.

To conclude the line-up procedure, a frequency run from 100 to 8000 Hz, in increments of 100 Hz, should be made as described above. The received signal readings in –dBm should be recorded and plotted against frequency on a graph. The resultant graph should disclose whether or not the transmission loss of the combination of

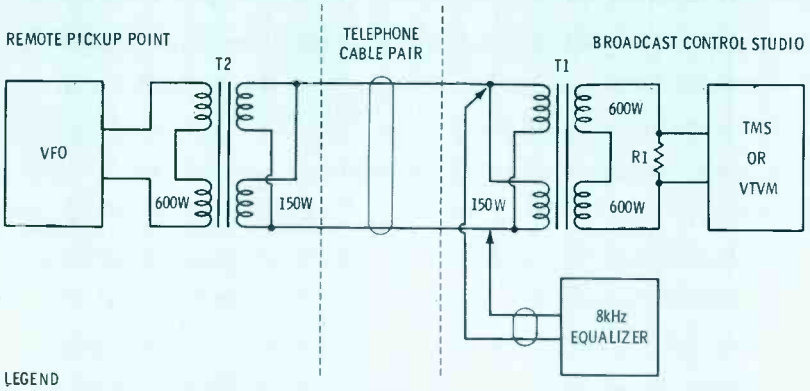


LEGEND

T1 ,- - - - 150:600 Ohm Repeating Coil. Type-Western Electric 111-C, 119-E, Altec #15036 Or Equivalent.

C, L and R --- See Text.

Fig. 5 Basic elements of an equalizer for use with a non-loaded cable pair.



LEGEND

VFO ---- Variable audio-frequency oscillator in 50-15000 Hz range such as WE #19-C, or equivalent oscillator equipped with output meter calibrated in dB.
T1, T2, ---- 150:600 ohm Repeating Coil such as WE #111-C, 119-E or Altec #15036.
R1 ---- 600 ohm non-inductive Resistor.
TMS ---- Transmission Measuring Set such as WE#2B, 3A or Northeast Electronics #TTS 4A or TTS 25A.
VTVM ---- Vacuum Tube Voltmeter or equivalent solid-state device calibrated in dB.
---- Cable pair or twisted pair.

Fig. 6 Test equipment setup for equalizer alignment.

equalizer and cable pair is fairly constant for satisfactory program use. If the graph shows a sharp increase or decrease in the attenuation at a certain frequency or over a narrow band of frequencies, it may be necessary to readjust the potentiometer in the equalizer unit. This adjustment should be made while the frequencies affected are being transmitted. Upon completion of this adjustment, another frequency run should be made to verify the smooth attenuation throughout the 100-8000 Hz band.

A similar line-up procedure may be utilized to equalize a non-loaded cable pair for the 50-15000 Hz range for FM broadcasting purposes. In this case, it will be necessary to provide an equalizer that is designed for operation to 15 kHz.

References

D. Talley, "Basic Carrier Telephony", Hayden Book Co.

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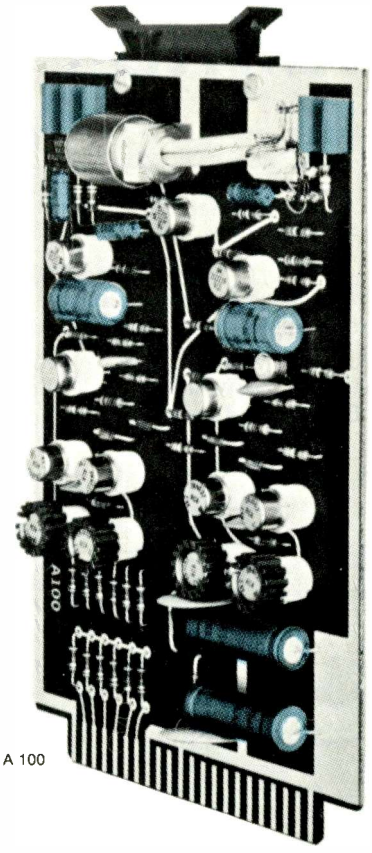

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CATV STANDARDS

Maintaining system reliability

By Harry Etkin

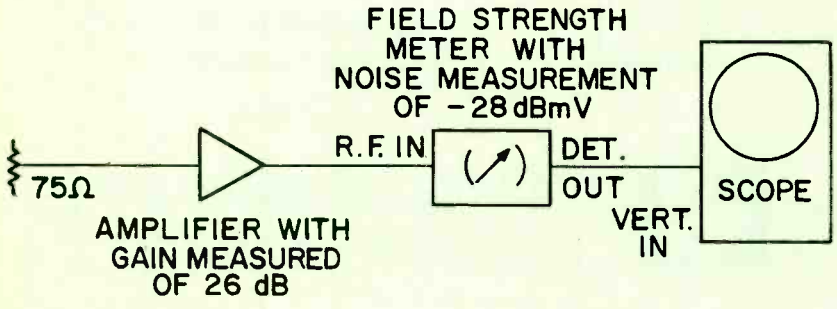
Community Antenna Television (CATV) Systems are increasing in number and technological sophistication. To support this continuing growth and advancing technology, the CATV industry needs technically competent engineers and technicians to maintain a Grade A quality signal on the cable. This service is intended to increase system reliability in order that CATV subscribers will receive uninterrupted service on all the CATV channels.

Whether or not the subscriber at the end of the line gets a quality signal depends upon the CATV triangle: state-of-the-art equipment, a high performance transmission system, and planned system maintenance. It is our purpose here to discuss maintenance.

Recommended for No Noticeable Degradation

Signal Level to Subscribers	0 to 10 dBmV
Signal to Noise Ratio	43 dB
Signal to Cross Modulation	51 dB
Signal to Hum Modulation	30 dB
System Response	± 1½ dB within any channel
Signal to Beat Interference	60 dB
Signal to Reflections	20 dB
Radiation (Within FCC Specifications)	Less than 20 uv/m low band and 50 uv/m high band on a tuned dipole at 10 feet.

Fig. 1 CATV System standards.



$$N.F. = 59 + N - G + 4$$

$$N.F. = 59 - 28 - 26 + 4 = 9 \text{ dB}$$

Fig. 2 Example of noise figure calculation of an amplifier. Observe scope trace such that only noise is seen, no video or FM pickup.

IMPORTANCE OF MAINTENANCE

Noting that the complexities of the cable television industry defy simplistic treatment, and with the technological improvements in the reliability of CATV equipment, CATV operators have a tendency to neglect and use rather haphazard maintenance procedures. A preventive maintenance schedule should be developed and adhered to in order to sustain the greatest possible reliability and value of the CATV investment. The purchase of CATV equipment represents a substantial investment. Equally important, a reasonable annual expenditure for good maintenance should be budgeted to support the value of the investment.

Each equipment instruction book should be referred to for detailed maintenance procedure, but each CATV system operator and engineer should take the time to analyze his equipment and prepare a check list to be sure maintenance chores are performed regularly.

Keep It Clean

The CATV equipment building appearance is usually a clue to the kind of maintenance the equipment is receiving. Dust is the major enemy of electronic and electrical apparatus. It can change electrical values of components, prevent proper electrical contact in relays and switches and produce breakdown and failures that may strike abruptly and without the slightest warning. A clean, well kept CATV operations building makes it an asset to the community.

Routine visual inspections should

be made. Screw type connections which may have loosened should be tightened. Check all moving and rotating parts for proper function and keep switches and relay contacts clean.

In many cases the antenna system requires maintenance, too. Guy wires (if provided), insulators, ground straps and transmission lines should also be inspected. Electrical junction boxes and pull boxes should be checked.

Tools And Test Items

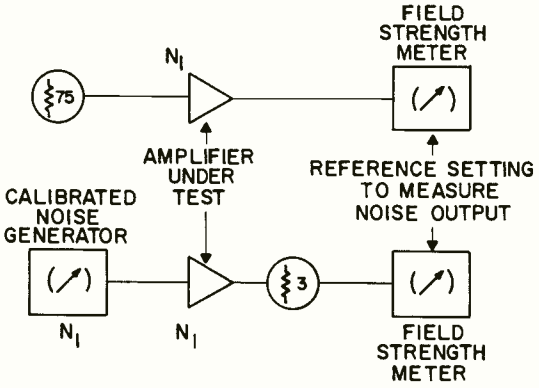
Even the smallest CATV facility should have access to an adequate set of hand tools for use in making repairs and maintaining the equipment. Good test equipment should be available and in constant use. Test equipment that will prove helpful when performing routine maintenance and making overall performance checks will include an audio oscillator, noise and distortion meter, noise generators, calibrated attenuation pads, volt-ohm meter or VTVM, oscilloscope and a field strength meter.

For new equipment a small stock of spare parts should be sufficient, since this equipment should operate several months before spares are needed. A stock of resistors, capacitors and related parts should be built up before their probable need. It is a good idea to invest in spare parts against the time when they will be vital to equipment repair.

Scheduled Maintenance

As there is no single maintenance technique, various procedures should be detailed and practiced to achieve the minimum failure and maximum equipment life. Overall operating conditions, age of equipment, and available engineering time will all enter into the choice of maintenance procedures that a CATV system will find most satisfactory.

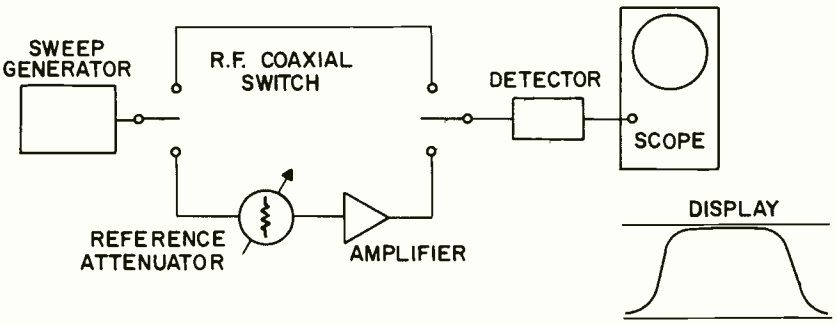
The aim of a good maintenance schedule is to obtain the maximum equipment reliability. This is usually accomplished by a detailed and continuous procedure devoted to checking, testing, cleaning and adjustments performed in a daily, weekly, monthly, quarterly and semi-annual routine.



N_1 = Noise Source

$\frac{N_1 + N_1}{2} = N_1$

Fig. 3 Noise figure measurement in laboratory.



Amplifier gain in dB = Attenuation in dB inserted in reference attenuator

Fig. 4 Test method for gain measurement of an amplifier.

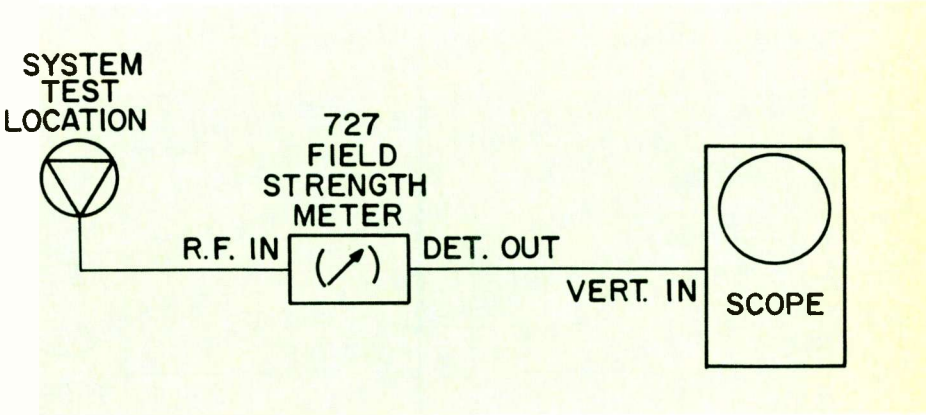
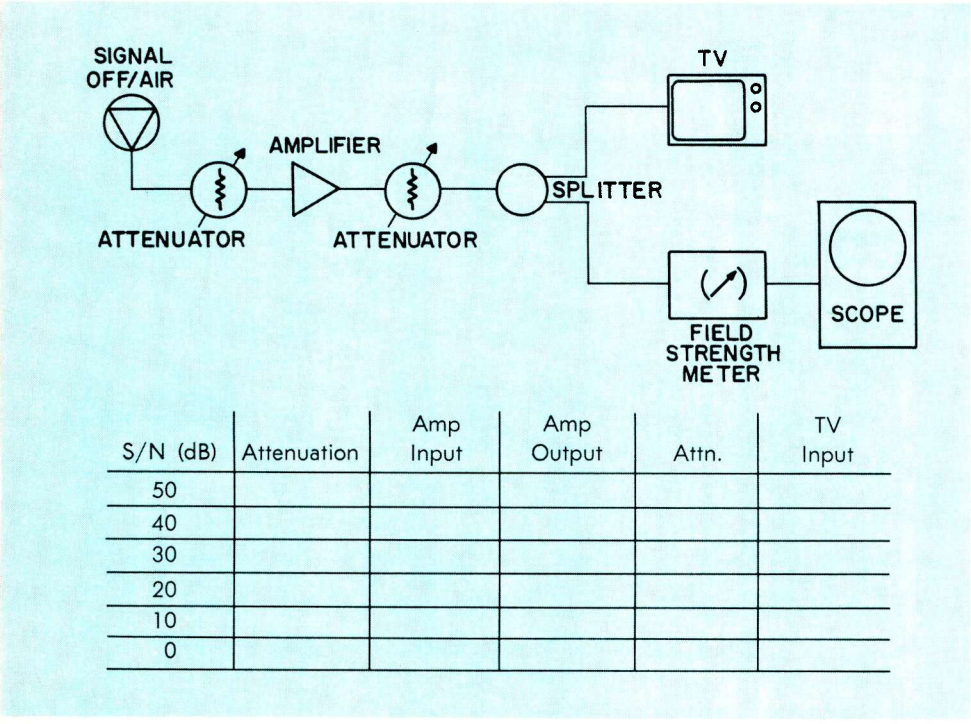


Fig. 5. Signal to noise ratio measurement of a CATV system. Follow this procedure: (1) tune the FSM to video carrier signal of desired channel and record; (2) tune the FSM to noise in unused channel or FM band and record reading; (3) Since the decibles are a logarithmatic ratio, the difference in decibles between step 1 and 2 is the signal to noise ratio; (4) add the correction factor (4 dB) of the meter to reduce S/N by 4 dB.

The CATV system operator's responsibility is the maintenance of a reliable cable signal to the subscriber. Many CATV systems maintain a remarkable signal reliability by developing maintenance procedures and practicing regular routines that will provide the greatest possible reliability from the existing equipment. Obviously, signal failure may result in lost revenue.

Besides delivering more television services, the CATV operator is more often competing with Grade "A" off-air reception and must provide the subscribers, not only additional programming, but signals of equal or better quality than that received off the air. This usually requires the adherence to a set of maintenance standards so that no noticeable degradation is incurred to the pictures by the CATV system.

Occasionally it is difficult, without the use of maintenance and test procedures, to know whether the cable system or TV set needs correction. It is extremely important to maintain these signals to determine whether any degradation is due to the originating transmitter, to propagation, or to the CATV antenna array.



S/N (dB)	Attenuation	Amp Input	Amp Output	Attn.	TV Input
50					
40					
30					
20					
10					
0					

Fig. 6 Equipment setup for signal/noise radio measurement.

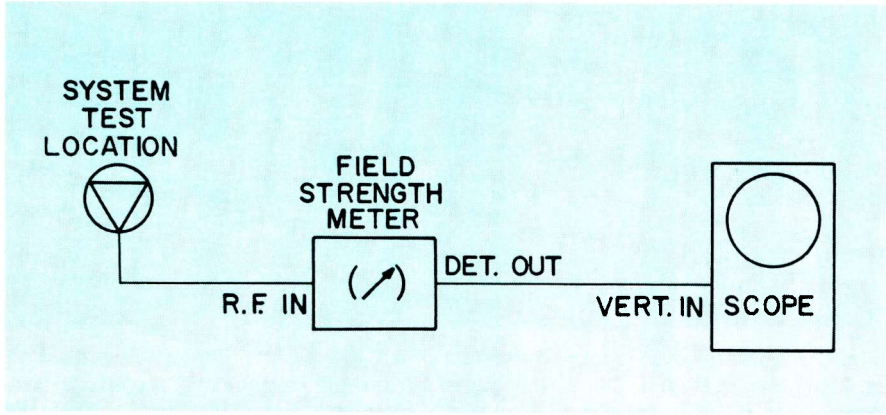


Fig. 7 Tune the field strength meter to a pilot carrier (73.5 MHz) and measure the ratio (in dB) between this carrier and any peak/peak hum modulation by means of the scope.

Maintaining the CATV system normally involves practical maintenance techniques and test equipment. Fortunately, the test equipment will be of ever increasing value in the future testing of the CATV system. Since most signal degradation factors are cumulative, it is imperative that they be kept at a very low level. Some of the system factors of importance are:

1. Noise Figure
2. Signal-to-noise ratio
3. Signal-to-hum modulation
4. System frequency response
5. Signal to beat interference
6. Cross-Modulation
7. Reflections—VSWR
8. Signal to reflections
9. Radiation

CATV system standards which are related to the specific information cited in proposed and NCTA standards are listed in Figure 1.

Noting that the complexities of the CATV system defy simplistic treatment, it is recommended that the condition of the CATV system be checked by measuring, observing and evaluating the system. This will provide a functional check to assure that the system is delivering the picture quality to the subscriber which is substantially the same as that received. Figures 2 and 3 are block diagrams showing methods of noise figure measurements of an amplifier. The symbols illustrated in the block diagrams are provided from the NCTA-003-0668 standard entitled "Graphic Symbols for Electrical and Electronic Devices to be Designated on CATV Systems Layout Drawings."

Figures 4 to 7 specify test methods and suggest techniques for determining system factors in cable systems.

Make a master copy of the test procedures shown in the figures. And when no tests are being run, it would be wise to insert some test equipment in the line at points which need constant survelance. In this way, trouble may be spotted while it is developed. In many systems, too much test equipment sits on the bench waiting for a crisis.

CATV proof of performance will be covered in the second part of this series on developing peak reliability. ▲

Changes Made In U. S. - Canada Pact Affect UHF Stations

The Canada-USA Television Agreement of 1952 has been modified in the following respects:

(1) a complete reallocation of Canadian UHF channel assignments which amends Table A of the Agreement;

(2) a Canadian Zone I designation for UHF channel allocation purposes.

The new Canadian Zone I for television allocation purposes is the same as Canadian FM Zone I and is described as follows:

"Zone I will be in that area between Windsor and Quebec which is located within the confines of the USA-Canadian border and the following lines: beginning from the west at the intersection of the common border and latitude 40° 10′; thence in a straight line northeast to the point of intersection of 77° longitude; thence in a straight line northeastward to the point of intersection of 72° longitude and 47° latitude; thence following the 47° latitude to the point of intersection with 71° longitude; thence following the 71° longitude southwards to the common border."

The remainder of Canada will be considered Zone II. All minimum mileage separations will be the same as the domestic standards contained in the Rules for U.S. Zones I and II.

FCC Hearing Set On Ed. FM Permits

Mutually exclusive applications for construction permits for a new noncommercial educational FM station in Washington, D.C., filed by Pacifica Foundation (BPED-896) and National Education Foundation, Inc. (NEF), (BPED-1012), have been designated for consolidated hearing by the Commission.

Pacifica is the licensee of noncommercial educational stations KPFA (FM) and KPFB (FM), Berkeley, Calif.; KPFK (FM), Los Angeles and is sole stockholder of WBAI, Inc., the licensee corporation of WBAI (FM), New York, New York.

The New York network: a case of broadcast planning

By Paul S. Andrews*

On October 2, 1967 Chancellor Samuel Gould of the State University of New York pushed the button which officially placed the New York Network (NYN) in operation. Closing that circuit meant the culmination of years of planning and another step forward for ETV.

The need for such a facility as NYN was apparent in the early 1960's. There were three ETV stations on the air at that time. In order to effectively send educational programs (mainly academic ones for higher learning), to the areas some distance from college campuses for people who could not attend college full time, a network facility was needed. This was true because the ETV stations did not have sufficient funds to purchase videotape recorders (which were still relatively new) nor the funds to hire qualified personnel to operate them. Despite these problems, videotape appeared more and more to be the best method for recording and distributing programs. One well equipped central distribution facility could get the programs to the stations and ultimately to the public most efficiently.

NYN finally got on track in 1966 when Governor Rockefeller became convinced that New York should have its own TV network. ETV had taken tremendous strides forward in New York since 1961. Not only had the number of stations on the air and the coverage they provided grown, but also the number of programs from campuses of the State University of New York had increased. Also, better general interest programs were being produced by National Educational Television (NET) and stations of the Eastern Educational Network (EEN).

Between 1961 and 1966 NYN had not been forgotten. NYN Director of Engineering, Joseph Doherty, had continued technical planning when time permitted so that

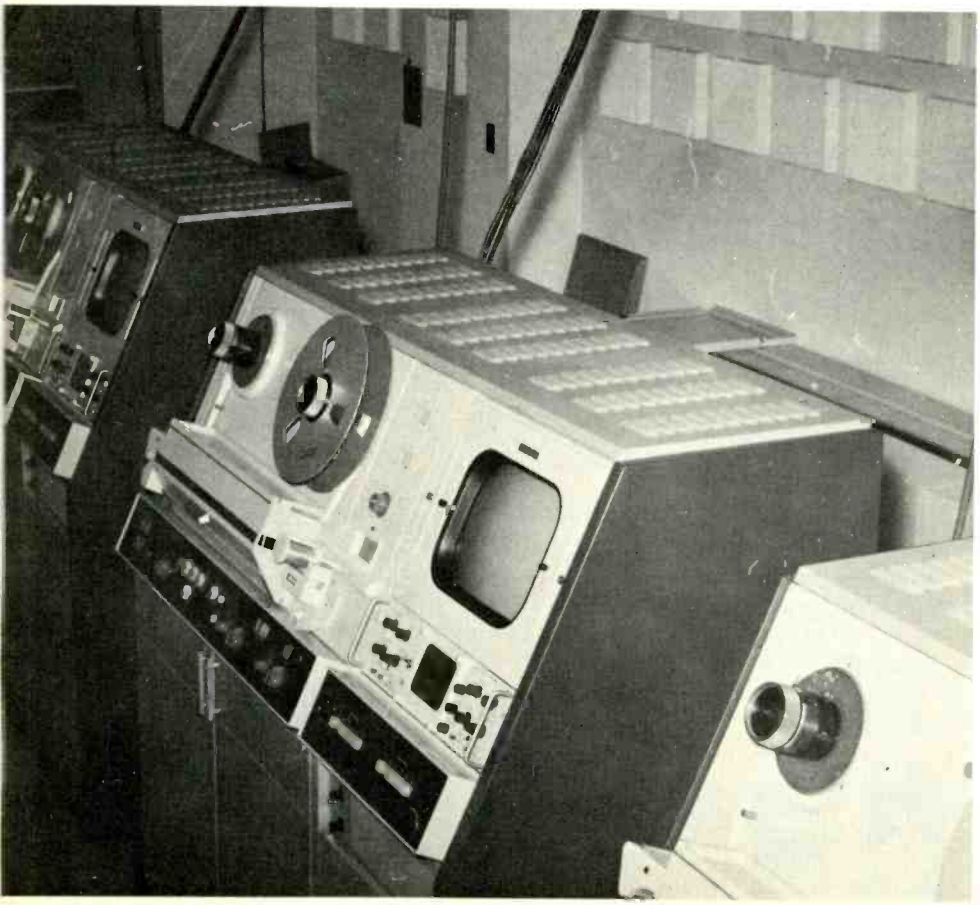


Fig. 2 The NYN video tape lineup.

*Technical Director, New York Network.

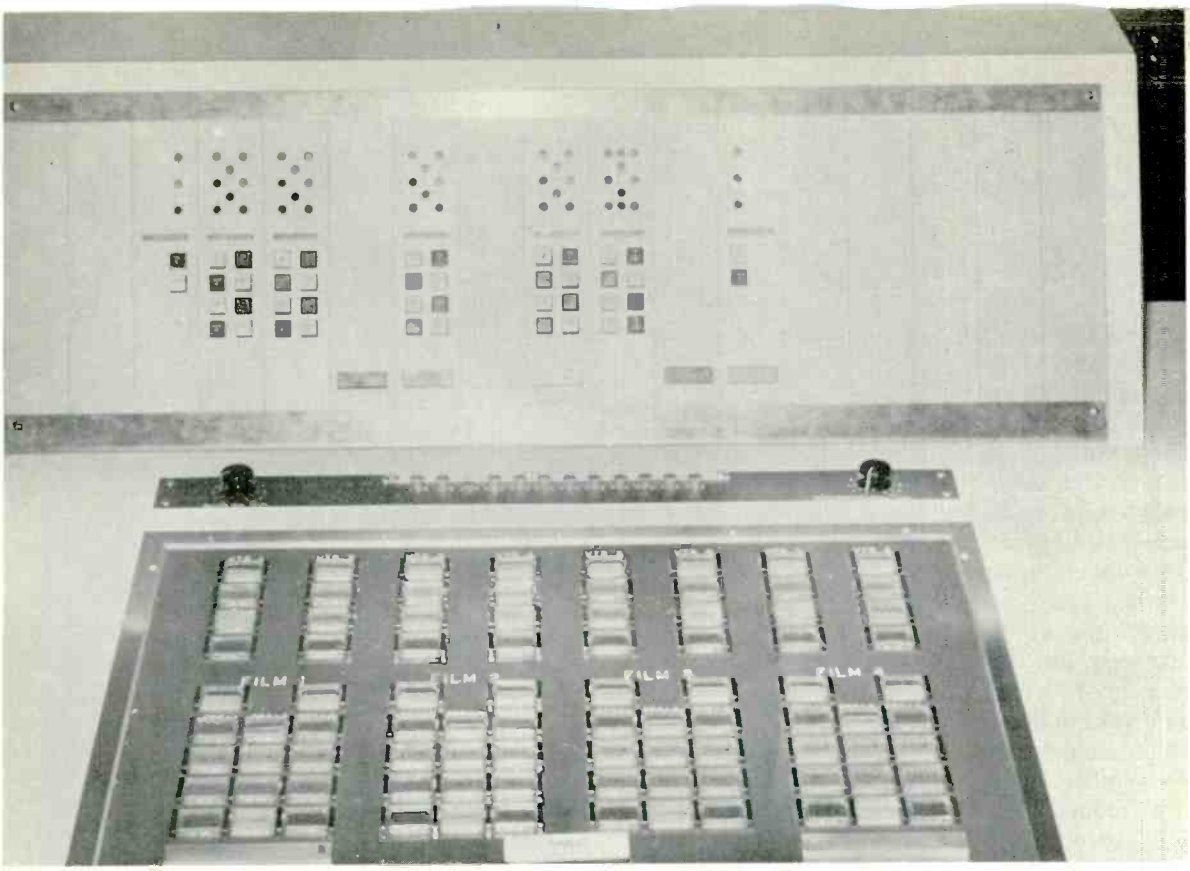


Fig. 1 New York Network microwave switching panel in the operating center in Albany. In foreground is the VTR and film island remote control panel.

when the green light was given the facility could be implemented with little delay. During these years, considerable thought was given to having the state build and operate its own microwave system for TV or to routing programs through the Civil Defense Radio Network and various other radio facilities utilized by the state governmental agencies. An economic analysis of these options finally led the NYN to select AT&T to furnish the state ETV facilities.

The main requirements were that each station should not only be able to receive, but also be able to transmit a signal to the network, under certain conditions simultaneously, and that all microwave switching be controlled by NYN at one central point.

Upon completion of the system, NYN became the first interconnected educational television network with direct microwave switching.

The upper part of Figure 2 shows the Network microwave switching panel which is located at NOC (Network Operating Center) in Albany, New York. Figure 2 foreground shows the VTR and film island remote control panel. The main carrier frequency is 6 GHz, but all switching of the microwave facilities is done at an Intermediate Frequency of 70 MHz and is entirely

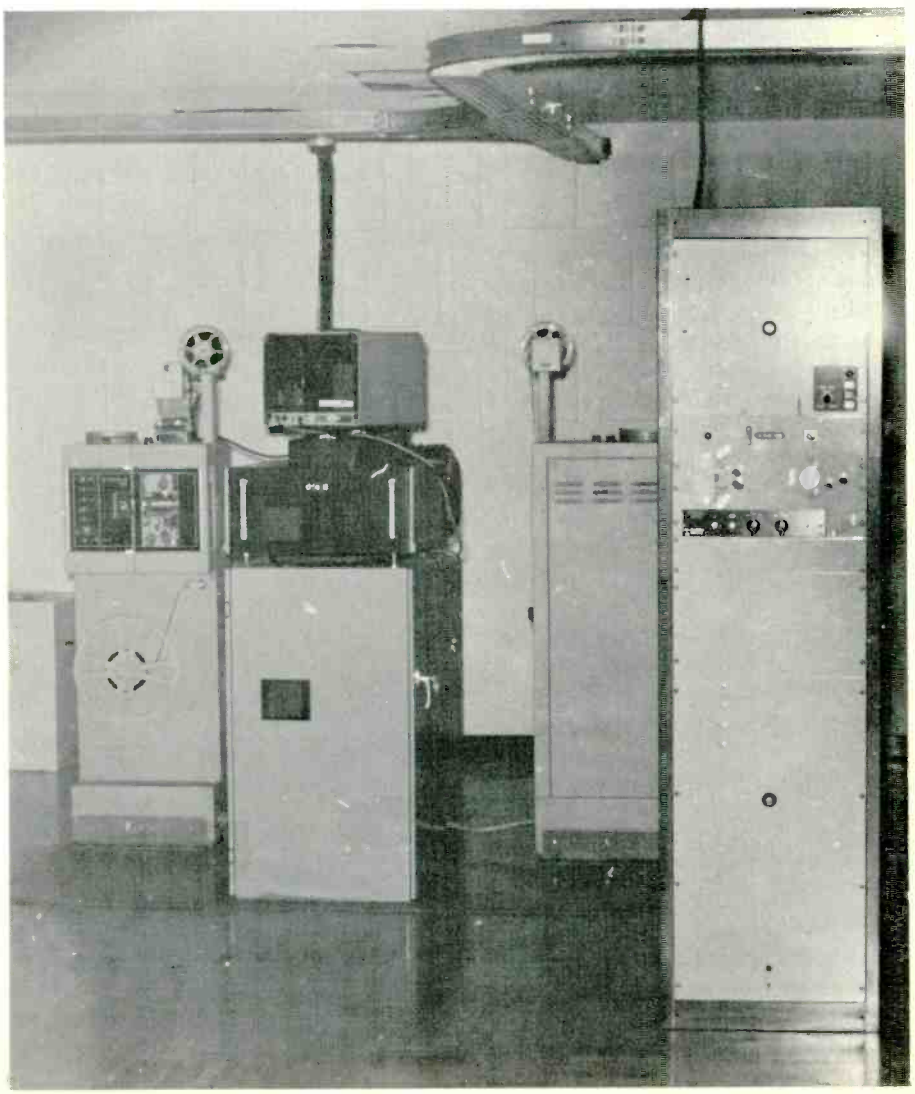


Fig. 3 Film chain layout.

controlled at NOC. This eliminates signal degradation encountered by demodulation and remodulation at each switching point.

An IF frequency is utilized in long haul microwave service to allow signal level path losses to be compensated for some years ago. 70 MHz was selected as the industry standard. It is still in use today because tube equipment used at the time required a relatively low RF frequency to maintain good overall gain with a minimum of amplification stages, but a high enough frequency so as not to sacrifice bandwidth. A ± 10 MHz frequency response is necessary to carry the TV signal on the FM carrier. The audio is added as a subcarrier at 7.5 MHz from the main 70 MHz carrier.

Switching Capability

NOC is located in the East central part of the State. All stations in the network including NOC are full duplex facilities, i.e. they can receive and transmit different programs at the same time. The network itself has one channel feeding west to Buffalo, one channel feeding south to New York from NOC, and one channel feeding east from Buffalo and one channel feeding north from New York to NOC. This means that if any station (WCNY for example) desires to transmit a program to WXXI, the westbound channel must be opened at WCNY for insertion of the desired program material. This also means that WNED would not be able to receive any programs originating east of WCNY as long as WCNY was transmitting to WXXI. WNED could, however, be receiving the program WCNY was transmitting to WXXI. It would also be possible for WCNY to transmit a program on the eastbound channel to NOC for taping and leave the westbound channel of the net closed to send programming from NOC to WNED.

Each "drop" or "receiving pont" has a "transmit" condition and a "thru" condition. The "transmit"

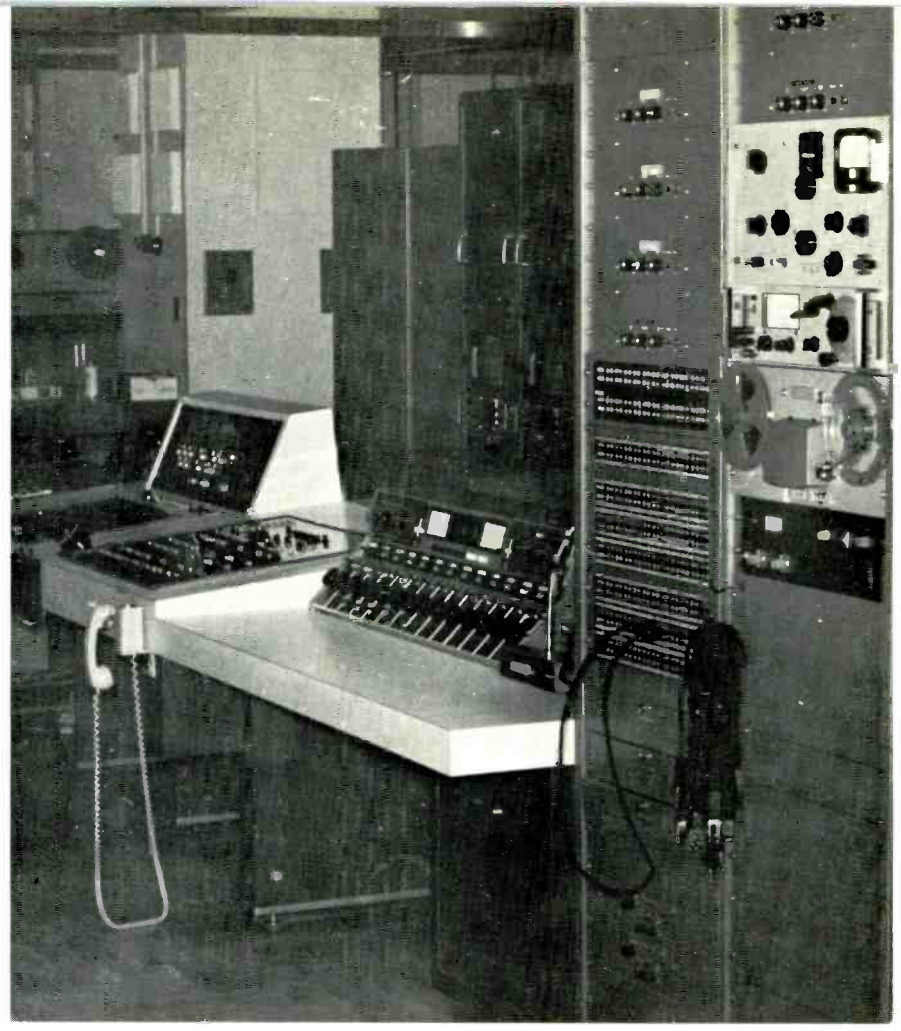


Fig. 4 Audio control center and patch panel.

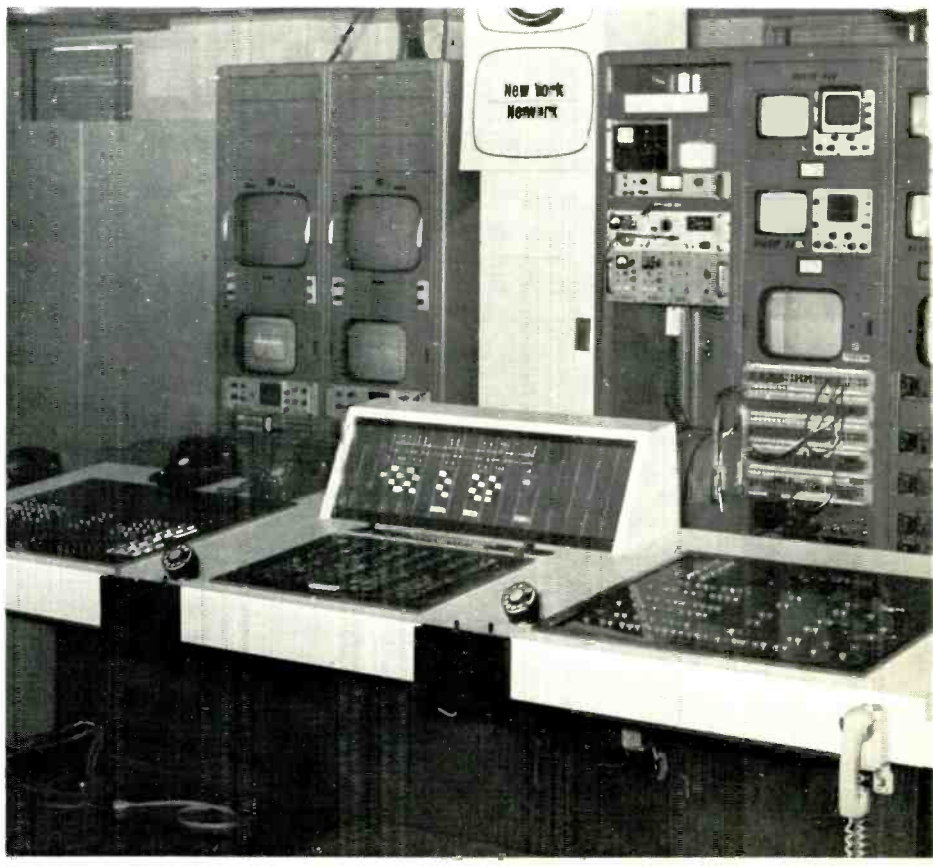


Fig. 6 Functional layout at NYN control center showing left side of the control area.

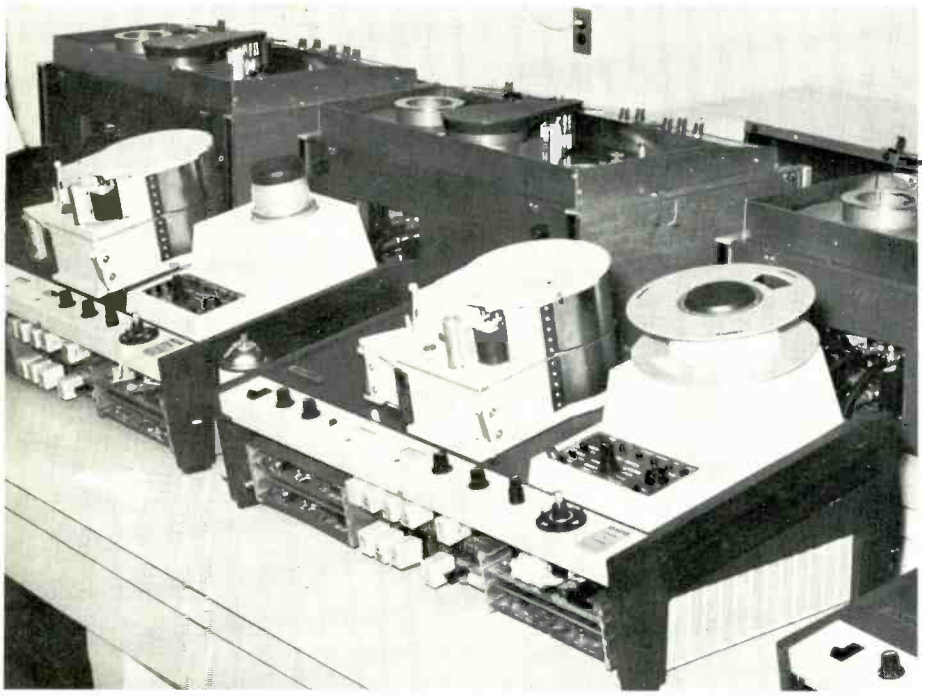


Fig. 5 Heart of the Duplicating Center at NYN.

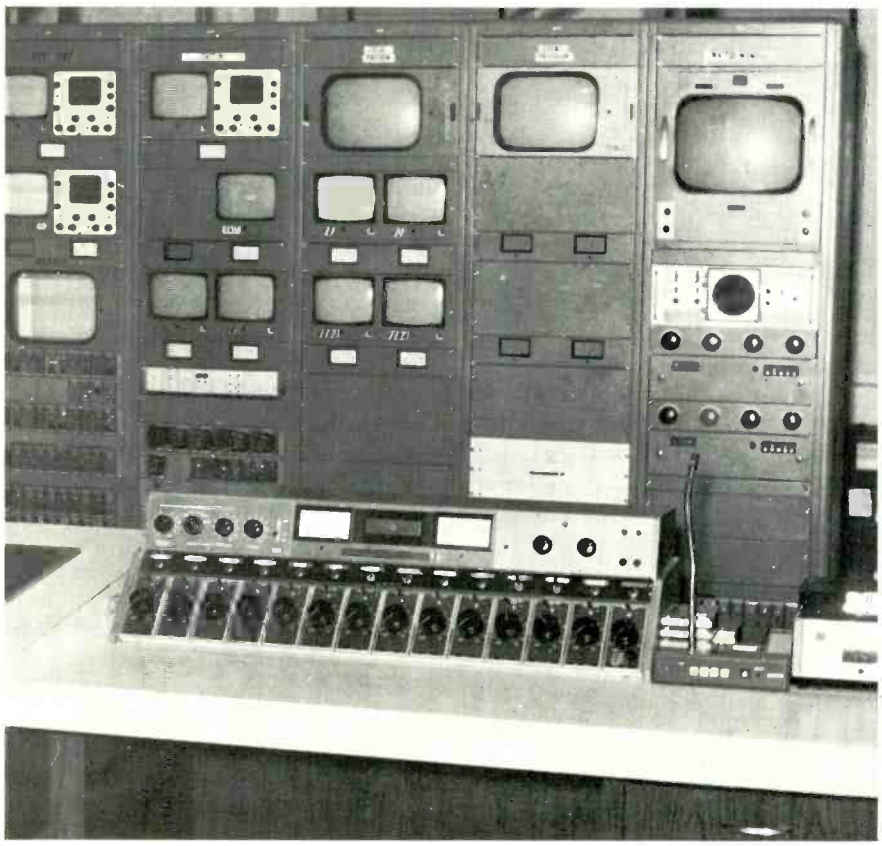


Fig. 7 Righthand side of the control center.

condition opens the channel in any selected direction. The "thru" condition merely takes the amplified 70 MHz IF converted from 6 GHz from the previous system transmission point and reconverts it to 6 GHz for retransmission to the next point; effectively by-passing or going through that particular point. Thus each point can only be set up for "transmit" to originate programs or for "through" to by-pass that station. This in no way affects the receive facility as all points receive at all times.

Switching control and tally light circuits are carried over regular telephone land lines. The circuits consist of a continuous carrier which is shifted up or down by predetermined frequencies as the control buttons are depressed on the microwave switching panel (Figure 2 upper). Each switching point utilizes a different carrier frequency for this "Quindar" TM system of remote switching control. As an operating example, let us assume WCNY wants to transmit east to NOC. The NOC TD pushes the "Xmit East" button on his control panel; this shifts the "Quindar" TM carrier for Syracuse (2400 Hz) up to 2425 Hz. At WCNY a "Quindar TM receiver takes the 2425 Hz through a band rejection filter which passes only the 2425 Hz signal. This signal is then processed and sets up the "PRESELECT" circuits arming the actual switching circuit and sending a tally signal back to NOC to a light on the microwave control panel. This tells the NOC TD that WCNY is ready to be switched to "TRANSMIT EAST". The NOC TD must push an "Execute" button to make the actual switch. This circuit activates a 2800 Hz signal to be transmtited and WCNY will then have their microwave transmitter switched to "transmit east". The "Execute" signal is always a 2800 Hz tone and anything set up in a "preselect" mode will be switched.

A unique feature of the network switching circuits is a "Preview" facility that is included to allow the network technical director to pre-

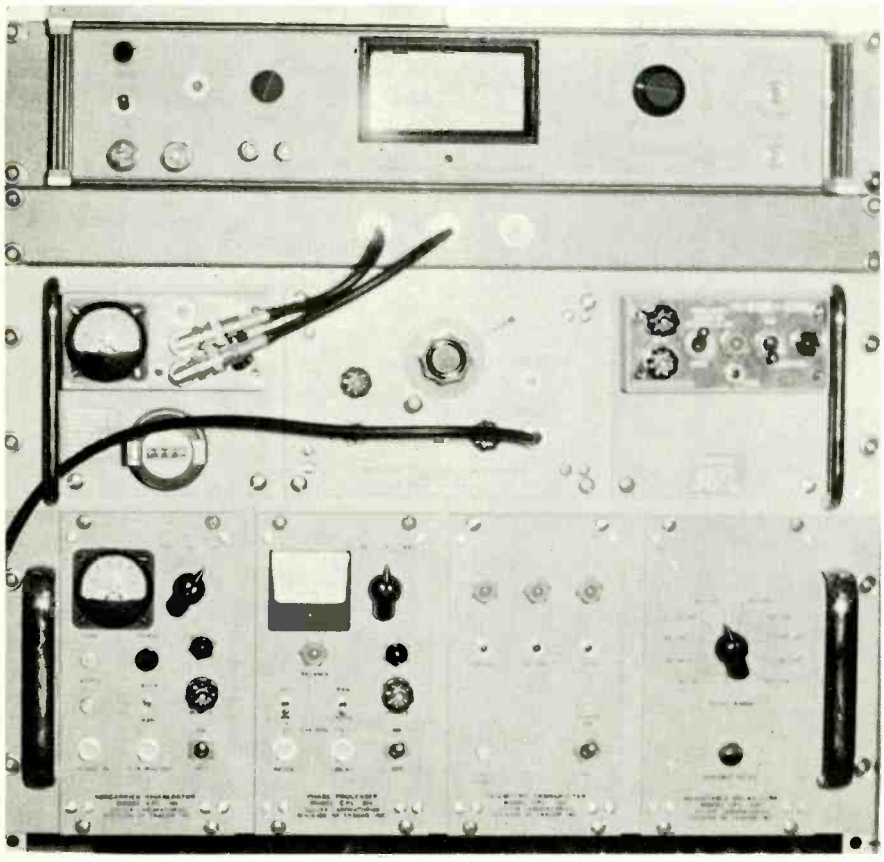


Fig. 8 Second unit from bottom is the NYN time standard. Across the bottom from left to right are the subcarrier regenerator, phase processor, telemetry transmitter, and the adjustable delay line.

set an upcoming microwave configuration and operate a "Preview" button and observe, by tally lights, whether he has made the proper selections. In this way he can make corrections in advance so that network switching errors are held to a minimum.

The NYN Layout

Technical facilities at NOC consist of four Quadraplex Video Tape Recorders (Figure 2), two colorized and two with electronic editors, two color 4-V film islands, one of which is equipped with a playback unit for synchronizing sound magnetic film with optical film (Figure 3), a Custom Program Switcher with special effects, and a General Electric Audio Console (Figure 4). One 14 x 8 custom master control switcher with "preset" capability (left side of Figure 8). Also, there are four two-inch and four one-inch helical scan video tape recorders and audio duplicating equipment which comprise the "Duplicating Center" operation of the Network. These are shown in Figure 5.

Figures 6 and 7 show overall views of the NOC control area. In the foreground is the operating control area and in the background, left to right, are the film island control consoles and the racks of monitors and associated equipment for the switchers, sync generators and test signal generators.

System Sync

Another unique feature of NYN is the use of Sulzer Tracor Model 2.5B frequency standards and television synthesizers at all stations and NOC. The units have an accuracy of 1 part in 10 to the eleventh power and, in conjuncton with a synthesizer, allow framing of any station to any or all other stations so that full composite programming can be accomplished utilizing two or more stations in the Network. The NOC standard (Figure 8), second unit from the bottom) is constantly checked by using WWV on 20 KHz. These units are finding wide usage through a loan arrangement for Eastern Educational Network programming in conjunction with NYN feeds. Automatic framing is planned for the future so that all stations may be fully locked together automatically.

Tracor Chroma-Fix is also in use between NOC and WNDT to synchronize the 3.5 MHz color subcarriers so that full composite color programming is possible. This is carried over a pair of telephone lines using audio tones. The Chroma-Fix is the lower unit in Figure 8).

Communications facilities consist of technical and administrative private telephone lines with two-digit dial selection at all stations (NOC and the New York office of NYN). A TWX facility between all units is also provided; ASR (Automatic Send-Receive) Model 28 equipment utilizing a tape perforator and tape reader is used at NOC and the New York office; and KSR (Keyboard Send-Receive) Model 28 equipment is utilized at other locations.

NYN has been in operation long enough for all equipment to have "settled in" and all systems are performing as well as or better than expected. Future plans include color production facilities and the addition of the four-year University Center campuses to the Network. ETV stations on Long Island and in Watertown are also planned for addition to the Network in the near future.

And so what was once an idea is now a practical reality. No icing on the cake, no frills. No state educational broadcasting system is any better than the planning that preceded construction. Yet educational broadcasters should remember that their plans must be keyed to realistic state goals based on the immediate and projected needs. ▲

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Most engineers are faced with the problem of worn tape on cartridges. And rather than pack them up, send them away and wait several days to get them back, I devised a simple method of rewinding them in a very few minutes.

Take the screw out of the cover and remove the cover. Lift the tape out of the guides and pressure pads so that it lays in front of the cartridge. Cut the tape near the center with a pair of scissors and splice the new tape to the end which winds around the outside of the cartridge reel. This splice does not have to be a good splice. Fasten the two tapes together making sure that the tape is not reversed and trim the splicing tape on both sides of the tape.

Be sure to keep the new tape loose to prevent tightening on the cartridge reel, pull the other end of the old tape that feeds from the center of the reel. The new tape will follow right after the old tape around the reel of the cartridge. It may be necessary to guide the tape with your finger so it doesn't climb up on the reel. Keep pulling the old tape until the new splice shows up.

Pull the spliced section out about six inches from the front of the cartridge and cut in back of the splice. Leave about the same length of new tape and cut also.

Moisten a cloth or tissue with denatured alcohol and clean the back side of both ends of tape up fairly close to the cartridge. This is necessary to remove the lubricant. After the alcohol has dried, overlap the tape close up to the cartridge, keeping them exactly in line. Cut through both tapes on a slant, apply a good splice and trim the sides. Replace the tape in the guides and over the pressure pads and reassemble the top.

Be sure to use a lubricated tape which is designed for cartridges and is available from most tape suppliers.

This method is very simple and will furnish you with a cartridge which will run the same length of time as the old tape.

Gordon Wiley,
Chief Engineer WGAW
Gardner, Mass.

Violation Goof List For Station Staff Culprits

Every week Broadcast Engineering magazine receives news from the FCC. And every week we get a look at what isn't happening at the station level.

Here is a list of what continually goes wrong. Why not post this list and keep your staff aware of these violations that occur so often. Adherence will surely save the station money and insure consistent technical operations.

Maintenance log—Includes failure to: enter signed statement of required inspection; record required quarterly tower light inspections; enter required weekly antenna base current remote meter caliborations and enter notation of external frequency checks and monitor correlation.

Operation log (transmitter)—includes failure to: make entries of required meter readings at half-hour intervals and log required daily tower light observations.

Station identification—Includes failure to: identify the station by the assigned call letter and location at the specified intervals.

Records (engineering)—Includes failure to: make available for inspection program operating and maintenance logs; equipment performance measurements and field intensities measurements.

All logs and records—Includes failure to: make required entries; sign logs; make orderly and legible entries and insure entries are factual.

Indicating instruments—Includes failure to: calibrate remote antenna ammeter within 2% of base meter; label meter function; provide calibration curves for remote meters and calibrate remote meters once a week.

Equipment performance measurements—Includes failure to: make equipment performance measurements; include spurious and harmonic measurements and include all required data and curves.

Program log—Includes failure to: authenticate sponsorship; enter required details of public service announcements; sign log and initial corrections and show political affiliations of political candidate.

Transmitter—Includes failure to: provide proper fencing and lock around antenna base; attenuate spurious and harmonic radiation and maintain transmission line in good condition.

Operators—Includes failure to: have properly licensed operator on duty; verify that Radio telephone Third Class Operator Permits are endorsed for broadcast operation; make required five-day-per-week transmitting equipment inspection.

Modulation monitor—Includes failure to: provide properly operating modulation monitor; notify Engineer in Charge of District when operating within monitor and file informal request with District Office for additional time when monitor is out of service more than 60 days.

Station and operator licenses—Includes failure to: post station authorization and modifications thereunder and operators' licenses at the principal control point of the transmitter.

Operating power—Includes failure to: maintain power within the limits specified in the rules; maintain ratio of antenna base currents in directional antenna system within 5% of specified value.

Modulation—Includes failure to: control modulation in excess of 100% on negative peaks of frequent recurrence.

Antenna lighting and painting—Includes failure to: maintain antenna tower painting and lighting in accordance with the terms of the station authorization.

NEW PRODUCTS

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

STEP System

In 1961, **Chrono-log's** first electromechanical STEP System for TV switching automation was installed. About three years ago, Chrono-log replaced the electromechanical System with the solid state STEP system.

Since 1961, a total of 15 STEP Systems have been put into operation in TV stations in the U.S. and Canada. All but one of these STEP Systems are currently in use or being installed. Five of these installations represent re-orders by broadcasters who, after a few years experience with the STEP System, decided to install additional systems in other stations they operate.

Chrono-log has now added to its line the CRT STEP System for all-day TV switching automation. The CRT STEP System is a modular automation system which is expandable from a station break automation system to a computer-controlled all-day automation system.

The Cathode Ray Tube STEP System is similar to the Solid State STEP System as far as the functions it performs and its control capabilities. However, in the basic configuration, the pinboard memory and the Display Panel are replaced by a Cathode Ray Tube Display and Keyboard.

The keyboard is used to enter the break sequence into the STEP System. The on-air event plus up to 14 upcoming events are stored in the system and are displayed on the CRT screen. Changes in all events (except the present on-air event) can be made from the keyboard at any time, even when the system is putting events on air.

For each event, the screen displays the duration or real-time for that event; the video source and audio source; machine control functions as appropriate; special effect and transition data; and a description or identification of each event.

As each event is taken on air, the system moves all events up one position on the screen, leaving the bottom event open for the TD to enter another upcoming event. A special keyboard provides complete alpha-numeric data entry plus special control and data entry keys to allow the TD to enter his time data, video and audio sources and other operating functions without the need for "tabbing" to the proper position in the line. The system automatically enters the data in the proper position.

The elapsed time for each event is part of the information stored for the event. As each event is taken, the Time Display on the on-air line of the CRT resets to the duration time for that event and counts down in 1 second steps. At 00:00 time, the next event is taken and the process repeats. General operation including manual takeover, modes of operation, etc. are the same as in Solid State STEP System. The only exception to this is that there is no Preview Mode in the CRT System since 14 upcoming events can be displayed on the CRT at all times.

Circle Number 60 on Reader Reply Card

Camera

A new monochrome broadcast television camera which can be easily converted to meet future color requirements of educational, military and commercial television users has been placed on the market by **Ampex Corp.**

The new Model BC-210M, designed for studio and remote use, has a single plumbicon pickup tube. It is a monochrome version of the Ampex BC-210. The BC-210 is a moderately priced color broadcast camera equipped with two plumbicon tubes and used at many commercial television stations.

The BC-210M will be publicly shown for the first time at the National Association of Educational Broadcasters Convention in Washington, D.C., November 10, 11 and 12.

The BC-210M can be converted to full broadcast color capability by addition of a single coloring channel.

The upgrading approach, converting the BC-210M for color, eliminates new camera expenses incurred

by users making the transition from monochrome to color television, according to Lawrence Weiland, vice president-general manager, Ampex video products division.

"Broadcasters typically lose up to 80 percent of their investment when selling monochrome cameras, then incur additional expenses averaging $75,000 for each color camera," Weiland said.

Monochrome broadcast facilities which can benefit from the economic color-adaptability of the BC-210M include small commercial stations and educational networks operated by school districts, colleges, universities and military organizations. The new camera also is designed for sophisticated closed circuit television production applications where color may be needed in the future. When converted, the BC-210M performs identically to the BC-210.

The BC-210M weighs 35 pounds and uses lightweight camera cable less than two ounces per foot and .47 inches in diameter. The new camera is 8½ inches wide, 13½ inches high and 20½ inches long with viewfinder. It produces studio quality pictures with scene illumination of 30 foot candles. When upgraded to color it weighs 50 pounds and has the same dimensions.

Circle Number 61 on Reader Reply Card

Frequency Marker

Telonic Instruments has announced the availability of a new variable frequency marker operating from 1 to 2000 MHz and designed for swept frequency applications. Basically a plug-in module for the 2003 Sweep/Signal Generator System, the variable marker is designated Model 3323.

Incorporating a highly stable oscillator, the Marker unit provides a single birdy-type mark on the oscilloscope trace at the frequency set by a calibrated tape on the front panel of the plug-in. The entire 1 to 2000 MHz range is covered in 3 bands, selected by a three-position switch also located on the panel.

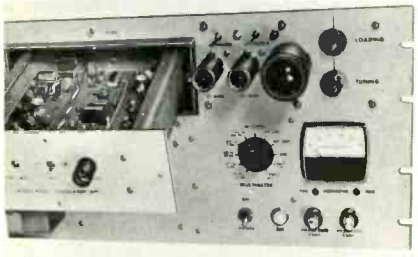
The new variable marker allows the user of the 2003 system to mark a frequency and then test at that point, or by manually sweeping with the "birdy", to determine the frequency at which he is working.

Either way, the new plug-in unit provides an inexpensive method of obtaining frequency marking capability over an extremely wide range.

Circle Number 64 on Reader Reply Card

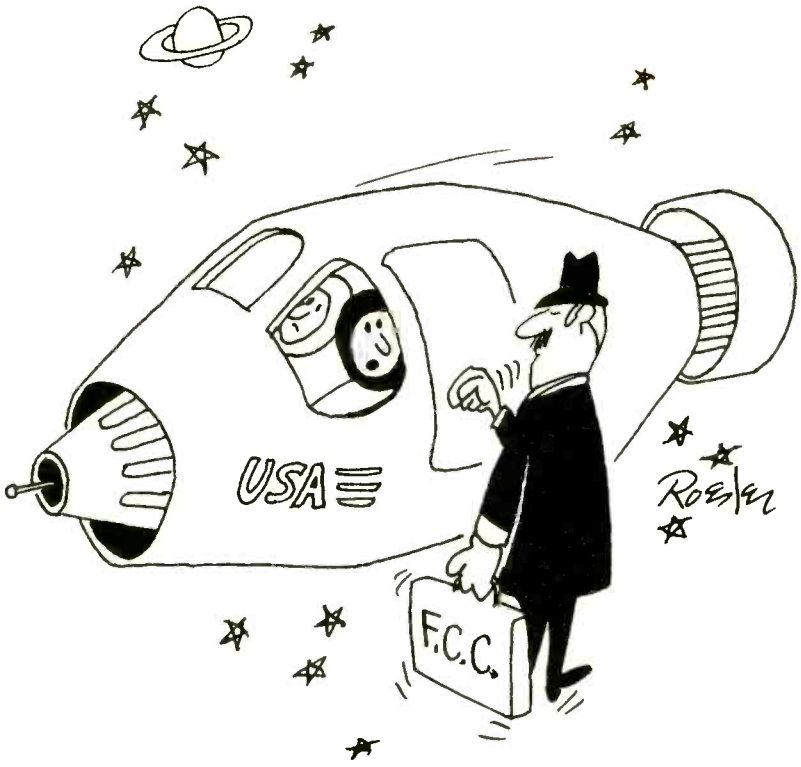
FM Exciter

CCA announces a new Direct FM Exciter for simultaneous Stereo and SCA operation. The FM-10DS incorporates only seven transistors and three inexpensive conventional tubes costing less than $10.00. This combination provides, according to the manufacturer, the optimum in



reliability and performance and eliminates the problems of high power transistor drift, expense and spurious emissions.

Circle Number 65 on Reader Reply Card



"OH, OH! THERE MUST BE SOMETHING WRONG WITH OUR LAST TELECAST!"

Microphone

A new cardioid dynamic microphone, with a rugged all-steel case and acoustical features designed specifically for live entertainment use, has been announced by **The Turner Company,** a subsidiary of Conrac Corporation.

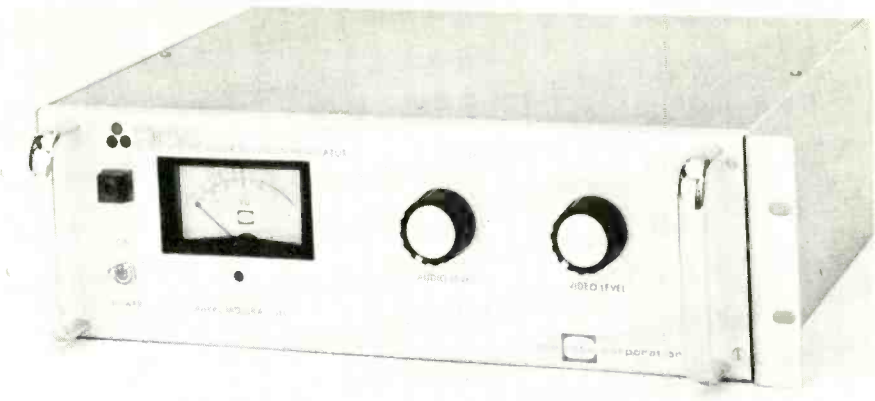
Sound cancelling ports on the side of the case of the Turner Balladier Model 2266 provide a controlled cardioid acoustical pick-up pattern which reduces feedback howl and suppresses unwanted background noise. The microphone cartridge is baffled and isolated to reduce breath noise, popping and handling noise. The slim steel case, with satin chrome finish and steel grille, provides the ruggedness required for continuous bandstand use.

Circle Number 66 on Reader Reply Card

Buying? Selling?

Use BE

Classified Ads



Color TV Modulator

A new color television modulator which produces phase equalized color video signals exceeding NTSC color standards has entered full-scale production at **Catel Corporation.**

Designated the CTM-2500 and the top of Catel's modulator line, the new solid-state device will accept either local or microwave input and features an envelope delay equalizing network.

The unit will produce low-cost, broadcast-quality transmission signals in any closed-circuit, film, local-origination or microwave system in studio, ETV, CATV, microwave link or ITV use.

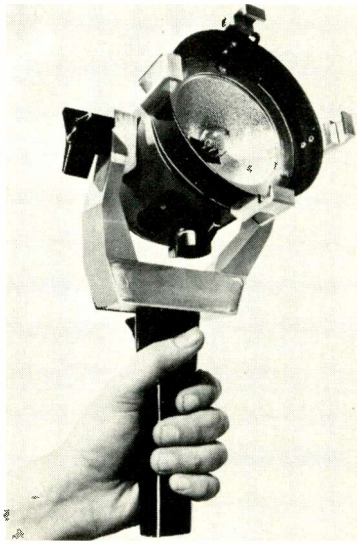
A new crystal controlled carrier and all JEDEC registered transistors assure performance. The video input can be from a line, film chain, camera, microwave link receiver or TV demodulator. The audio input is either 600 or 10,000 ohms or an intercarrier 4.5 MHz signal. The audio carrier frequency is AFC controlled to assure a maximum drift of 2 KHz. The video carrier frequency is crystal controlled to maintain a stability of .001 percent.

Circle Number 67 on Reader Reply Card

Portable Light

Berkey-ColorTran, Inc. announces the introduction of the first professional battery operated or 110 volt portable "quartz" light.

The Mini-Pro (code number 100-091) incorporates a utility yoke containing an on/off switch and recessed power receptacle for the 110



volt detachable 9′ cord. The fast focusing control produces a field of light without hot spots. The unit is completely portable and can be stand-mounted or hand held with a high impact plastic handle (accessory) that locks quickly and easily to the yoke. A wide variety of single-ended, long-life "quartz" lamps is available for both battery operation and 110 volts.

The Mini-Pro, including lamp and handle, weighs only 30 ounces. A complete line of professional accessories includes handles, barndoors, dichoric daylight filter, scrims and stands. The unit incorporates a fast action self-locking integral accessory ring.

Circle Number 68 on Reader Reply Card

Video Tape Recorder

Philips Broadcast Equipment Corp. has announced the 3403 Video Recorder, a semi-professional unit intended for universal applications where action from any source of visual information must be recorded in a simple, fast and efficient way.

The Philips 3403 produces a stable picture within a short starting time of two seconds after the playback button is pressed. It can record and play back video signals with or without associated audio signals.

Tape-saving high-density recordings are produced on this video tape recorder and interchangeability of tapes is possible on recorders of the same type. The 3403 has a sound dubbing facility and features stop-motion and slow-motion. It has been designed for reproduction of color programs through the use of a color adapter which will be available in the near future. This video recorder employs the helical scanning principle . . . the magnetic tape running in a closed "alpha" loop on a drum. A magnetic head rotating within the drum and touching the magnetic tape through a narrow slot in the drum, serves for a video signal, playback of the synchronization as well as recording and sound signals on the lower and upper edge tracks of the tape.

Circuitry is transistorized and the printed circuit boards are hinged for easy removal. Magnetic heads are exchangeable and made of ferrite which is highly resistant to wear.

Circle Number 70 on Reader Reply Card

Projector

An advanced designed 16mm projector, the "Super" 1600, is now available from **RCA Audio-Visual Products.**

It features a completely new sound system consisting of a transistorized 15 watt RMS (30 watt peak power) amplifier, a wide range 4″ x 8″ internal speaker, and an improved exciter lamp of the BAK type with twice the output of the usual BTD type. In combination with a high-efficiency optical system, "Super" 1600 assures quality, undistorted sound.

Other major advances include an improved fluid clutch for even take-up tension on any size reel, a smooth and fast rewind system, greater motor torque, and many inner refinements that add to overall projector reliability.

Two versions of the "Super" 1600 are available, one with sound speed only, and one with sound/silent speeds for those users who still have the old silent 16mm films or may have produced their own films without sound.

The "Super" 1600 still retains the automatic "Safe-Threader" as an optional accessory, a simple manual threading path, large sprockets to protect the film, ease of operation with all controls centrally located, and flip-up reel arms that can be positioned with one hand.

Circle Number 71 on Reader Reply Card

V.S.V.T.S.

Telemet's new Very Short Video Transmitting Systems (V.S.V.T.S.) send television and wideband data signals over 124 ohm balanced cables. Consisting of a transmitter and a receiver, this all solid state equipment—manufactured by Telemet Division of Geotel, Inc., Amityville, N. Y.—provides variable pre- and post-equalization to compensate for transmission losses in various lengths of 16 PEVL cable up to 25 dB.

Adjustable slope equalization provides rapid alignment of the equipment in any cable circuit. Both the transmitter and receiver equalizers exhibit a gain-frequency characteristic inversely proportional to the average 16 PEVL cable. These Telemet systems are capable of quality transmission of EIA standard monochrome (RS-170) and NTSC color television signals; and other wideband signals including multiplexed telephony and high speed digital data.

The Telemet Transmitter Series 3284 includes variable pre-equalization from 0 to 10 dB, in 1 dB steps. An output amplifier provides a complex of 124 ohm balanced source to properly match the 16 gauge video pair cable. By inserting shorting plugs, this complex termination may be changed to a non-complex 124 ohm balanced termination for test purposes. The transmitter has its own regulated power supply with an alarm circuit for front panel failure indication, and rear panel facilities to connect to an external alarm system.

The Telemet Receiver Series 3283 has an input differential amplifier to convert the 124 ohm balanced input to an unbalanced line. A fixed 5 dB step-equalizer, and 10 steps of 1 dB each can be switched in to provide form 0 to + 15 dB of gain frequency compensation. The mop-up equalizer provides approximately ±1.5 dB compensation at 10 discrete frequencies. A feedback clamper attenuates low frequency distortion and interference. A plug-in phase equalizer is also supplied with each receiver to provide group delay correction.

Circle Number 72 on Reader Reply Card

In December Issue
Look For
Power Generators
IC Applications
VTR Headlife
CATV Proof
And The Annual
BE Index

TECHNICAL DATA

For further information, circle data identification number on reader service card.

101. **ALLIED ELECTRONICS CORP.**—The 1970 catalog of electronics equipment for industry is now available. The catalog lists over 50,000 separate stock items for over 500 manufacturers for research and development, production, communications, education, controls and entertainment. Detailed specifications, descriptions and illustrations are provided for all products. Indexing includes a product index, a manufacturer's index and an index of products meeting military specifications.
102. **ALLIS-CHALMERS** — Bulletin 53B3913 describes a lightweight, packaged, brushless, synchronous generator for engine-generator service. The 50, 60 and 75 kw three phase units can be used for prime or emergency stand-by electrical power. New design concepts are described in the bulletin along with a table of electrical specifications and space dimensions.
103. **AMPHENOL DISTRIBUTOR DIV.**—A line of BNC and UHF RF connectors with tarnish-free, corrosion resistant surface plating is described in brochure Form 181. Included in the brochure are details on the "Astroplate" process which is said to produce connectors that withstand corrosive environments, abrasion, constant handling, high temperatures (to 2600F) without wear-off and discoloration of finish deterioration.
104. **ELECTRONICS DIV., AMERICAN RELAYS**—The 7-69 Guidebook of Electromechanical Components and Equipment contains sections on counters, flow meters, precision potentiometers, servo mechanisms, test equipment and timers. Other categories include gyros, military synchros, fractional horse power motors, blowers and stepping switches. Photos, drawings and diagrams are included.
105. **ASTATIC CORPORATION**—A 20-page microphone catalog includes the new Series 810 Ultra-Cardioids, Series 820 Omni-directional Probes and Series 840 Lavaliers along with 50 other models. Also included is a microphone selector guide to assist the user. Replacement microphone cartridges and accessories are also listed.
106. **AUTOMATED METAL PRODUCTS**—A complete industry cross-reference guide for instrument panel handles made of brass, aluminum and stainless steel. The handles are available in a variety of shapes and sizes in standard, adjustable and folding types. Also available are various style ferrules designed to match the handles.
107. **CHEMTRONICS INC.** — A catalog of chemical products exclusively for the electronic service industry has been issued. It covers tuner sprays, contact and control cleaners, insulating sprays, lubricants, circuit coolers and other servicing aids. Featured are a foaming tuner lubricant/cleaner, an aerosol spray designed for cassette tape recorders and a tuner degreaser.
108. **COHU ELECTRONICS**—Technical specifications and the "mix or match" features of video and pulse distribution amplifiers are the subjects of a four-page data sheet. Electrical, physical and operating specifications are used in data sheet 6-535 along with photographs and a guide to enclosures for amplifiers.
109. **GENISCO TECHNOLOGY CORP.** — Specifications of a series of RFI miniature arc suppressors are provided in a data sheet. The arc suppres-

sors utilize an RC network concept as an RFI filter. Unit values designated in the data sheet range from .01 uf to .001 uf, with ratings of 28 VAC or 100 VDC and 125 VAC. The units are equipped with axial or plug-in leads in either series or parallel.

110. **MACARR INC.**—A line of periodic reversers for alkaline de-rusting and de-scaling is described in bulletin EP-104. Available in five models, ranging from 250 to 2,000 ampere capacity, the reversers are equipped with a selector switch for On/Off and Hold, a synchronous motor timer with an adjustable 120-second range and pilot lamps to indicate operating mode.

111. **HALLICRAFTERS CO.**—A two-page bulletin, S-1050, describes an AM broadcast and general coverage short-wave receiver, the SX-122A, for professional applications. The receiver features coverage of the standard broadcast band and 83 short-wave services in three tuning ranges from .538 to 34 MHz, product detector for SSB/CW, envelope detector for AM, dual conversion on all bands, temperature compensated, high frequency oscillator circuits, 50 KHz highly selective IF system with three ranges of selectivity and selectable upper or lower sideband.

112. **HAMLIN INC.**—A catalog offering a load selection guide for the standard types of reed switches made by the company is now available. The switches range in size from microminiature switches with a glass length as small as .375 to standard size and mercury-wetted types. Charts showing contact arrangement, dimensions, switching voltage and other electrical characteristics are also included.

113. **INFONICS, INC.** — Now available is a six-page brochure describing the company's line of 24 cassette and tape duplicators. The brochure contains a cassette application story with ideas on the uses of cassettes in education, industry, the religious world and entertainment.

114. **ITT CANNON ELECTRIC**—Two brochures describing the environment-resisting KPSE series of connectors designed to MIL-C-26482 and the low-profile KJ series designed to MIL-C-38999 are now available. The KJ contact densities range from 3 to 128 in 33 different layouts and are available in eight shell sizes. Two operating ranges are also available.

115. **LIBERTY CONTROLS DIV.**—A catalog of the company's entire line of relays and solenoids is available. Included are intermediate telephone type relays, multi-purpose relays, a miniature relay line, general purpose types, power relays, short-coil telephone types, general purpose plug-in relays, solenoids and timers.

116. **OAK MANUFACTURING CO.**—A new pushbutton switch, Series 800 Econo-Line, is described in Bulletin No. SP-346. The switch provides circuit flexibility from 1 PST through 8 PDT in five switching configurations: momentary, push-push, interlock, blockout and a combination.

117. **PREFORMED LINE PRODUCTS CO.**—A new bulletin covers a line of splicing and termination accessories for the installation of underground communications cable.

118. **RF SYSTEMS, INC.**—A two-page bulletin describing the firm's 20′ through 60′ "Astroscat" antennas has been issued. The bulletin contains complete information about the operation of the antennas, including electrical gain characteristics for Channels 2 through 83. Feed systems for single channel and broad band systems are described.

119. **SYLVANIA**—A pocket brochure describes SUHL I and SUHL II TTL integrated circuits. Logic diagrams, descriptions and type numbers are given for each product. The brochure is indexed according to family and each section is categorized by function. Electrical characteristics for each

circuit, available package dimensions and ordering information is also given.

120. **TECHNICAL WIRE PRODUCTS, INC.**—Data Sheet EMC-853 describes conductive strips for EMI/RFI shielding, sealing, grounding and static discharge. A total of 37 size combinations are each offered in three compressibility ratings: soft, medium and firm. Parts numbers of all three standard strips are shown along with adhering and joining methods.
121. **TELEMATION, INC.**—A brochure describing the TMV-708 broadcast camera control unit is now available for educators, CATV systems, broadcasters and other users of television equipment. The unit is designed for remote control of the TMC-2100 monochrome TV camera and distributes power, drive pulses, intercom and tally voltage to the camera.
122. **TENNEY ENGINEERING, INC.**—A series of chambers for simulation of altitude, temperature and humidity is described in bulletin No. R24. The chambers are said to be suited for a wide variety of environmental simulations tests. Models include two, three and five foot chambers.
123. **TRIPLETT CORPORATION**—A two-page technical bulletin provides electrical and mechanical specifications for a new digital panel meter, Model 5000. The Model 5000 is said to have an accuracy of .1% full scale ±1 digit, high sensitivity, automatic polarity, non-blinking 3½ digit display with movable decimal point, ± polarity display and over-range indicator and BCD and decimal outputs.
124. **WARENCKE ELECTRON TUBES, INC.**—A four-page technical bulletin, Issue 6970, features the electrical and mechanical characteristics of the RW-617 gridded crossed-field amplifier (GCFA) tube. The tube has an operating band of 2.6 to 3.2 GHz and is for use in airborne or pod-mounted applications. Typical characteristic curves showing grid control of the output as well as typical power output for the S-Band GCFA are plotted.
125. **WEINSCHEL ENGINEERING**—Short form catalog No. 5 for 1969-70 describing the company's components and instruments is now available. Described are precision fixed, variable and step attenuators; RF microwave components such as terminations, tuners, connectors and switches; microwave parameter measuring instruments for fixed and swept-frequency insertion loss, VSWR and gain measurements, power measuring and calibration instruments.

Remote Control Okay Given To UHF Station

Authority has been granted KLOC Broadcasting Co., Inc., to operate its UHF station KLOC-TV, Channel 19, Modesto, Calif., by remote control from the station's main studio. At the same time, the Commission granted KLOC-TV waiver of the Commission's TV transmission standards to the extent necessary to permit use of the multiplex technique on the aural carrier of its TV transmitter.

As a basis for the waiver, the Commission accepted KLOC's contention that "This matter is of the utmost importance to KLOC-TV, a UHF independent station fighting for its very existence. This proposal will provide substantial savings in salaries which can be devoted to the preservation of the station and improvement in its programming."

KLOC-TV sought the waiver so that it could relay telemetry and alerting signals from the transmitter to the studio control point.

KXAB Sold To KSOO

KXAB-TV, Aberdeen, South Dakota, has been purchased by KSOO-TV, Inc. of Sioux Falls, S. D. KXAB serves all of the central and northeastern portion of the state. KSOO, Inc. operates radio and television stations serving southeast and south central South Dakota, southwestern Minnesota, northeastern Nebraska and northwestern Iowa.

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Copper coaxial cable with a new *deeper corrugation*. Greater flexibility and strength. Use almost anywhere. Repeatedly. And the outer conductor is *solid copper.* No braids. No noise. No RFI. Moisture can't penetrate. Available in ½", 50 ohm, foam dielectric, Type FSJ4-50. Connectors, Type N or GR-874. Like a sample? Communicate with Andrew.

12-68

ANDREW

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Circle Number 59 on Reader Reply Card

SMPTE Gives Annual Awards

Dr. Peter C. Goldmark received the David Sarnoff Gold Medal Award for 1969 for his continuing stimulus and contributions in the conception, development and utilization of significant innovations in television, video recording, and in the application of television technology in the fields of aerospace, education, printing and medicine.

The Award was presented by SMPTE President Deane R. White at the Society's 106th Technical Conference and Equipment Exhibit in Los Angeles.

The following Awards were also presented at the conference:

Howard W. Vogt, Assistant Director, Photographic Technology, Div. Eastman Kodak Co., Rochester, N.Y., received the Herbert T. Kalmus Gold Medal Award for 1969 in recognition of his efforts in developing the Eastman Color Reversal Intermediate Processing System. His experiences in processing and knowledge of the Ektachrome system made possible the very rapid development of one of the most sophisticated processing systems to be used by commercial laboratories.

Dr. Albert Narath, Director, Institute for Applied Photochemistry and Film Technology, Technical University, Berlin, Germany, has been elected to Honorary Membership by the Society of Motion Picture and Television Engineers, in recognition of a lifetime of distinguished service as a teacher and engineer in motion pictures and television. His important historical investigations, extensive publications in various fields, his significant papers on phenomena related to the Kerr effect and his outstanding work on instrument design.

1969 SMPTE Journal Award To Bartleson

C. J. Bartleson, Kollmorgen Corp., Newburgh, N. Y., was selected for the Journal Award for his paper, "Color Perception and Color Television," published in the January, 1968 issue of the Journal of the SMPTE.

Allen Astin To Work On NBS Standards For Commerce Dept.

Dr. Allen V. Astin, recently retired Director of the U.S. Department of Commerce's National Bureau of Standards, has been named Consultant-Director Emeritus of the Bureau.

Dr. Astin's main interest will be in international standardization. He will aid in developing policies for NBS staff participation in international standardization activities, advise on ways of improving private participation in the process, and he will identify areas of international standardization which warrant increased attention by either private or public interests.

In his new status Dr. Astin will also be available to provide consultation and advice on the full range of NBS activities.

NAFMB Appoints Karen Layland To Administrative Staff

A new Administrative Director has been appointed by the National Association of FM Broadcasters.

The president of NAFMB, Abe Voron, and vice president John Richer, have announced appointment of Miss Karen Layland to the administrative post which involves supervision of the organization's New York office and coordination of its member services.

Miss Layland takes over responsibilities in the NAFMB office at 665 Fifth Avenue from Mrs. Lois Heuer who has been the organization's Administrative Director for the past four years.

Prior to joining the NAFMB staff, Miss Layland was Director of the Communication Center of the National Council of Churches, coordinating urban crisis information from ten regional offices throughout the U.S. She has also served in a variety of capacities on the staffs of several radio stations—KBIG AM-FM, Hollywood, California; KBEA/KBEY-FM, Kansas City; KOFO, Ottawa, Kansas.

Kentucky Network Announces Changes In Staff Structure

Ronald Stewart, Director of Engineering for the twelve station Kentucky Educational Television Network has anounced the following structure changes.

Robert J. Klein, former Studio Supervisor, has been assigned the position of Assistant Director of Engineering for Studio Operations. Prior to joining the network, Klein was Chief Engineer for WKYT-TV, Channel 27, in Lexington.

Donald A. Littleton, former Transmitter Supervisor has been assigned the position of Assistant Director of Engineering for Transmitter Operations. Littleton has held positions previously as staff engineer for KXLJ-AM-TV, KTWO-AM-TV, and KLUB-AM-FM.

WOW Promotes Two Engineers

Two long-time employees of WOW Broadcasting have received promotions.

Harry Stutzman of 1206 Maenner Drive in Omaha, who has handled Radio WOW AM and FM over the past years, is now Engineering Supervisor in charge of television operations.

One of WOW's veteran engineers, Percy Zeigler of 5120 Cuming, Omaha, has been promoted to Engineering Supervisor in charge of radio AM and FM operations.

Kliewer To NCTA Board

Lawrence W. "Duff" Kliewer has been named a member of the Board of Directors of the National Cable Television Association.

Kliewer, who was named to the post by the Association's Board during a meeting in Washington, D.C., August 21, will serve as a director until the next NCTA general membership meeting in June, 1970.

Hawaii International Has January Date

The Third Hawaii International Conference on System Sciences will be held January 14-16, 1970 in Honolulu. It is sponsored by the University of Hawaii with the participation of the IEEE Groups on Automatic Control and Circuit Theory and the Society of Industrial and Applied Mathematics.

This is the third in a series of conferences devoted to advances in information and system sciences. The conference will broadly encompass the following areas: information sceinces, computer sciences, communication theory, automatic control and system theory.

For information write Dr. Richard H. Jones (HICSS), Information Sciences Program, 2565 The Mall, University of Hawaii, Honolulu, Hawaii, 96822.

Program Conference Set To Meet In Atlanta

The Fourth Annual Radio Program Conference for communications media executives will be Dec. 5-7 in Atlanta. Some 1,000 advertising, broadcasting and recording industry people are expected to participate.

General sessions during the three-day event will feature addresses by prominent national figures, while special meetings will be devoted to communications advances in broadcasting, advertising and music and news dissemination.

Attention Writers: JACC Issues Call For Convention Papers

The 1970 Joint Automatic Control Conference (JACC) will be held at Georgia Tech, Atlanta, Ga. June 24-26, 1970. The sponsoring societies are the American Institute of Aeronautics and Astronautics, American Institute of Chemical Engineers, American Society of Mechanical Engineers, Fluid Power Society, The Institute of Electrical and Electronics Engineers, (Group on Automatic Control), Instrument Society of America and the Simulation Councils Incorporated.

Authors are invited to submit full length papers (no abstracts) for presentation at the conference. Papers dealing with all aspects of automatic control engineering and science (theory, design, applications, components, simulation, machine computation, etc.) are solicited.

All copies of the submitted papers should be clearly marked "For the 1970 JACC" and should be submitted by Nov. 15, 1969. Authors of accepted papers will be notified before March 1, 1970. All accepted papers will be reproduced in the JACC Preprint Volume.

Authors interested in submitting papers through IEEE may submit, by Nov. 15, 1969 five copies of the complete paper for review to Prof. J. B. Lewis, Department of Electrical Engineering, Pennsylvania State University, University Park, Pa. 16802.

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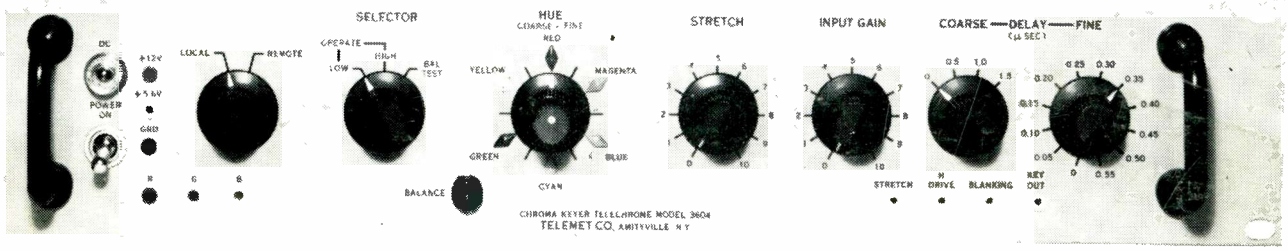

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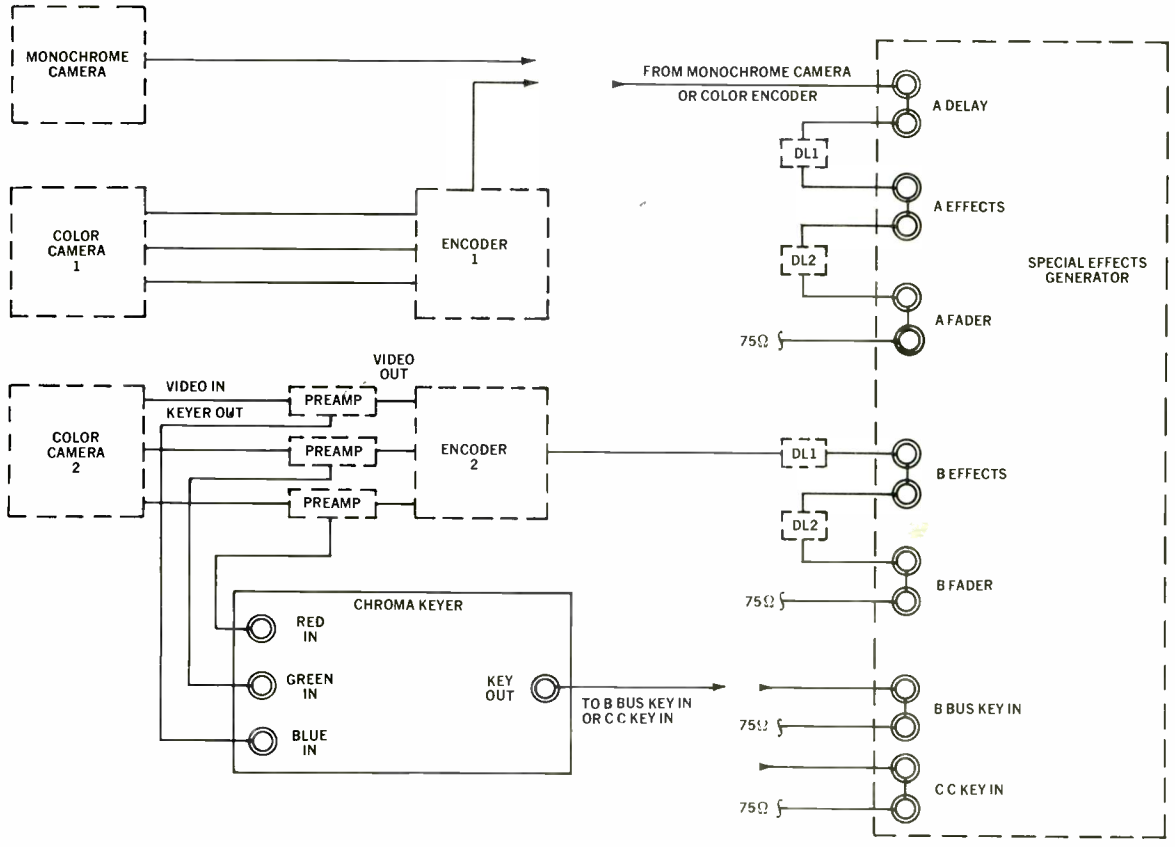

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