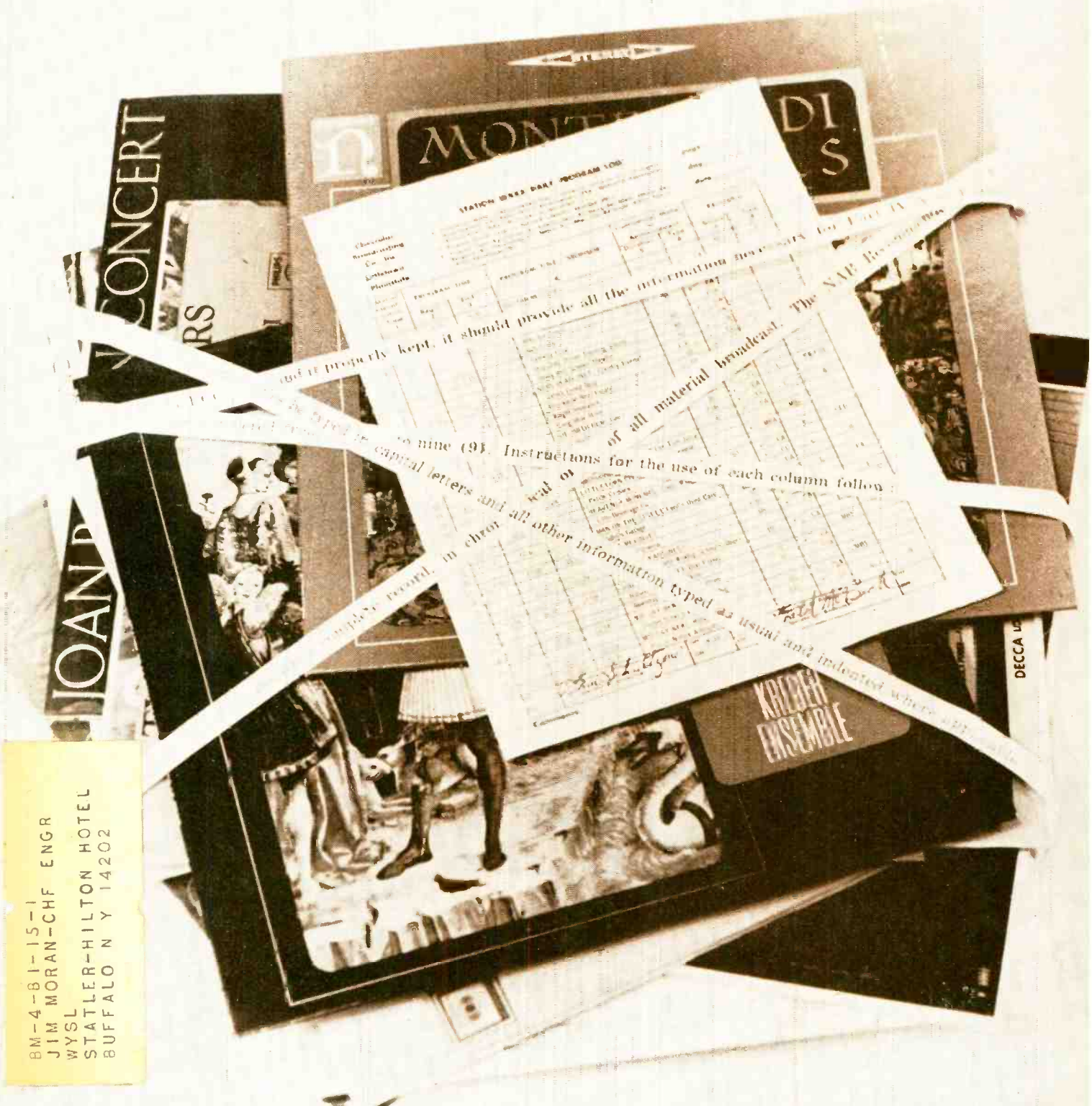
A MACTIER PUBLICATION / FEBRUARY 1966

BM/E

THE MAGAZINE OF BROADCAST MANAGEMENT/ENGINEERING



Using FCC's New Program Log-Keeping Regs.

JERROLD

Channel Commander

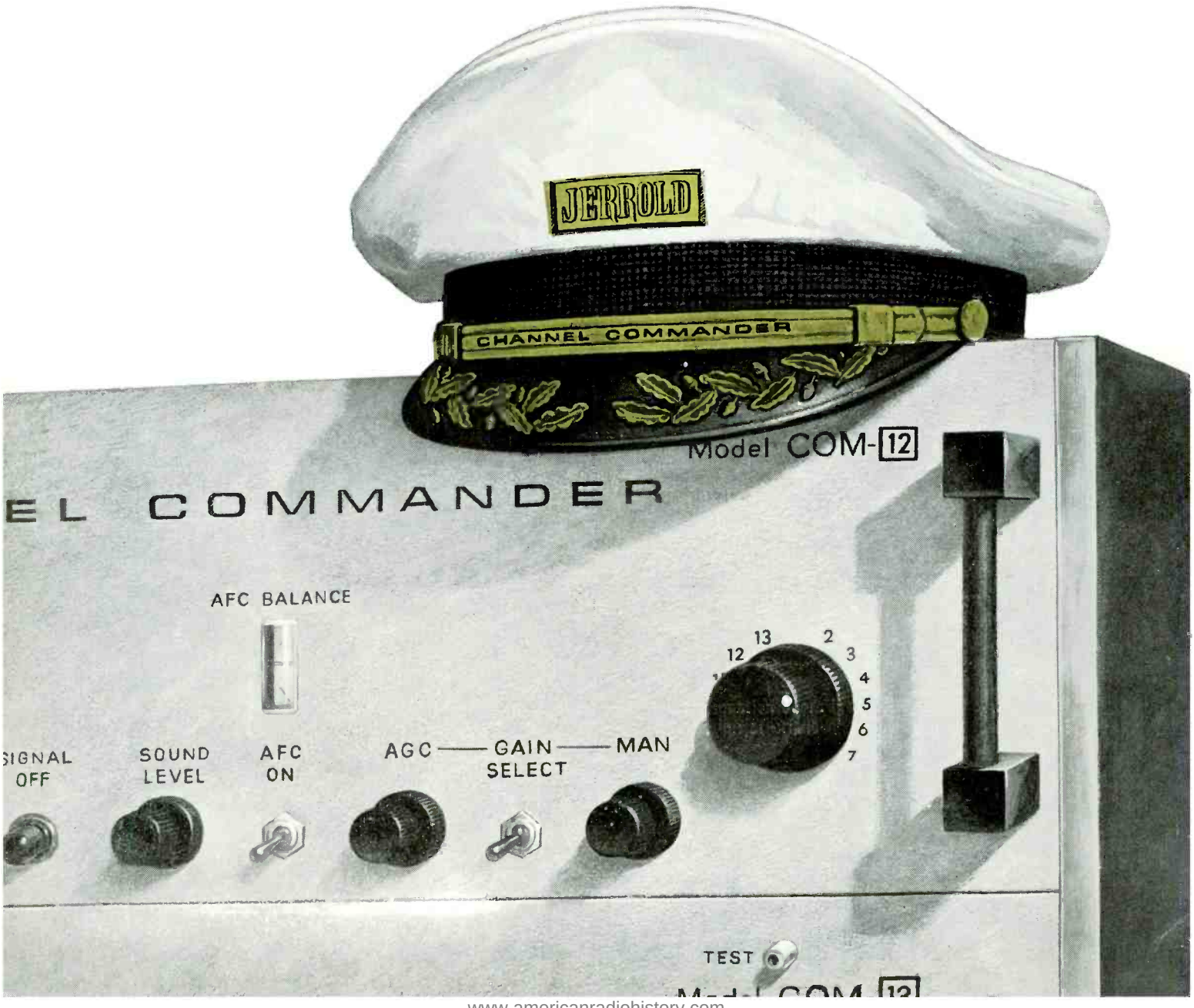
guarantees 12-channel CATV capability

You can "go 12 channels" or in channel-at-a-time stages with the Channel Commander. It's a complete channel-processing unit with plug-in modules. It receives any VHF channel (2 through 13), then delivers a completely processed and controlled output on either the received channel or any other VHF channel—to permit adjacent channel transportation on a single trunk. Best of all, it's *easily* installed with existing head end equipment. For vivid color or crystal-clear black and white TV start at the head end—start with Channel Commander, it's that simple. For details phone 215-226-3456, or write:

JERROLD

CATV Systems Division
JERROLD ELECTRONICS CORPORATION
15th & Lehigh Ave., Philadelphia, Pa. 19132

FIRST IN CATV • The nation's largest and most experienced manufacturer-supplier of CATV equipment and services.

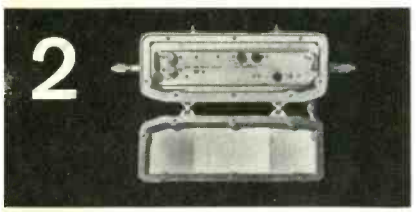


13 Reasons Why The viking SOLID STATE AMPLIFIERS Are Best!

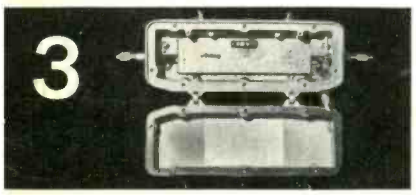
Although the number "13" has always been considered a "bad omen", Viking is so confident that its new "GOLDLINE SERIES" of high level modular solid state CATV amplifiers represents the most advanced engineering concept of solid state design, that we challenge fate and present only 13 reasons (out of the innumerable reasons that can be stated) to show why you should THINK VIKING when you THINK SOLID STATE.

Here are the 13 reasons why you will now consider number "13" to be the luckiest number in CATV.

"Push-Pull" construction allows one man to replace the internal amplifier unit within seconds without unsoldering wires nor disturbing cable fittings.

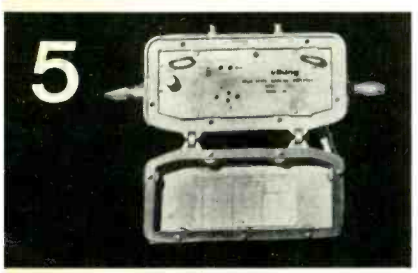


Two piece hinged housing with seal-on gasket and captive screws permits easy accessibility to all controls and test points.

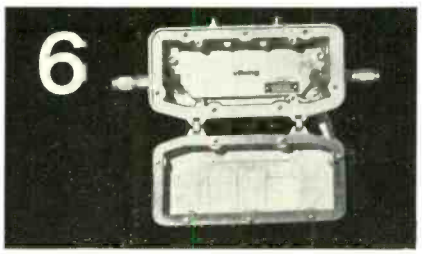


Inline amplifier die-cast aluminum housing provides complete weather and moisture proof enclosure with "VIK-O-PROCESS" protection for salt air regions.

Greater cascadability allows a 12 channel system bigger than 60 mainline amplifiers in series or better than 1400db of cable can be built for a signal-to-noise ratio in excess of 40db.

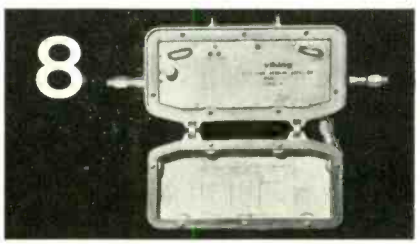


Amplifiers designed with lowest noise figures, 10db maximum and highest output capability, 51dbmv.

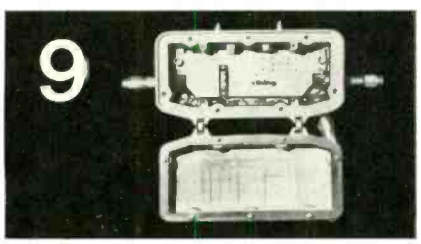


Mainline amplifier AGC circuit compensates for thermal changes in the cable with no extra cost or insertion loss.

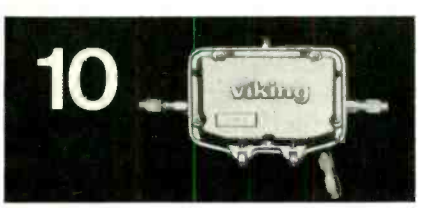
Only AGC amplifiers available with separate high and low band plug-in pads and full-wave power supply.



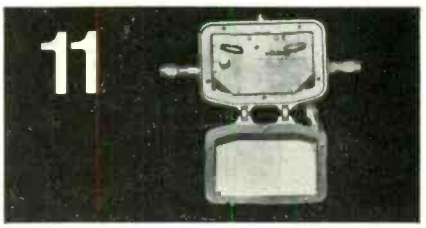
Lightning and surge protection beyond 10,000 volts.



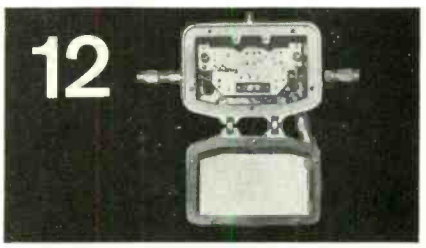
Both RF and AC power feed through bridger amplifier locations where internal amplifier unit is removed from amplifier housing.



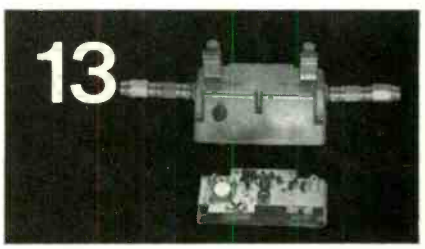
All silicon RF transistors in sockets and heat-sunk.



Built-in external -10db output directional tap for powering associated bridging or line extender amplifier and external easy to service fuses.



All input and output connectors are of the revolutionary new Viking "Super Match" true 75 ohm series.



"Super Match" connectors permit full one inch engagement of cable conductor into spring finger contact area of connector body allowing for maximum thermal contraction of the conductor during extreme temperature variances —No more conductor "pull-out" problems.

Phone or write for your free brochure on Viking's new "GOLDLINE SERIES" of solid state amplifiers

830 Monroe Street, Hoboken, New Jersey, Call Us Collect: New York (212) WH 3-5793, Hoboken: (201) OL 6-2020

viking

Circle 4 on Reader Service Card

FEBRUARY 1966 / VOLUME 2 / NUMBER 2

BM/E

THE MAGAZINE OF BROADCAST MANAGEMENT/ ENGINEERING

From the looks of the new Program Logging Rules, the Commission seems intent on shaping broadcast program content. NAB was motivated to publish a 20-page pamphlet, "NAB Radio Program Log Recommendations," and to use it as the basis for a feature presentation at each of the Regional Conferences last Fall.

Considering the importance of the subject, we asked Art Director Gus Sauter to symbolize his impression on this month's cover. (One might interpret his artistic message to mean that the FCC is "tightening its control" over broadcast programming.)

What do the new Program Logging Rules demand of broadcasters? BM/E's legal experts provide the answers in this month's FCC column.

MACTIER PUBLISHING CORP., BRYCE GRAY, JR., President
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ELECTRONIC PROCUREMENT
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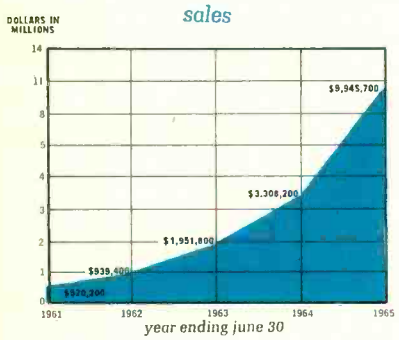
Controlled Circulation postage paid at Orange, Conn.

AMECO, INC. 2949 West Osborn Road • P. O. Box 11326 • Phoenix, Arizona 85017 • Phone (602) 262-5500

Do you know? AMECO makes 207 basic CATV products

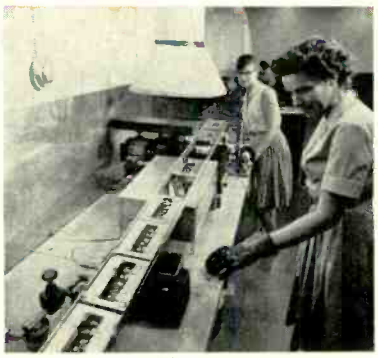
That's not all. In addition to basic amplifiers, connectors, splitters, power supplies, line extenders and transformers, Ameco manufactures over 1197 variations — to fill all your special needs.



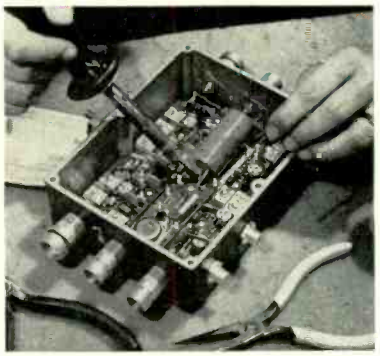
Why? Because we believe that our customers know what they need, and our aim is to supply those needs and requirements. Total sales for 1965 confirm our aim. Thanks to our ability to foresee and produce the needs of CATV industry, sales increased dramatically from $520,200 in 1961, to $9,945,700 in 1965!

Every Ameco product is thoroughly researched, field-tested, (quality-controlled each step of the way) and performance-proven before it reaches your system. So, go with the best — *go **AMECO!***

Ameco's production facility expansion has doubled production capacity. In 1966, production is expected to be three times that of 1965.



Hollis flow-solder system. Automatic, fast and reliable.



Quality-Control — at every critical point in production.

Full production of performance-proven 70 series.

AMECO . . . CATV quality performance and ingenuity

ameco

OFFICES IN ALL PRINCIPAL CATV AREAS

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BROADCAST INDUSTRY NEWS

CATV Emergency Alert System

An emergency alert system for Santa Barbara, Cal., and vicinity has been successfully proven in a test conducted by KEYT (Ch. 3) and Cable TV of Santa Barbara, Inc. Although the subject of the test was simply a matter of public convenience (a water cut-off), it was apparent to observers that, should there be an emergency, authorities had available to them a means of communicating with the TV audience.

Cox Broadcasting Corp. has ordered a Honeywell Series 200 Model 120 computer which will be used initially for log writing, scheduling, audience evaluation of programs sales analysis, daily availability reports, general accounting, and local election result computation for WSB TV-AM-FM. The computer will also provide general market research for all Cox properties and accounting and billing for approximately 35,000 cable subscribers. The equipment will be housed in the new 2-story $1 million expansion of White Columns on Peachtree St., Atlanta. The structure, scheduled for completion in July '66, will encompass nearly 100,000 sq. ft. of working area, making it one of the largest broadcasting plants in the nation.

Educators Are Busy Broadcasting

A 2-channel 2500-mc ETV network has broadcast more than 10 hours daily since the start of the 65-66 school year, according to the Spring Branch Independent School District, and a 15-hour schedule is expected by the end of the school year. The Micro-Link produced system supplies a 24-school network on Channels 7 and 9; Channel 9 is used primarily for instructional films and 7 is used for district-prepared enrichment material videotaped at the school. Studio and transmitting equipment cost $70,000, plus an additional $142,000 for 325 classroom monitors on dollies.

And after a year of operation, Weymouth Instructional Materials Center reports that ETV is a prime method of instruction, with 23 elementary and high schools sharing facilities to serve 11,450 students. The Blonder-Tongue CCTV equipped system is student operated, using 3 cameras and a film chain for origination.

Across the Atlantic, the largest ETV system yet planned has been ordered from the Marconi Co. for the new first year science building at Edinburgh Univ. Nine automatic cameras and 51 receivers will be installed, with a control room and wired video and audio distribution network linking lecture theatres and viewing rooms.

Automatic data processing techniques have been adapted to broadcast traffic and accounting systems. Born at KIMN Denver, the Traffaccounting system provides a double control feature which establishes a system of checks and balances. Traffic and accounting data from the broadcast order are punched into cards which are used to produce logs, availabilities, affidavits, statements, sales projections, salesmen's commissions, etc. The KIMN system, which has been in operation since 1962, will very quickly pinpoint a station's current and future commercial load. Report production time is kept to a minimum; for example, the program log rarely requires more than 15 to 20 minutes, even in the biggest stations. William S. Cole and J. Elliot Knoll, in cooperation with IBM, developed Traffaccounting. Above, Mr. Cole and operator Pat Sarno examine an automatically printed program log.

Preserve Today's Events, Voices

The NAB Committee on Recorded Sound is urging stations and networks to record and preserve on tape contemporary events and voices that may be treasured by future generations. Since cost often rules out film or videotape, the committee suggests the use of

We'll do a month's work for you free!

Just send this page to CBS Laboratories. We will send Audimax and Volumax to your station. If you want to send them home after 30 days, we will pay the freight. But if you want to make your station their permanent home, all you do is pay $665 each.

At the end of that period, chances are you will be so sold on Audimax and Volumax you will want to buy them.

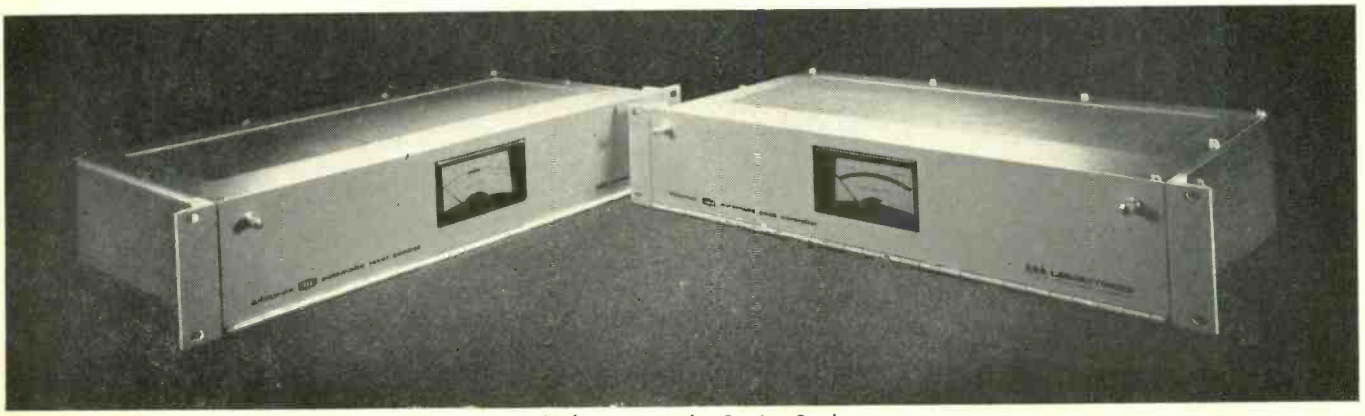
And you should. After all, they can increase your program power 8 times.

Solid state Audimax is an automatic level control years ahead of the ordinary AGC. By automatically controlling audio levels, it frees engineers, cuts costs and boosts your signal.

Volumax, also solid state, outmodes conventional peak limiters by controlling peaks automatically without side effects. By expanding effective range and improving reception, it brings in extra advertising revenue.

We can afford to give Audimax and Volumax away free. Because we know they're so good, most people can't afford to give them back.

CBS LABORATORIES
Stamford, Connecticut. A Division of Columbia Broadcasting System, Inc.



Circle 6 on Reader Service Card

audio tape to permanently record celebrities and interesting people connected with local history and milestone events which are often of national interest. Also, the committee points out, the material can be a source on which dynamic new programming may be based. Also, the NAB is seeking the participation of audio collectors in its survey to locate a wide variety of sounds, from the faint buzzing of a gnat to an Atlas booster blast-off. The committee is studying the feasibility of establishing a national archives in which recordings on tapes, discs, film, etc., could be stored.

Ameco Subsidiary

Co-Ax Construction Co., a wholly owned subsidiary of Ameco, Inc. will build complete CATV systems under turnkey contracts. The new Phoenix-based company is headed by Lewis G. Coggins, formerly Ameco director of contracting.

Western Microwave Reorganizes

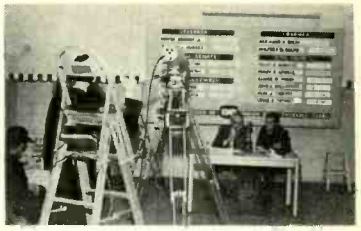
Western Microwave of Bozeman, Mont., has announced a corporate reorganization to effect a stronger financial position and offer better service to the 8 TV stations and 12 cable systems it serves in Idaho and Montana. The merger with a new company, Western Microwave, Inc. involves both purchase and stock exchange, pending FCC approval.

Minimum AM Power: 250w?

The FCC has invited comments to a proposed rule making which would raise the minimum power for AMs from 100 to 250 watts, day and night. The Commission has, for some time, discouraged 100w stations, regarding such low power operations as inefficient use of broadcast frequencies. Only about 12 stations are now operating with such power and they will be encouraged to apply for the increase in the event the proposed rule is adopted.

Two Signatures Required

In the switch to new program logs some stations are apparently overlooking the old rule (Sec. 73.111) requiring an operator to sign both on and off (plus times), according to a recent issue of "The Gabcast" published by the Georgia Association of Broadcasters. The FCC is giving advisory warnings to stations. If only one line is provided on a log form, the second signature doesn't have to be on a line.



Subscribers to cable TV in Bridgeton, N.J. viewed their first coverage of a local election last Nov. 2nd. A Garden State TV Cable Corp. poll of subscribers found that 83% of its subscribers were tuned to the coverage. The firm plans to offer similar programs of local interest in the future as a public service.

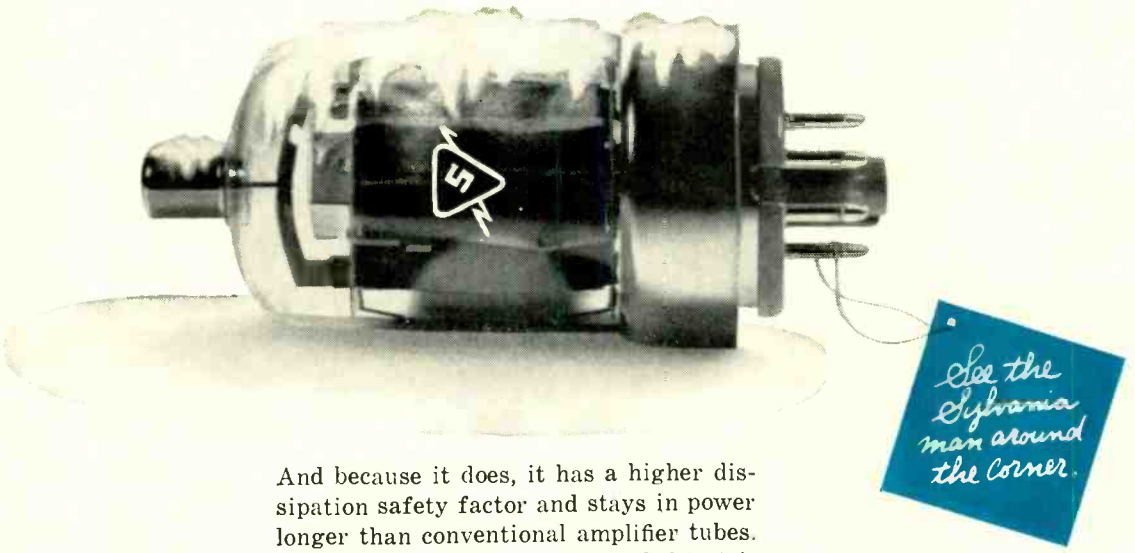
TvB Uses CCTV

The Television Bureau of Advertising is using video tape facilities to feed closed circuit programs and commercials between its New York office to as many as six different locations simultaneously. Linked to the N.Y. Telephone Co.'s switching center, b&w or color videotape or 16mm b&w film may be transmitted to any company hooked into the same center.

A 500% growth in the next five years is seen for the CATV industry by Robert J. McGeehan, President of Entron, Inc.

In an address to the Washington Society of Investment Analysts, Mr. McGeehan said, "CATV is now entering what I predict will be an unprecedented period of dollar volume over a protracted period of many years. Pessimistically, within five years, our industry will experience a growth of five times its present volume which is in excess of $35 million to over $175 million. Yet, I see very few opportunities to earn the 400% annual return recently quoted, but I do see excellent prospects for realistic earnings in the area of 25 to 30%."

Our 6146B has a cooling system inside.



And because it does, it has a higher dissipation safety factor and stays in power longer than conventional amplifier tubes.

The heart of the system is Sylvania's cool-running Hi-Con plate. It's iron that's copper-plated and then nickel-plated.

This combination keeps the tube cool, prevents hot spots, assures greater uniformity in heat reduction and efficient heat radiation.

The Sylvania 6146B also has increased heat transfer at a lower operating temperature because a heavy oxide insulating coating isolates the heater from the cathode. Rated power output is maintained even at reduced heater voltage.

The cathode is cold-rolled from a blend of powdered metals to eliminate peeling and flaking of the emissive coating. Emissive materials are progressively reactivated and this reduces "gm slump."

Get the 6146B and other electronic components fast, in any quantity, from your local Sylvania distributor.

Sylvania Electronic Tube Division, Electronic Components Group, Seneca Falls, New York 13148.

SYLVANIA

SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS GT&E

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Collins Expands

A $9 million construction program is now underway at Collins Radio's Dallas location. Approximately 225,000 sq. ft. of manufacturing and 110,000 sq. ft. of administrative facilities are scheduled for Dec. 1966 occupancy.

Larger Tape Plant

Capacity of the Ampex magnetic tape plant in Opelika, Ala. will be nearly doubled with new construction scheduled to begin this year. The new facility, plus internal modifications now underway in existing buildings, will substantially increase manufacturing efficiency.

ABC Buys Audio Gear

The American Broadcasting Co. has awarded contracts totaling $523,000 to Gates Radio Co. for transistorized broadcast equipment to be installed in ABC facilities across the country. The order covers both TV and radio equipment, audio consoles for mobile TV vans, and audio systems for four major radio facilities.

Polaris Plans Merger with Natco

Officers of Natco Corp., Pittsburgh, Pa., and Polaris Corp., Milwaukee, Wis., have signed a letter of intent to merge; approval by directors and shareholders of both companies is required, as well as by appropriate governmental agencies including the FCC. Terms of the agreement involve an exchange of Natco cumulative voting preferred stock for common Polaris stock. Polaris stations include WTVW-TV Evansville, Ind.; KXOA Sacramento, Cal. (ownership of which will be retained); and KTHI-TV Fargo-Grand Forks, N.D.; KCND-TV Pembina, N.D.; WFIA Louisville, Ky.; and KPLS Santa Rosa, Cal. (which will be disposed of so that Natco can acquire two VHF-TV outlets in the top 50 markets). After the merger, Natco will own 3 V's: Augusta, Eldorado-Monroe, and Evansville.

G-E Gets 2-Way Contract

The FCC has awarded G.E.'s Communications Products Dept. a contract for a quantity of G-E MASTR Progress Line 2-way mobile radio units. The equipment is VHF-FM and will be used in various district offices.

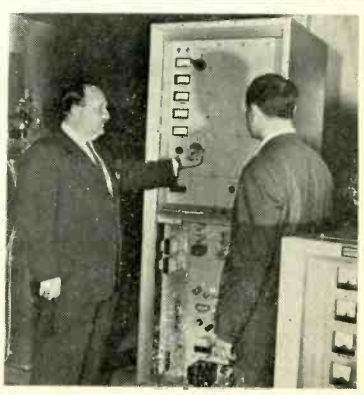
Spanish Net Buys EMI Gear

Central control and network switching equipment for the Spanish Television Network has been ordered from EMI, Ltd. Facilities for switching married audio and video and all video switching will be provided, using plug-in modular equipment. Special effects equipment and a storage system which will allow up to 10 picture sources to be pre-set on each program are included.

Portuguese Buy Marconi Xmitters

Radio Televisão Portuguesa is planning to install Marconi TV transmitters in its two new stations at Muro in the north and at Mendro in the south of Portugal. Installations at the Mendro station is already underway; scheduled to begin operation on Band III later this year, the station will use a 5-kw visual and 1-kw aural transmitter. The Muro station was scheduled to begin operating last December on Band I with a 10-kw visual and a 2-kw aural transmitter.

Spain's largest commercial radio network, Cadena Azul de Radiodifusion, has announced the purchase of Sintronic FM transmitters. Together with their Spanish distributors, Suministros Electricos Maldonado, Madrid, Singer Products Co. is inaugurating a program that includes the immediate delivery of 16 U.S. made transmitters and over 50 more to be manufactured under license in Spain. J. L. Dominguez, Technical director of Suministros Electricos Maldonado, observes the tuning procedure demonstrated by Alvin Schwartz, Singer vp.



A Cummins Generator may cost you far less than one more power failure!

Loss of business. Pilferage. Loss of life. Lawsuits. Prevent any one of these power failure problems—once—and you've paid for the best diesel generator you can own. Cummins.

For hospitals, radio and TV stations, bottlers, stores, plants, homes, and wherever else electrical power is essential, Cummins emergency power units have proved their worth. One failure, cost paid.

But let's talk about your specific needs. Call or send the coupon—we'll prove our point.

For complete information on Cummins emergency power, send this coupon to:

Richard Jonson, Manager, Emergency Power Section,
Cummins Engine Company, Inc.
1000 Fifth Street, Columbus, Indiana 47201

Name_____

Firm_____

Address_____ Zip_____

City_____ State_____

Look for Cummins in the Yellow Pages under "Engines—Diesel"

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Circle 11 on Reader Service Card

NAMES IN THE NEWS

William S. Evans has succeeded **La Motte T. Cohu** as president of Cohu Electronics. Mr. Cohu will remain as board chairman and chief executive officer. Mr. Evans was vp and director. **Robert E. McDowall,** vp and director, is now executive vp.

Warner T. Smith, vp of Superior Cable Corp., has been appointed to North Carolina Technology Utilization Board by Gov. Dan K. Moore.

W. T. Smith

W. E. Ross

D. Michael Ganley has been named assistant to Duane Crist, Ameco vp, contract sales. **William E. Ross** has been named to the newly-created post of sales admin. manager.

Harold W. Lindsay, former technical assistant to the chairman of the board of Ampex Corp. has been named manager, audio engineering dept. **Leon Wortman,** formerly product manager of CCTV systems and equipment, has been appointed manager, profess. audio products.

Vincent R. Borelli has been appointed Director of Marketing, Craftsman Electronic Products, Inc. He will be responsible for developing and directing the firm's national sales organization. **Matthew J. Lysek** has been appointed Sales Engineer for Craftsman, and will serve as a technical advisor to customers.

Howard N. Burkhart has been elected assistant treasurer of Memorex Corp. He was manager, accounting.

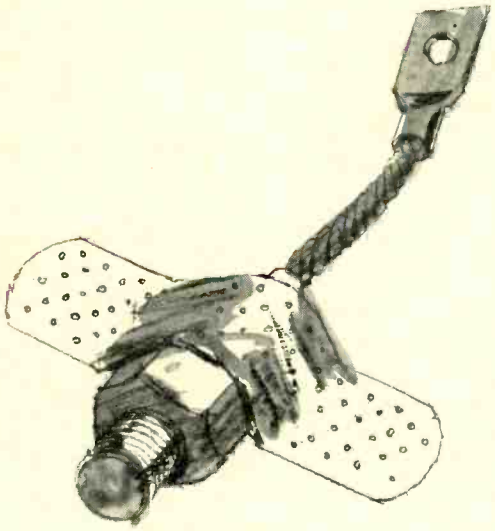
H. N. Burkhart

John Monte

John Monte has been promoted to the position of Sales Manager, CATV Div., Viking Industries. For the past 4 years he has specialized in handling turnkey and complete system rebuilding contract sales.

Clifford M. Kirtland, Jr. has been named vp of finance for Cox Broadcasting. Mr. Kirtland joined Cox in 1963 as secretary-treasurer.

Vroman W. Riley has been named manager, Jerrold Communications Systems Div. Mr. Riley was previously microwave sales manager with RCA.

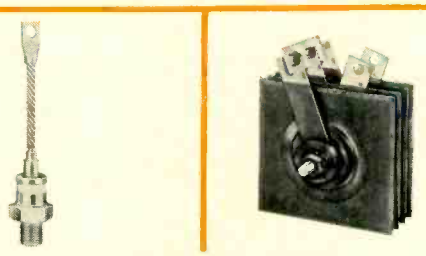


never needs first aid!

enduring toughness without special care!

No first aid needed! Syntron Avalanche Silicon Rectifiers are tough! Designed with built-in mechanical strength where it's needed. They provide protection against voltage transients. The Avalanche Silicon Controlled Rectifier gives you the same protection plus all diffused construction which assures exceptional uniformity and stability of characteristics. You get the dependability and efficiency you need to help you meet the highest standards of reliability and top performance.

Write for Detailed Information



SYNTRON

SYNTRON COMPANY

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66R9

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Mr. M. D. McGuire and the reliable CAS TRA-217 amplifier.

Let CAS stop your amplifier problems

More than 250 CAS amplifiers in Abilene, Texas, CATV system operate for 12 months without a single failure. That's over 1,500,000 amplifier hours of trouble-free operation.

How's that for reliability? CAS performance-proved TRA-217 solid state amplifiers are unaffected by lightning surges, transistor or other circuit failures . . . reduce subscriber downtime and keep component maintenance to a minimum.

"No Failures"

Listen to what Mr. M. D. McGuire, chief engineer of TV Cable of Abilene, Inc., says:

"We now have more than 500 CAS TRA-217 amplifiers in our system. Most of them have been in use since November 1964. After all that service we have had no failures. The CAS amplifiers continue to deliver signals with no deterioration and require a minimum of technical attention."

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INTERPRETING THE

FCC RULES & REGULATIONS

Revised Program Forms for Radio Stations

THE EXISTING program logging rules and programming section (Section IV) were developed in the mid-1940's at a time when television was still in its experimental stages, most AM broadcasting relied heavily on network feed, and renewal dates were determined by *frequency* rather than by geographical location. Thus, the old programming section and logging rules were devised for an entirely different situation than we face today. During the 1950's, television grew; AM stations became less and less reliant upon networks, and many more AM and FM stations went on the air. The Commission developed a keen interest in licensees' efforts to provide diverse programming in tune with the peculiar needs of those within its service area. Also, it became apparent that the broad logging rules provided no meaningful guidelines for log maintenance, resulting in widely varied abbreviations, legends, forms, etc., often difficult for the FCC to interpret. Finally, as the demand for spectrum space, frequencies, and channel allocations began to far exceed the supply, the Commission imposed requirements that would better enable it to make an *affirmative* finding that the licensees, in fact, are serving the public interest, convenience, and necessity.

The Commission's informal inquiries into these matters began some ten years ago, and it instituted formal proceedings in February 1961 with a Notice of Proposed Rulemaking. There were five Notices of Further Proposed Rulemaking, the last one in June, 1964. Innumerable comments from the industry were received and digested along the way, an *ad hoc* committee, with representatives from the NAB, FCC, and FCBA, was formed to make recommendations. *En banc* oral arguments were heard by the Commission, and six stations were used to test the new forms. Thus, after approximately ten years of diligent studies and comments, the Commission adopted the new program forms and logging rules on July 27, 1965.

There can be no meaningful discussion of the new program form and logging rules until the broadcaster recognizes the Commisson's basic purpose. In short, your program logs and Section IV-A of your renewal application must provide the Commission with facts and documentation as to the following:

(1) Your efforts to seek out and determine the needs of your audience and respond to those needs with programming;

On August 12, 1965, the Commission released its Reports and Orders amending the program **logging** rules (Report and Order, Docket No. 14187, FCC-65-687) for AM and FM stations and adopting the new Section IV-A (Report and Order, Docket No. 13961, FCC-65-686) for broadcast application forms for new stations, renewals, assignments, and transfers. While the instant changes do not now affect TV stations, it is highly probable that the Commission will release the new television program form and logging rules in the immediate future. While these will be somewhat more involved, they are expected to be closely akin to the AM-FM forms. This article deals with (a) the background of the new rules and (b) an analysis of the new program **forms.** Next month's article will deal with the new logs.

(2) Your ability to prove that you have performed in accordance with your last proposal.

The New Program Form—Section IV-A

In its July 27th Report and Order in Docket No. 13961, the Commission amended Section IV and adopted Section IV-A. The new programming form applies solely to AM and FM stations. The new Section IV-A will replace the old Section IV and will appear in applications for new stations and changes in facilities (FCC Form 301), renewals (Form 303), assignment of license (Form 314), and transfer of control (Form 315). The new Section IV-A employs different methods of inquiry, expands greatly upon the factual detail required to support the answers to the basic questions, and should better enable the Commission to determine if you have ascertained the needs of your audience, attempted to meet those needs, and performed in substantial compliance with your last proposal.

Section IV-A includes the following major subdivisions:

Part I —Ascertainment of program needs
Part II —Past programming
Part III —Proposed programming
Part IV —Past commercial practices
Part V —Proposed commercial practices
Part VI —General station policies and practices
Part VII—Other matters and certification

Part I may eventually become the most important part of your renewal application. The very nature of broadcasting enables the broadcaster to *know* what is happening of interest in his community and what his audience wants.

In reality, "surveys" of audience needs are not necessary or warranted. Additionally, a licensee can design a survey to say whatever he desires. Despite these facts the Commission, at this time, has seen fit to place great emphasis on the ascertainment of program needs. Therefore, it is incumbent upon licensees to plan and annually conduct at least one thorough "survey," or several informal surveys, to determine the tastes, needs, and desires of its audiences and to compile definitive records to substantiate these findings. Even the smallest station should take some *concrete action* in this area.

What kind of documentation does the Commission expect? How much will be required? There are no "rules of thumb" or formulas, but it is evident that you are expected to exert a "reasonable" effort in this direction. What might be construed as "reasonable"? The size of the station, the market, and the profitability of the operation would be considered in evaluating the licensee's efforts. Without the benefit of any formal indication from the Commission on this point, it is suggested that you determine the number of program opinions, appropriate for your station, with the aid of *your* legal counsel.

The question remains, "What survey methods might prove most satisfactory?" Of the numerous possibilities, the following alternatives are suggested:

(1) Have members of your staff, who belong to various civic groups (e.g., service clubs, philanthropic organizations, PTA, citizens' associations, religious groups, and the like) conduct *oral surveys* and submit periodic memoranda to you as to the results and/or have *brief questionnaires* completed and tabulated for your use. Actually, the distribution and tabulation of questionnaires on 3 x 5 cards would be less time consuming than posing the questions orally and preparing a memo on the results.

(2) Keep a record of community (program) contacts by your staff.

(3) Send out form letters, seeking opinions on programming.

(4) You might retain an independent survey firm.

(5) Periodically, broadcast a request for such information from your audience. You might offer a small prize for the best recommendations.

Regardless of the methods you employ to obtain documented indications of the interests of your audience, you should:

(1) Immediately set up procedures, policies, and plans to obtain such evidence;

(2) Examine the survey results carefully;

(3) Prepare a brief resume of each survey to be included in your renewal application;

(4) Make some effort to adopt the meritorious suggestions received.

If you should choose to ignore the Commission's manifest interest in this area, you can expect little understanding and no "special consideration" whenever your operation is placed under FCC scrutiny.

The remainder of the new program form places its emphasis upon your percentages of *news, public affairs*, and all other programming (exclusive of entertainment and sports), and your commercial content. Your future renewals will include less statistics and more explanation.

The *effective dates*, as modified, of the new AM-FM program forms (Section IV-A) should be noted. (See *Supplement to Report & Order* in Docket No. 13961, FCC-65-818, adopted September 15, 1965.) They are as follows:

Effective Date	*Application*
November 1, 1965	(1) Form 301 for *new* AM-FM stations
	(2) Forms 314 and 315 for assignees and transferees (buyers)
January 1, 1966	Form 303 for *renewals* (applies to *proposed* programming only)
November 1, 1966	Form 303 for *renewals* (The entire new Section IV-A becomes effective.)
December 1, 1966	Forms 314 and 315 for assignors and transferors (sellers)

In several places throughout Section IV-A (e.g., Part II, paragraphs 3 and 12; Part IV, paragraph 25) you are given an opportunity to explain how and why the program and/or commercial percentages do not accurately reflect your programming. You must remember that you will be judged on the old "proposal versus performance" test; you will be wed to the percentages in the absence of explanatory statements. Therefore, unless those percentages are 90% or more accurate, you would be well advised to qualify them. Additionally, if, in between renewals, your percentages vary 10% or more of the time from those proposed, write the Commission and put it on notice of the changes.

To appreciate and understand fully the new program logging rules, which will be discussed in detail in next month's article, it is essential that the licensee thoroughly comprehend the background and purpose of the new Section IV-A. Too many licensees have looked upon the new logging requirements as the essential thing and have paid little attention to the new program form. It is vital that the licensee recognize the basic fact that the only reason for the new logging rules is to develop the information requested in the program form. If the broadcaster fails to study the new program form now, and take definite steps to amass the information sought therein, the station may be in serious trouble at renewal time. ●

Henry Declares War on 'Trivia'

The FCC's Policy Statement on Comparative Broadcast Hearings, issued last July, may be just the first step in the Commission's efforts to cut down on "trivia" and "red tape." Or at least this is what one might assume from Chairman E. William Henry's remarks of January 17 before the FCBA. The following excerpts from his address outline several meaningful "benchmarks"

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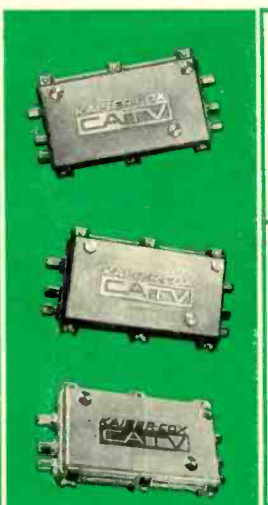

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broadcasters might observe in their future dealings with the Commission.

"Improving the FCC's hearing process—or, if you will, cutting its procedural red tape—is obviously an important matter. Certainly it is an apt subject for New Year's Resolutions. . . .

"What we have been able to do encourages me that we should be able to do more. . . . To begin with, I would insist upon the stricter enforcement of our existing procedural requirements, most particularly those relating to the number, form, and time for pleadings. Generally speaking, late, superfluous, and dilatory pleadings should be rejected out of hand. . . . Furthermore, extensions of time . . . should be discouraged and kept to the irreducible minimum. . . .

"Secondly, we must explore ways to find a simpler and more informal process for the minor classes of adjudicatory matters. . . . We can also improve the efficiency of the hearing itself. For example, our current procedures provide that any party to a hearing may insist upon an oral presentation . . . we might well amend our rules to allow Examiners to require written presentations. . . .

"Next, I believe we should commence a thoughtful exploration into selectively increasing those hearing matters which can be turned over to Examiners. . . .

"If we are to bring about meaningful improvements in our hearing process, we must declare war on trivia. . . . We have already attacked this enemy on several fronts. Let me mention two of the most important—and controversial.

"First, we have taken many matters out of the adjudicatory process entirely. We have done this by handling a number of regulatory problems through rule making rather than *ad hoc* adjudication. . . .

"The second front in our war against trivia has been our effort to control the comparative hearing. . . . Our response has been the Policy Statement on Comparative Broadcast Hearings issued last July. . . . Past hearings have often featured hot contests among applicants over immaterial differences that failed to figure in the final agency decision. . . . Now, under our new Statement, no inquiry into these areas will even be permitted except upon a threshold showing that a distinctive record or deficiency exists and is worth exploring.

". . . I am hopeful that the Policy Statement will reduce the comparative problem to manageable dimensions. . . . If comparative hearings under the Policy Statement do *not* improve substantially, however, I am prepared to explore seriously some of the more radical proposals we have all heard in the past. Many alternatives have been suggested: an award to the first qualified applicant, auction to the highest bidder, choice by lot among those meeting high minimum qualifications, and enforced merger of qualified applicants, to mention a few. . . . Let me say that I raise these possibilities . . . quite seriously. If, in the end, the whole tortured comparative hearing process is not substantially improved, then it is not in the public interest to waste our time, your time, and everybody's money on a process that often resembles a hollow charade." ●

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TV Antenna Systems Performance and Measurement

By H. E. Gihring and M. S. Siukola

What constitutes good antenna system performance? How can it be measured to determine if expectations are met? How should the system be designed to best fulfill these expectations? These and other far-reaching questions are answered, and the mystery of the 1.1 VSWR requirement is dispelled.

ALONG WITH the growth of TV broadcasting, the state of the art has greatly improved. At the same time, the complexity of the antenna system has increased. As a result, the requirements for both performance and realiability must be re-evaluated. These requirements are:

1. No visible ghost.
2. Properly installed fault-free components.
3. Proper load presented to the transmitter.

The required specifications to meet these requirements include a means of determining the far-end reflection and the reflections from each component, and a limit on the impedance value presented to the transmitter.

Antenna System Requirements

About 20 years ago, when TV antennas were first designed for quantity production in the present VHF bands, the ghost arising from too great a mismatch was recognized as a limiting factor. Tests were made on a long line to determine what far-end mismatch would produce a visible ghost. It was found that a mismatch giving a VSWR of 1.15 was clearly visible. A 1.1 VSWR was just below threshold at normal contrast and was chosen as an acceptable value. The specification was applied only to the far-end reflection, from the antenna only. This was a good standard to follow in view of the type of antenna systems employed at the time, but changes in present-day systems and requirements have outdated it. The VSWR value of 1.1 was a means to an end—*namely, that there be no visible ghost under normal viewing conditions.*

Early TV installations were fairly simple. The transmitter was often located in a downtown building and towers were generally only 200 or 300 feet high. A superturnstile antenna was placed on the tower and two 3-inch coaxial lines ran directly through a diplexer into the transmitter. Since then, however, transmitter sites have been moved beyond the city limits, where space permitted the erection of taller guyed towers. The transmitter building is usually located some distance from the tower base to minimize damage from falling ice. This necessitated longer transmission line runs. In the move from downtown, new equipment was often obtained so that a spare transmitter became available. This necessitated a switching system. As a means of assuring that all of the components met requirements, the 1.1 specification was applied not only to the antenna but to the whole antenna system. Towers were still of the order of 500 feet and systems were not too complex.

Now, 1,000-foot towers have become common, and the complexity of systems has increased still further. Other items, such as harmonic filters, patch panels, 6″ line with adaptors and transformers to 3″ line and similar equipment, are now being used. As systems become more complex, it is increasingly difficult to meet the 1.1 VSWR system specification. Sometimes there are so many components that the VSWR up to the building wall approaches 1.1. Meeting both the performance and reliability requirements, with a VSWR specification only, is becoming increasingly difficult—and, as it turns out, also unnecessarily stringent. A different and more appropriate method is necessary—*namely, a means of determining that all of the components are performing properly and are correctly installed.*

When making system impedance measurements, VSWR readings are often taken every 0.1 megacycle across the 6-mc channel. In these readings, a cyclical variation takes place, as shown in Fig. 1. The cause of this variation can be explained in the following manner: There are, in most TV antenna systems, two groups of components—the close-in components in the station, such as elbows, gas stops, etc, and the far-end components such as the antenna and also some additional elbows. The close-in and far-end components are connected by a run of vertical transmission run, as shown in Fig. 2. At a given frequency within the channel, the close-in and the far-end component reflections add, giving a relatively high value of VSWR. At a slightly higher frequency, the electrical length of the line is one quarter of a wavelength longer, causing the close-in and the far-end components to cancel, resulting in a relatively low VSWR. For a 1,000 foot line there will be about 12 cycles, as shown in Fig. 1.

The number of cycles is independent of frequency, and is therefore the same for all TV channels. It depends only upon the total length of the transmission line and the velocity of propagation. For an air dielectric line, the approximate number of cycles for a 6-mc channel is L/82, where L is the total length of the line in feet. Depending upon the reflection values of the far-end and close-in components, the VSWR could, for instance, range from a very low value up to 1.2 or 1.3. Hence, the question arises: *What type of impedance should be presented to the transmitter by a TV antenna system to assure proper transmitter performance and safety of the components?*

Research has shown that good system performance can be obtained by following certain methods. Some areas are critical and some are not. To apply the same design criteria to the whole system and at all frequencies in the channel is unduly restrictive in some areas and not sufficiently restrictive in others.

Authors are staff members, RCA Broadcast and Communications Products Div., Antenna Engineering Center, Gibbsboro, N.J.

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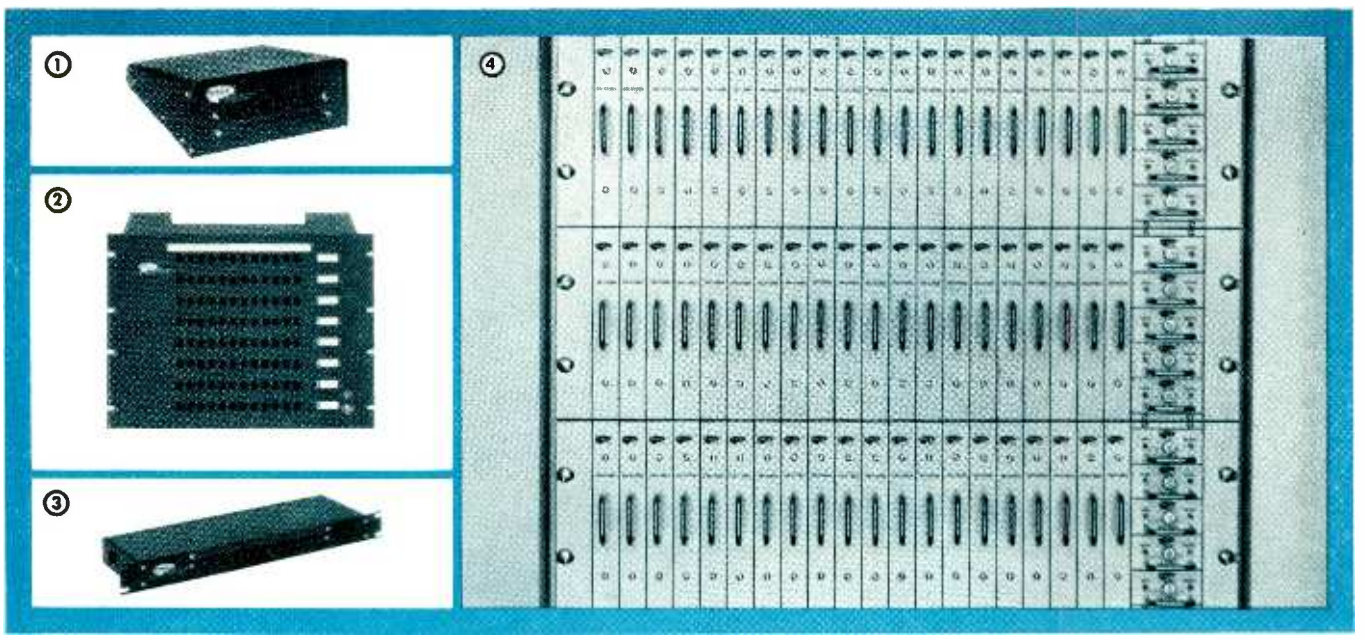

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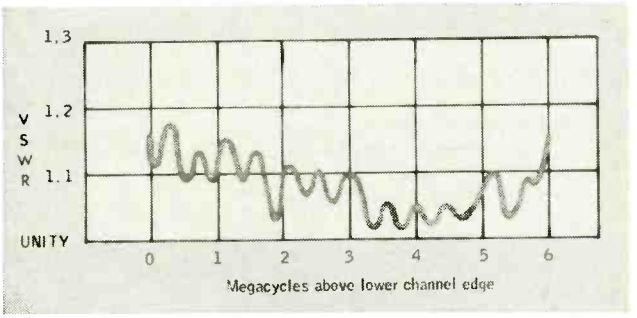


Fig. 1. Plot of VSWR vs frequency for a typical TV antenna system when the total transmission line length is 1100 feet.

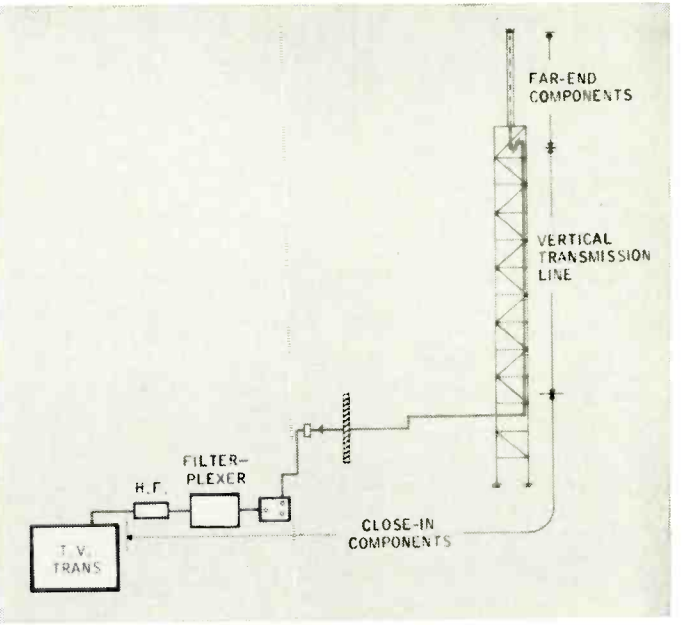
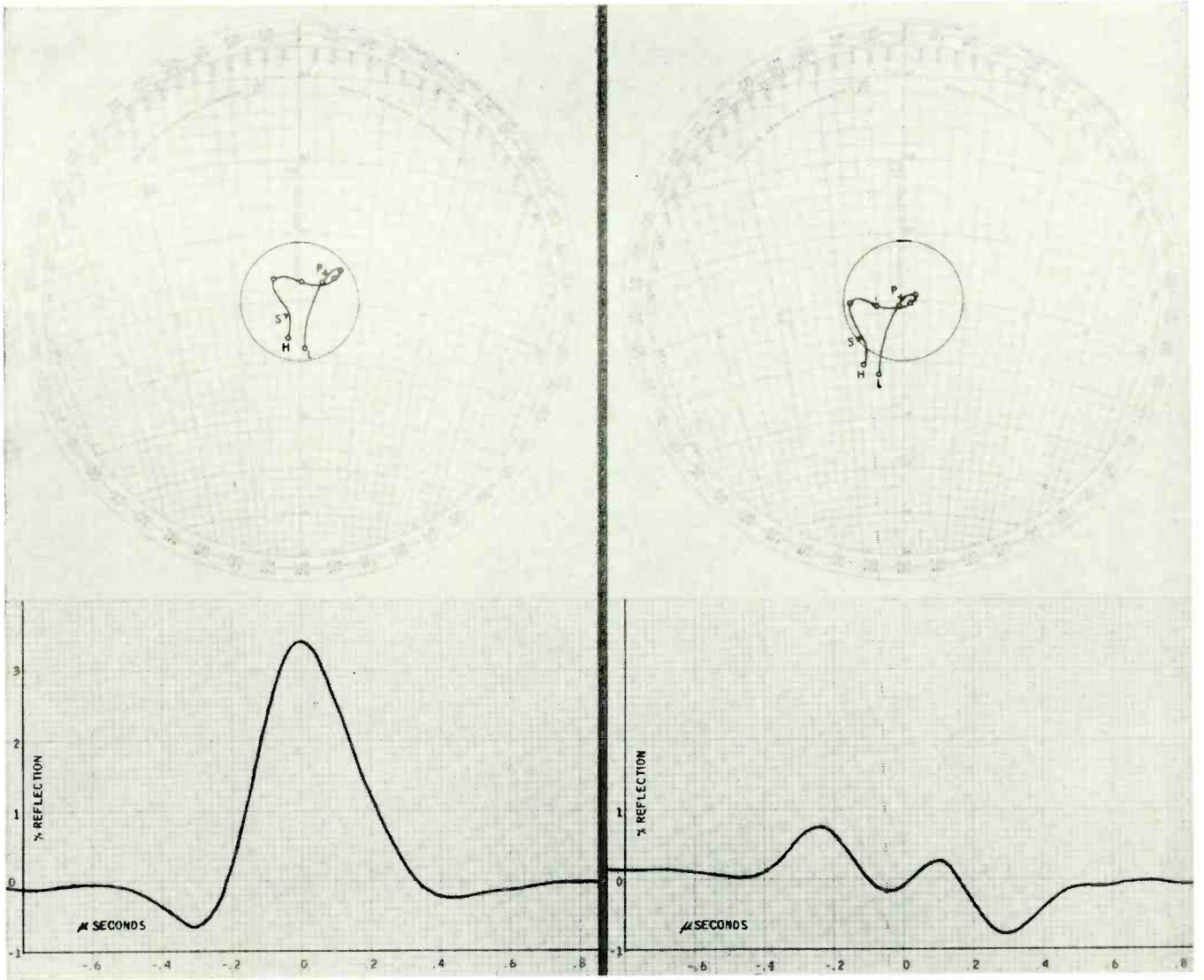


Fig. 2. In typical antenna systems, reflections from the discontinuities of close-in and far-end components alternately add or subtract as the electrical length of the transmission line varies with frequency. The resulting cyclical variation is shown in Fig. 1.

Fig. 3. Impedance plot enclosed by a 1.1 circle. Symbols L and H are the low and high ends of the 6-mc channel. P and S are the locations of the picture and sound carriers. All other dots are 1 mc apart.



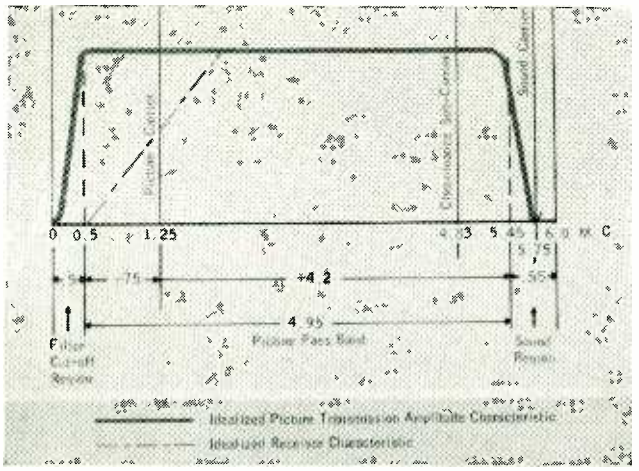


Fig. 4. Idealized picture transmission amplitude receiver characteristics. Note that the lower and upper 0.5-mc segments are not in the picture pass band.

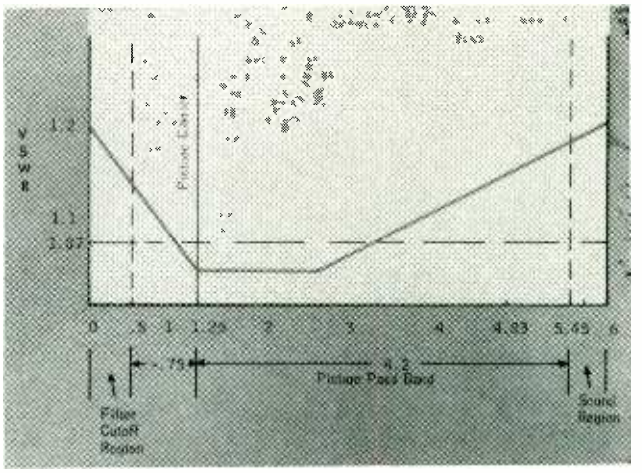


Fig. 5. If the RF pulse method is not used, a V-shaped VSWR antenna specification will provide a lower value of reflection than a flat VSWR specification.

All ghosting as a rule is the result of far-end reflection. The far-end components consist of the antenna and usually an elbow complex of some type. Historically, antennas have been built to a VSWR specification of 1.1 for all frequencies in the 6-mc channel. If an antenna having a VSWR of exactly 1.1 across the channel were built, the reflection percentage would be very close to 4.75, which, at the end of a long transmission line, would produce a visible ghost. Knowing this, manufacturers have for many years designed antennas with lower VSWR values (as far as the state of the art has allowed) at the important portions of the channel, thus producing better antennas which would minimize visible ghosts. Hence, in determining far-end reflection limits, either a modified VSWR specification or an RF pulse specification may be used.

However, if an RF pulse specification is used, there are good reasons for not using the VSWR specifications simultaneously, since the two are often mutually incompatible and the results may be detrimental to best performance. For example, the upper left portion of Fig. 3 shows the Smith Chart plot of a TFU46K antenna enclosed by a 1.1 circle. For this condition, the VSWR at the picture carrier frequency would be 1.06 and at .75 mc higher would be 1.08. The reflected signal calculates to be 3½%, as shown.

On the other hand, if the designer were permitted the liberty of placing the impedance plot on the Smith Chart in relation to the 1.1 circle as shown on the right in Fig. 3, the VSWR at the picture carrier and somewhat above it would be less than 1.015. The calculated reflected signal in this case is 0.8%, notwithstanding the fact that the VSWR at the low and high ends of the band are no longer at 1.1 but 1.13. But since the lower and upper 1/2 mc are not in the picture pass band, as can be seen from Fig. 4, and for other reasons, a VSWR specification would be more beneficial if it were V-shaped instead of flat —for instance, one that would allow a 1.2 specification in the lower and upper half megacycle of the channel and a lower value such as 1.05 at picture carrier, as shown in Fig. 5. However, if an RF pulse value is specified, a simultaneous VSWR specification would only be redundant and may result in a situation where best performance is not possible.

Elbow Complex

As for the far-end elbow complex, Fig. 2 depicts a common method for connecting the input of the antenna to the vertical transmission line run. With 3-inch line, a two-elbow complex is possible since the vertical run could be moved sufficiently to disengage the elbows. However, with 6-inch and larger transmission lines, a group of four elbows is usually used. Components of this type, especially when they cover a large frequency band, cannot be made completely transparent and some small reflections will occur. Often, due to space restrictions, it is not possible to select the best separation between elbows so that the small VSWR of each may add directly. The cumulative VSWR can be significant, especially since the picture signal "sees" all of the tower top components, including the elbows, as one reflection point. Hence, it is general practice to match the elbow complex with a slug to minimize its reflections.

There is also a practice followed in certain situations to optimize far-end impedance by use of a variable transformer. Consisting of a piece of transmission line containing a series of movable probes, it is adjusted for a minimum RF pulse reflection value. Such a method has considerable merit but must be used with some discretion; its effectiveness depends on the electrical separation between the reflection source and the variable transformer (generally the electrical length between them, but in some cases, depending upon the "shape of the impedance curve," it may be appreciably more). The optimizing becomes gradually less effective as the separation becomes greater and ceases to be effective at about 100 feet for air dielectric lines, since the negative "bump" from the transformer becomes displaced in time from the reflection it is supposed to eliminate.

Generally, it is more desirable to initially design antennas with an impedance characteristic which will provide a minimum reflection from an RF pulse, rather than to optimize after erection. However, this may not be possible in some situations. Certain mathematical analyses indicate that the frequencies from the picture carrier upwards for about a megacycle must have the best match for a minimum RF pulse reflection. If the antenna is designed and built in accordance

Measuring TV Antenna System Performance

There are three general methods for determining design specifications and measuring performance: System VSWR measurements, RF sweeper method, and RF pulse method.

System VSWR Measurements: A signal generator, slotted measuring line, and VSWR meter are required. Readings are taken every 0.25 or 0.1 mc, depending on the length of the transmission line run. The equipment is relatively simple and readily available, and the whole system can be measured, thus providing a steady state value of VSWR for the sum of all the components.

Disadvantages: All discontinuities in the system are added vectorially, making the result difficult to analyze. This can be seen from Fig. A, which depicts several periodicities. The rapid fluctuation every 0.5 mc indicates that the length of the transmission line run is about 980 feet. There is also a 4-mc period indicating that there are two discontinuities 120 feet apart—the mean value a-b, which is 1.12, and a variation from this value, line d-e-f, which is ± 1.03. The latter could be the tower base elbows, while the 1.12 value could be the close-in components in the transmitter building.

Summary of the Three Measurement Methods

Requirement	METHOD		
	VSWR with slotted line	VSWR with RF Sweep	RF Pulse
No visible ghost	Indefinite	Medium	Excellent
Properly installed components	Poor	Poor	Good beyond 150'*
Proper impedance termination to transmitter	Good	Fair	Poor

*Excellent if an RF 0.02 μs RF pulse width is used. A DC pulse method can also be used.

Now the analysis becomes more difficult. The average value of the rapid fluctuations (line d-e-f) could be the summation of the close-in components, while the value "c", which is one-half the 0.5-mc period fluctuation, could be the far-end components. On the other hand, the two could be reversed. Furthermore, since the curve touches the unity value of VSWR at 2 mc, the values could switch at this point so that line d-e-f could represent the far-end components from 0 to 2 mc. and the close-in components from 2 to 6 mc, or vice versa. Such a conclusion would, of course, invalidate the 4-mc analysis made above.

While a number of hypotheses can be formulated from these measurements, the most important value, namely the VSWR of the far-end components, is extremely difficult to determine. Additional information can be obtained by making changes in the station or by having a rigger make tower top changes which would indicate which value was "close-in" or "far-end". However, such a procedure is somewhat laborious.

System VSWR measurements are not well suited for periodic check-up purposes, since results may vary depending upon the location of the measuring point, the adaptor components utilized, and for UHF the VSWR vs frequency curve may change with temperature. (A 50°F change for a 1,000-foot transmission line will change the physical length of the line by a quarter wavelength at about Channel 25.)

Plots of VSWR vs frequency, similar to the one in Fig. A, have a sinusoidal type of variation in which the values may range, say, from a match to as high as 1.3. This variation is usually the summation of two fixed values of impedance separated by a transmission line. If a proper analysis of this impedance is not made, false conclusions may be reached regarding the operation of the antenna system and also the effect on the transmitter.

RF Sweeper Method: In this method, an oscillator is varied to produce the RF frequencies in the 6-mc band at a sweep rate of 60 cycles or more so as to obtain a bright enough image on an oscilloscope. A delay line about 500 feet in length is used in series with the station transmission line as shown in Fig. B. A calibration point for 100% mismatch is obtained by opening the line at "m". The peak to peak oscilloscope deflection is usually set at some given figure, such as 4 inches, as shown at "a". A trace is then photographed when the delay line is terminated in a matched load at point "n". If the delay line is perfect, the trace should be a straight line as at "b". With the delay line connected to the antenna, a trace as at "c" is obtained.

The far-end VSWR can be calculated from this trace as shown at "d". A low frequency deviation may also occur as shown. This is a measure of the close-in mismatches and can be calculated both in magnitude and location in a similar manner. The equipment is more portable than a measuring line, especially for the lower channels. Also, this method overcomes one disadvantage of the measuring line in that VSWR values of far-end components having a more rapid variation, ΔF_1, can be separated from the close-in and delay line effects. The close-in components will cause the periodicity corresponding to ΔF_2 in Fig. B. Because of this, the method is most useful for checking antenna systems as well as the far-end components of the system.

Disadvantages: The location of faults in the transmission line has almost the same severe limitations as VSWR measurements. In addition, a good portable delay line is not available at UHF channels. While a 1/2-inch styroflex line has been used, the high attenuation makes a very high power oscillator necessary. The line to the antenna can be used, but obtaining a calibration point by, for instance, opening the line near the top the tower, imposes difficulties. Furthermore, the close-in VSWR values will not be obtained. Finally, while the oscilloscope trace provides a measure of the impedance presented to the transmitter, it is not as precise in this respect as the measuring-line method.

RF Pulse Method: In this method, actual picture transmission conditions are simulated by sending an RF pulse through the antenna system. The pulse often used is 0.25 μs at the −6 db level, representing the narrowest pulse that can be transmitted through the TV system and also one which has the highest energy content in the higher order sidebands. The carrier of the pulse is centered at the visual carrier of the

channel to simulate the visual transmitter. A reflectometer is used to sample both the incident and the reflected signal. A block diagram of the components is shown in Fig. C. Both signals are detected in equipment having an ideal receiver characteristic using the vestigial sideband transmission principle. The pulse rate is the same as the horizontal line frequency of about 15 kc, although this is not at all critical.

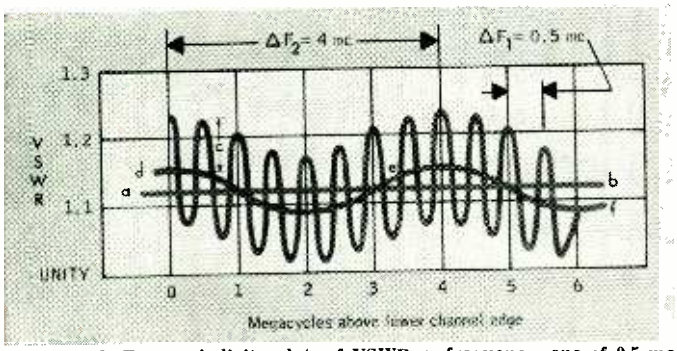


Fig. A. Two periodicity plots of VSWR vs frequency, one of 0.5 mc where the two discontinuities are separated about 980 feet, and another of 4 mc where they are separated about 120 feet. The VSWR values of the three discontinuities can be determined approximately. The separation between discontinuities can be calculated from the formula L = 491.5/F, where F is the frequency change in mc from peak to peak.

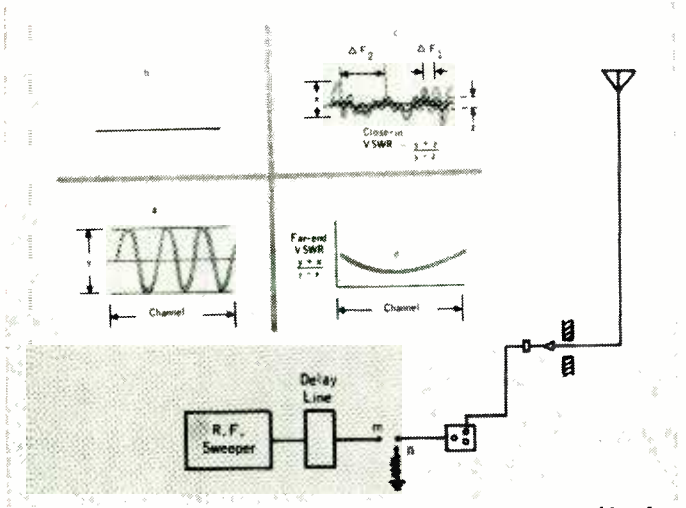


Fig. B. Using a delay line, the RF sweeper method provides far-end and close-in VSWR values as well as the distance between any discontinuities from the L = 491.5/F relationship.

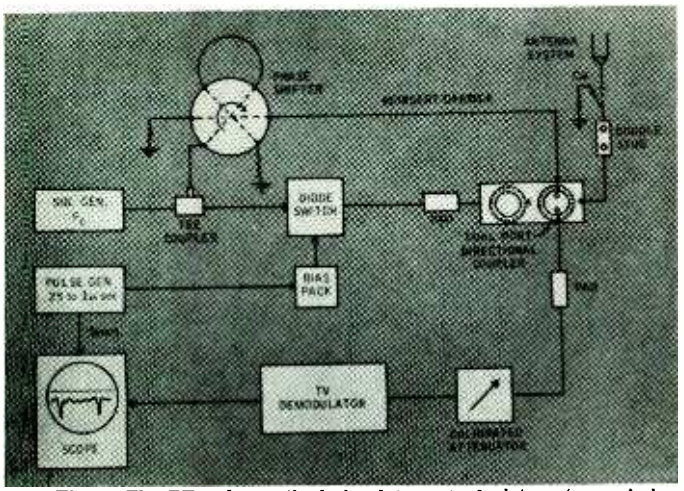


Fig. C. The RF pulse method simulates actual picture transmission and accurately measures the reflection from both the far-end components and the transmission line.

Both incident and reflected signals are displayed on an oscilloscope, and an amplitude comparison of the two values is made. An oscilloscope trace with the reflectometer in the reflected position is shown in Fig. D. The phase of the carrier compared to the reflected sidebands is adjusted by a line stretcher or phasor so as to measure the maximum relative reflected voltage, thus representing the most pessimistic condition. The amount of reflection from the far-end components is specified as a percentage of the input pulse magnitude, 3% being a typical value.

Other reflections in the system, such as the transmission line, are specified for a lower value, typically 1%. Since the display on the oscilloscope is on a time base which corresponds to distance, the location of such reflections can be determined. For an 0.25-μs pulse, discontinuities occuring within a distance range of about 100 feet will appear as one reflected pulse. In special cases, such as a candelabra installation where an antenna system including all of the far-end elbow complexes may be located over a distance greater than 100 feet, a longer RF pulse should be used so as to summate these effects for the longer pulses that may appear in TV transmission. A longer RF pulse should also be used for any situation where an accumulation of reflections over a distance of greater than 100 feet is suspected.

The RF pulse method gives the best measure of actual system performance since it utilizes actual picture transmission methods. In the analysis, the most

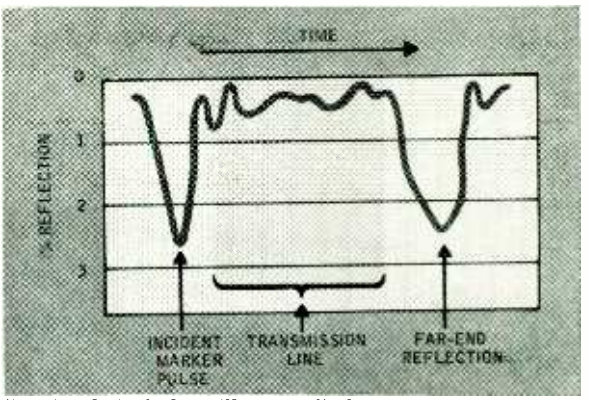


Fig. D. A typical oscilloscope display using the RF pulse method.

pessimistic conditions are sought by using line stretchers to adjust the phase for the maximum RF pulse reflection. The method fulfills the requirements for best analyzing the pertinent characteristics of the antenna system. It gives a clear, definite indication of the far-end reflection, which can be directly related to ghosting. It displays the transmission line run on a time base at the RF frequency used so that faults are shown with respect to both their amplitude and location.

Disadvantages: More instrumentation is required than for the other methods. However, the quantity and complexity of equipment has been reduced considerably in the past few years. While the RF pulse method pinpoints line faults more accurately and reliably than the other two methods, the pulse width of 0.25 μs precludes their location to within 100 feet. However, by using a narrower RF pulse of about 0.02 μs with the same basic equipment, faults can be located to within 10 feet, including the first 150 feet from the transmitter. The method does not, however, indicate the impedance presented to the transmitter.

with the curve at right in Fig. 3, or with Fig. 5 in general, optimizing will probably not be necessary or, at the most, used only as a means of gaining a slight additional improvement. Hence, by the proper use of techniques which will permit the antenna system to be designed for minimum RF pulse reflection, optimization would not be necessary in most cases.

Properly Installed Components

Naturally, high quality components having the latest engigineering improvements should be specified. Also, proper transmission line lengths must be used to prevent the addition of discontinuities within the channel. Equally important is the layout of the transmission line system. Transmission line components, including elbows, gas stops, reducers, transformers, etc., are not completely transparent. Thus, a minimum number should be used. The tower top elbow complex should be matched to make it as transparent as possible. It may also be desirable to match the components at the tower base, especially if there are more than one and the horizontal run is more than 50 feet.

Components in the station do not affect picture performance, but they may change the impedance of the transmitter termination. If the number of components used are such that the VSWR from the transmitter to the station wall could appreciably exceed 1.1, it may be advisable to optimize them in order to have a total system VSWR, as seen by the transmitter, at a safe level, such as 1.3.

If installation of the transmission line starts at the transmitter and proceeds toward the antenna, progress can be watched with .02-μs pulse equipment and reflection values above the general level investigated immediately. Installation practices recommended by the manufacturer should be followed.

To meet the performance standards for today's TV antenna systems, the RF pulse method is best for determining far-end reflection since the percentage values can be directly related to ghost visibility. Typical values are of the order of 3%, although in some of the earlier designs, variable transformers may be required to meet this specification. As an alternative specification, the RF sweep method determines VSWR values of the far-end components and provides a usable evaluation with simpler equipment. A V-shaped VSWR curve will give lower reflection values than flat 1.1 VSWR specs.

The RF pulse method will spread out the entire system on a time base and show the location of faults. Typical reflection percentages are 1%. As an adjunct, and not a specification, an RF pulse of .02-μs can be used to locate faults more precisely. A DC pulse can be used if its limitations are recognized. The effect on picture transmission is best analyzed with the 0.25-us pulse. The .02-μs pulse equipment is more of a diagnostic tool to find the exact location .

The best approach to proper impedance termination at the transmitter is a VSWR measurement using either an RF sweeper or measuring line. The purpose of this measurement is not to check ghosting or system discontinuities, but only to see that the impedance presented to the transmitter is acceptable. A value of 1.3 at the carriers has proven to be generally acceptable. ●

So far, there's only one applicant

It's Lenkurt's 76 TV microwave transmission system.

This is the system that's bringing top-quality color and black & white TV into areas where they used to think something was wrong with their picture if it didn't have snow most of the time.

For instance, take the 76 TV Studio Transmitter installation at station KOLO-TV in Reno, Nevada. Since the 76 is transistorized, the new system operates with practically no maintenance, quite a bonus to KOLO-TV because one of their microwave terminals is located on Freel Peak, where 20 foot snows and 100-200 mile winds are not uncommon.

Another outstanding feature of the 76 system is its versatility. At the University of Kansas Medical Center, a 76 ETV system makes it possible for students to participate in classes being presented at a sister campus, 45 miles away. This is one of the few two-way ETV systems in existence. This system is significant because of the high resolution it provides for remote observation of medical techniques.

And the Columbia Basin Microwave Company is using our microwave to transmit two off-the-air pickups through an extensive 76 network to serve several CATV companies and school districts.

So, whether you're planning a community TV setup, an Educational TV program, or want to join a network, *and* you want rugged, reliable equipment to help with top-quality color and black & white TV transmission, you'd be doing a smart thing to write us for the resume on our money-saving, solid-state 76 TV microwave system.

Lenkurt Electric Co., Inc., San Carlos, Calif. Other offices in Atlanta, Chicago, Dallas, and New York City.

LENKURT ELECTRIC

SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS GT&E

Circle 19 on Reader Service Card

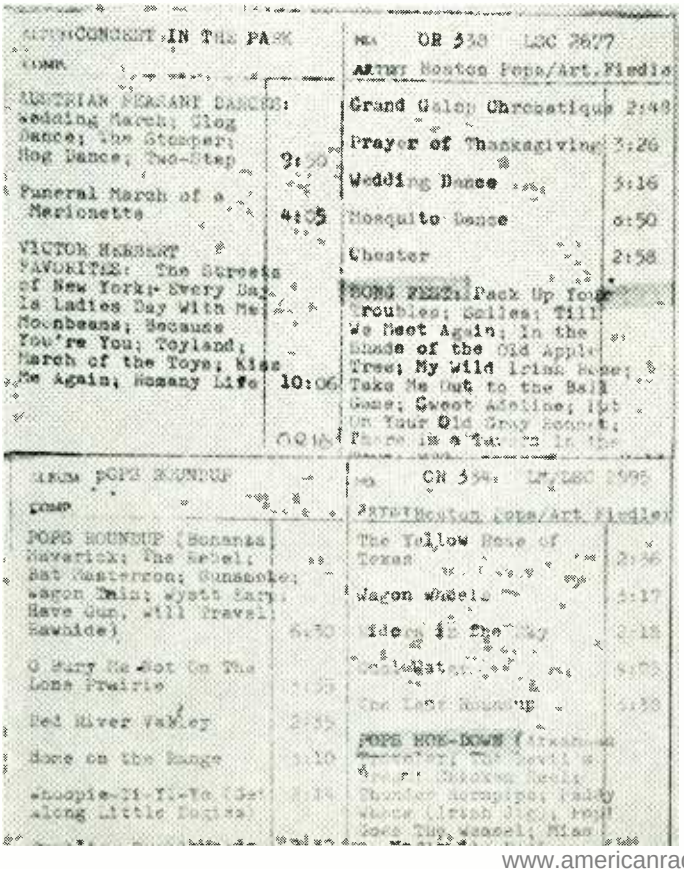
A music slot for each day has a folder for program data sheets prepared in advance. Programs are planned 8 weeks in advance to allow for printing time.

Building An FM Station —FROM CP TO SIGN-ON

Carl B. Haeberle and James W. Davis

Part 5: Programming for our new FM-stereo outlet took on an importance worthy of a 1st-Class AM facility!

The serated, 4 x 6 3-up cards used for record filing list pertinent data on each album to aid program preparation.



WHILE IT WAS NOT our intention to program for specific ethnic groups, we felt that there was a need for more European-style music, at least during some time periods. Also, in conjunction with our "foreground" music concept, we wanted to establish a distinctive sound, so that when a listener tuned across the dial he would immediately recognize WAJR-FM without hearing the call letters. Music preferences were made known to us as soon as the intention to build the station was announced. Through letters and personal contact, many people were quite generous with advice. Then, too, we had an accumulation of comments on music tastes in our AM file. With these guideposts, plus the manager's 20 years experience in the market, we developed our program structure.

Programming Techniques

To prepare programs initially, a trained musician and two temporary programmers were hired, each schooled in certain types of music. The intention was to set up a 6-month schedule, after which the permanent programmer could handle the job by merely inserting new material with the best of the previously used music. Before planning a daily schedule, the programmer checks the preceding week's list to avoid duplication of feature material, thereby guaranteeing a 2-week separation of featured artists and music.

A feature artist is selected for each 45-minute time block. Two cuts by the featured artist, then a cut from a blending orchestra or group, then back to the featured artist for another one or two cuts, make up a typical segment. A third element adds another blending or contrasting group, then a switch back to the featured artist. The "featured artist" policy permits a complete day's programming with a minimum of duplication, even though different programmers work on separate blocks. These are distributed so that the programmers' style does not get stale to a constant listener.

In stereo programming the lack of music in some categories becomes a critical factor. Due to a shortage of records and a strict music policy, the programmers were virtually forced to follow a set format in major daily programming blocks.

Initially, we figured a programmer would need only 15 minutes to program each hour; this, however was a 50% error. We quickly discovered that it takes approximately 30 minutes to program an hour of music, if the desired quality is to be maintained. Five normal cuts are programmed per quarter hour. The transmitter studio operator justifies the program list at the close of the hour by deleting unnecessary cuts. To properly close the hour, the last indicated disc is back-timed. If it appears that he will run short, the operator inserts additional music listed on a standby disc prior to the last scheduled cut. The standby records are chosen so that, although the given selection may not be ideal in that given position, it will not be entirely out of place.

Mr. Haeberle is production director and Mr. Davis is C.E., WAJR-FM, Morgantown, W. Va.

Production Liaison

Program openings and closings and half-hour announcements and breaks are recorded on reel-to-reel tape; promos and commercials are recorded on cartridges. The operator at the transmitter studio need only start the reel-to-reel tape for beginning, half-hour break, and closing. The music sheet prepared by the programmer tells him which cuts to play on each album. Since the operator works a 9-hour shift, as many breaks as possible are figured in the program schedule, even though they may be only 3 or 4 minutes. Most featured material for each program is selected from the same album, thus, the operator has to change only the accent disc. Records and tapes are transported between the program department on a daily basis, except for the week-end material, which must all be packaged on Friday. Announcement and intro tapes are recorded by an AM announcer who devotes about two hours a day to provide control and direction.

We had hoped to operate with one part-time secretary-librarian. This turned out to be a 50% time study error. With traffic, posting programmed music to the log, and the rather extensive work of handling record ordering, the job definitely requires a full-time girl.

Program Control

To maintain quality programming, air checks are made by almost all section leaders. The Chief Engineer makes a daily trip to the transmitter if for no other reason than to inspect the area and to check on operator problems. Programmers air-check their program blocks against the music file list to insure continual attention to the log, and management listens for proper program concept. To maintain a logical means of control, engineering problems—including sloppy board work—are referred to the Chief Engineer; administrative problems are taken to the Production Director, and music errors are referred to the Chief Musicologist. All concept questions are settled by the Production Director. Due to the limited contact between operators and programmers, if an indicated record cut is bad, the operator notes the fact on a Daily Problem Sheet which is returned to the program department.

Program Log Forms

Program logs presented a challenge at the outset. Since the station was to operate on a tight budget after the initial expenditure, it was decided to repeat some program segments to a limited extent. To do this, the log had to provide a usable copy for re-logging in the future. Also, the program and music logs had to be combined for the operator. After due consideration, we had the log printed on NCR stock (No Carbon Required), bound in units of three. These forms cost nearly three times as much as any other; however, considering the time required to load three sheets of paper in a typewriter and set up the carbons, the cost of the NCR forms is justified.

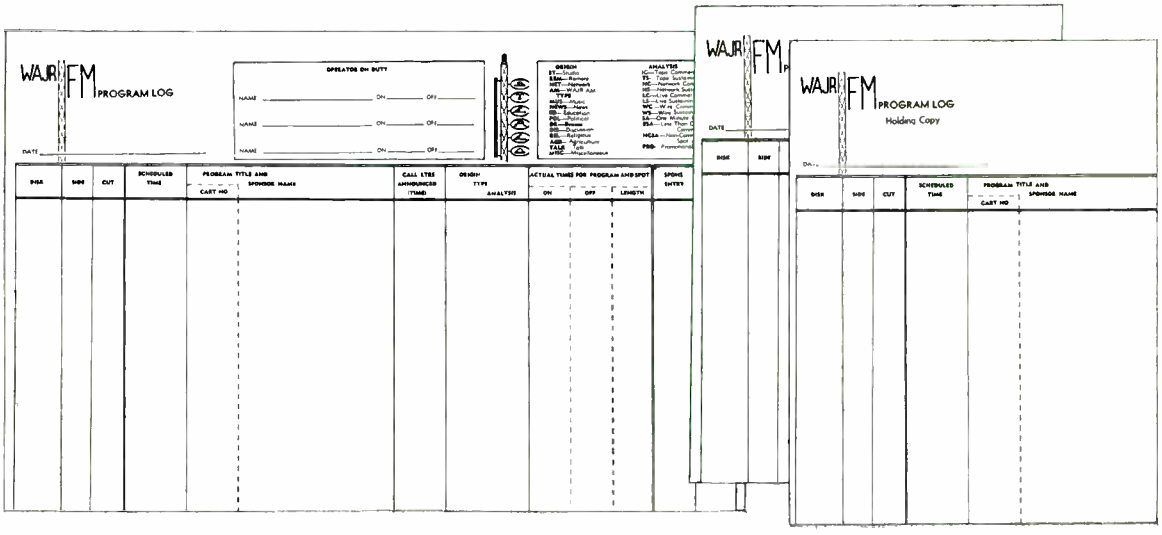
The left side of the log (Fig. 1) includes a triple column for entry of record number, side, and cut. The official program log requires a minimum of fill-in time. The "cart" column includes numbers of cartridges and tapes to be used at specified times. The white cover sheet becomes the official log with time entries, etc. It is shipped to the transmitter with the daily record stack. The yellow second sheet is filed for a repeat of the music series. Changes will be made in pen and ink, then the new log prepared from it. The pink third copy is used as a dummy for the following week's scheduling, then destroyed. The music list helps identify a listener call-in for a song title. By referring to the list, the record number, side, and cut, the title may be found in the record file.

Music Library File

Building a stereo record library within our requirements has been difficult, due to the un-

Fig. 1. The log form serves as both music sheet and official program log.

Fig. 2. The second and third copy of the NCR log form are used to prepare future programs, and do not include the official log information.



availability of a vast selection in some categories and further compounded by the fact that some record companies are reluctant to release records to stations for less than the full wholesale price. Several companies offer a music service; however, in our case, as much as 50% of the music received on this basis is not usable because of its content. Even if service costs are low, the cost-per-disc becomes almost the normal wholesale rate. The major companies have been quite helpful with prices and services; one company has established a means whereby unwanted material in their subscription service may be exchanged, assuming it is in original condition. One company (Somerset) is now providing full albums for 50¢.

Prefix

The Orchestra section is filed under the prefix "OR" and albums coded with an orange magic marker. Dinner music is listed under DM and labeled with blue magic marker. The Male Vocal selections have the prefix MV and are marked with red. The Female Vocal discs are filed under FV with a green marker; Vocal Groups are headed VG and indicated with yellow magic marker. The double coding system insures correct filing.

Numerical System

Each separate group is individually numbered —from one to infinity. To keep individual artists together we estimated the additional disc probability of major known artists, then left holes throughout the file to allow for additional releases, artists, and music types.

The new discs are checked against order forms and logged in, and assigned a prefix, and if a Promotional Issue or received from a Music Service, checked. If not usable within our programming concepts, it is removed from circulation and held for future promotional use. Usable discs go to the librarian and are assigned a number. We maintain a long sheet with all music on hand and the number availabilities. The librarian "builds" the file cards, inserts them into the card file, and releases the disc for air use. By holding out new discs until they are completely filed, the card file is up to date at all times.

File Cards

Pre-printed legal length spirit stencils are imprinted with the card file headings of ALBUM TITLE, COMPOSER, ALBUM NUMBER (ours and the publishers), ARTIST, and SONG TITLES. By use of a letterpress process, we are able to apply enough pressure to not only mark the headings on the master but to force an imprint from the transfer sheet, thus providing headings on all duplicated material. Three-up cards are cut to the proper width, and serated every 4" to provide the desired 4 x 6 card size. These are not split apart until after run-off. Both BROADWAY and CLASSICAL records are color coded black. BROADWAY discs are prefixed SM (show music), as we include movie themes, and orchestral records featuring one show. In numbering new SM discs, a cast album is given the next consecutive number in the file (no holes left for additions) and all adaptations from the original are assigned its number and a letter. The classical file is handled by the publishing company number only. All RCA Classical discs are filed in one group, all Columbia in another.

Program Concepts of WAJR-FM

7:00-9:00 A.M. "Daybreak," a light, airy, "Doris Day Movie" approach designed to lift the listener at the beginning of his day.
9:30-11:30 A.M. Caters to an audience segment of mixed nationalities without sounding like a foreign language station.
11:30-1:30 (Noon break for 15 minutes of news and sports): "Cafe Internationale" relies heavily on light European themes, music found at any street cafe. This show has required more work than any other to stay within our concept, due to the limited amount of available stereo music.
1:30-4:30 P.M. "Contempore" features instrumental American movie themes, with a tempo slightly faster than the mid-morning show. Music from the swing era, sprinkled in periodically, serves as an accent element.
4:30-6:00 P.M. "Club Rendezvous" features combos and quiet group—a drive-time show with a different approach to relax and soothe the listener after a day's work.
6:30-8:00 P.M. (following half-hour news break): "International House" produces a restaurant format music block with a sound more suited to the family dining room than to a commercial establishment. The foreign element is again injected to enhance the program image.
8:00-11:00 P.M. "Jetstream" swings from classical to subtle jazz to broadway and back again —music with a bigger, more dynamic sound— Mancini, Leroy Anderson, Percy Faith types. Provides feature music in direct competition with TV's major time block. (TV reception is poor in several portions of WAJR-FM service area.)
11:00-Midnight: The final hour, "Quiet Village," provides a typical late show musical fare in a lush relaxing vein.

Throughout the day individual vocal artists are limited to the 7-9 A.M. block and the 11-12 midnight show. Group vocals are used from sign-on until 11:30 A.M. All other music is instrumental except "Passport to Broadway" on Saturday afternoon and one hour of "Jetstream," two times a week. Other areas of tight control include the use of brass, used only during "Contempore" and "Jetstream." In both cases, wailing or screaming material is prohibited. As a standing rule, modern two-beat music is used with extreme caution—if at all—even though performed by name orchestras. Show themes were chosen to maintain sound continuity with the basic program concept. The underlying or overall goal was to develop an individual sound without resorting to jingles and other identification builders.

To reduce the over-use of music and to allow ample separation between days of use, the orchestra file was split into 7 stacks. Each stack contains about 60 discs comprising a variety of music. One stack is used for each day of the week, then we go back to the top. Other classifications are maintained in normal file sequence.

Of course, we are constantly adding to our library; we feel justified in purchasing an album if it has at least two cuts we can use. Our initial record order, composed of less than 200 albums, was selected on a general basis, music we were sure to use, even if it became necessary to make format changes. By the on-air date, we had increased our library, since our format had become more finalized. ●

(Continued next month)

Full-Time vs. Daytime Operation

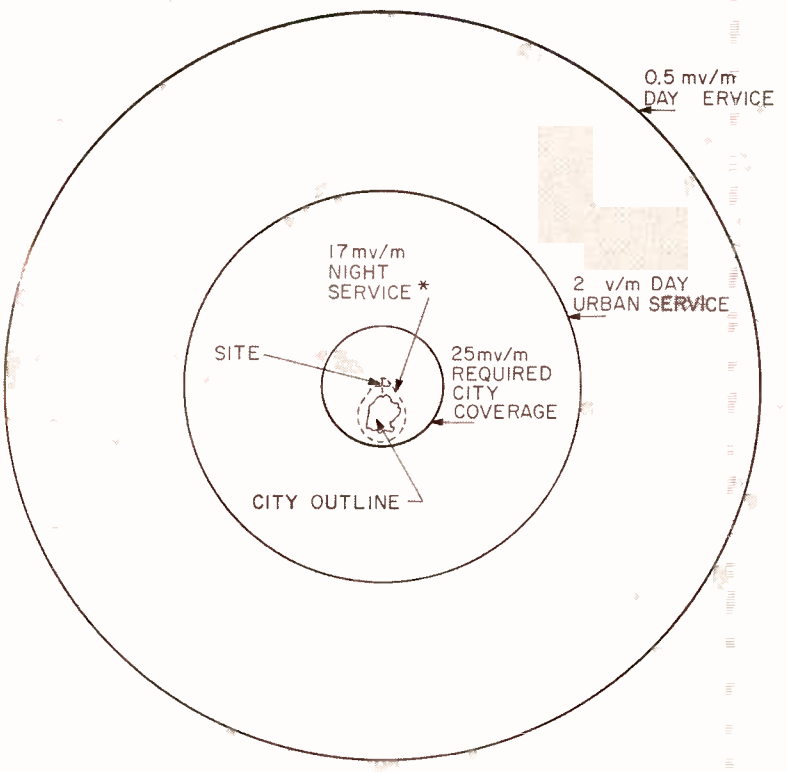
Is there a full-time AM in your future? This article may help you decide

Comparison of day/night service areas of a typical full-time station.

1000 kc 5 kw U.D., 0.5 kw DA-N
Conductivity 4 mmhos
Radiation non DA • 400 mv/m

NIGHTTIME OPERATION:
4 Towers in service
Maximum radiation: 25 mv/m contour 5 mi
Service area, 17 mv/m contour 6.5 mi
Population served: 19,000

DAYTIME OPERATION:
Distance to 25 mv/m contour: 7 mi
Distance to 2 mv/m contour: 25 mi
Distance to 0.5 mv/m contour: 45 mi
Population served: 109,000



*Night 25 mv/m contour is only slightly smaller.

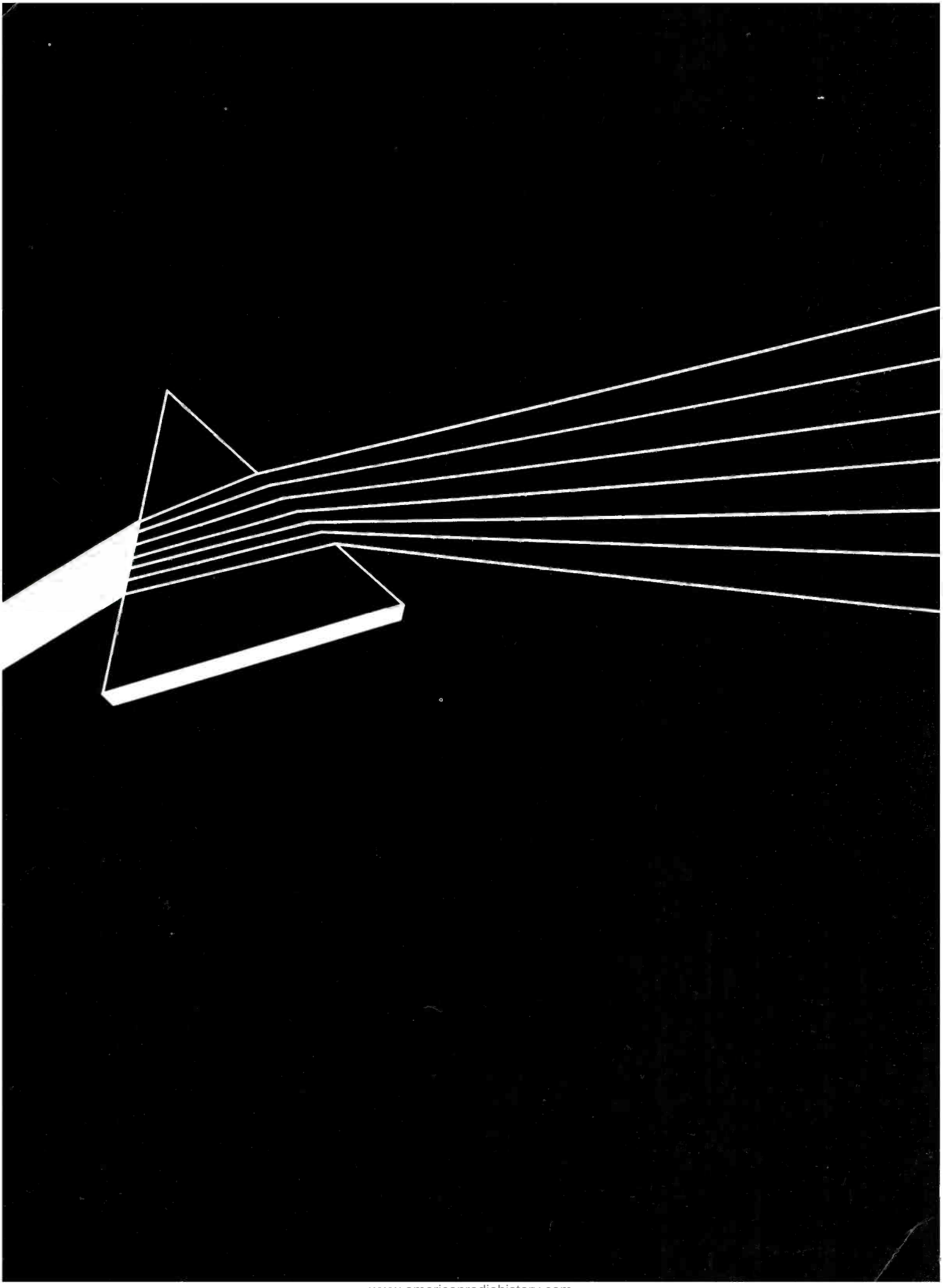
WHEN, if ever, does it pay an AM daytimer to go full-time? There are many station owners and managers in this quandary right now, weighing, as they must, prevailing conditions peculiar to their market. Here are some facts and figures of a general nature which may help clarify your individual problems.

Market Considerations

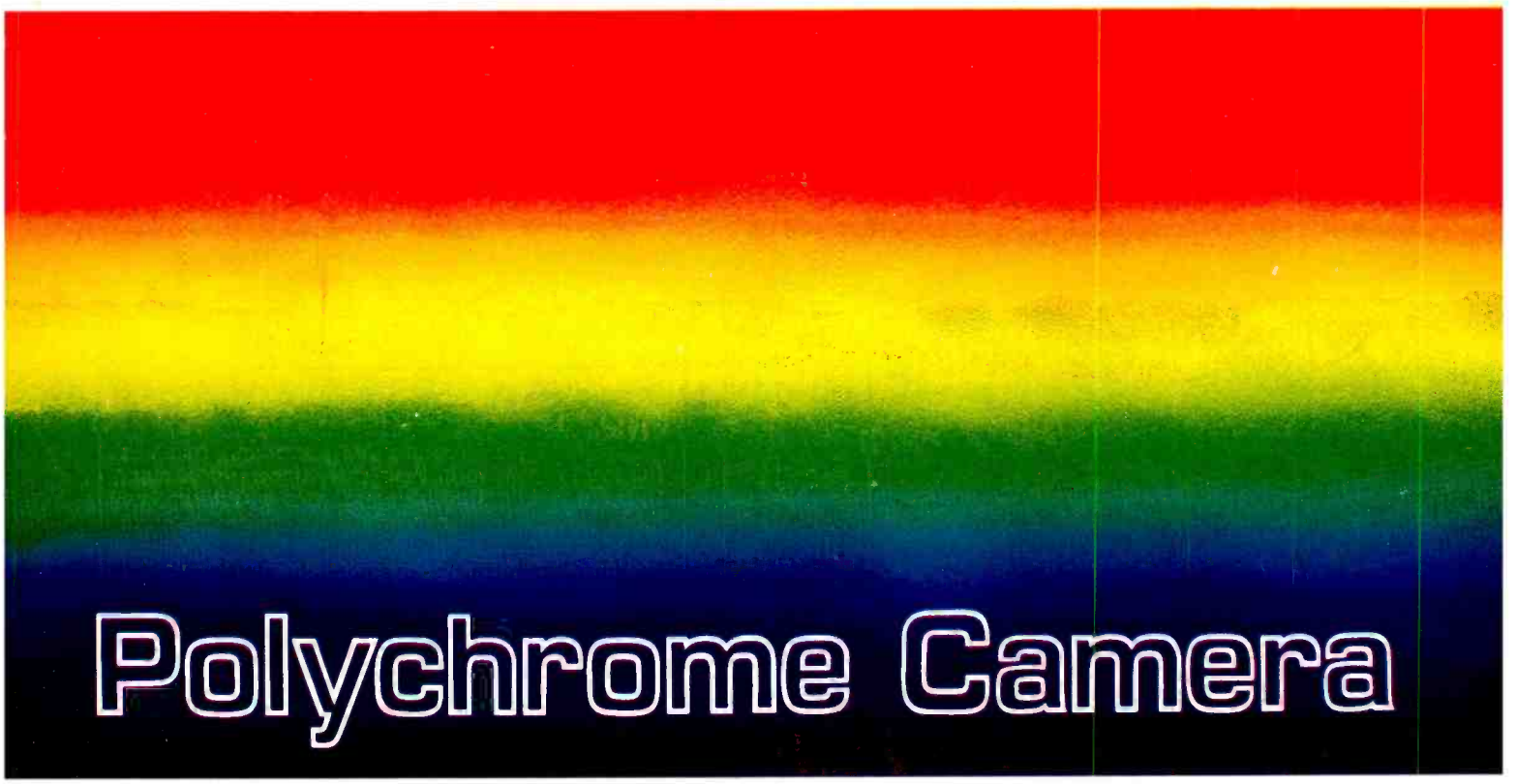
If your service area does not have a full-time station, or a nearby facility, providing primary night-time service (at least 2.5 mv/m), you have a very strong reason for considering a full-time operation. If there is no local TV, but only Grade B from another city, you should be further encouraged. Even Grade A TV shouldn't stop you, if that is the only drawback. Further, if local industry employs a good number of workers who change shifts on a 24-hour basis, or even on a 2-shift basis, you have another favorable condition for full-time operation.

On the other hand, if your market has a full-time AM station or a local TV, then you should think twice, and then twice again, before you venture into night-time operation. In that case, your source of revenue will be limited, and you must decide whether there is enough additional business to cover the added expense.

There are still some communities that do not have a full-time local station, or even a primary signal from a nearby station. In one particular case, there is a city of more than 20,000 which must rely on a station more than 20 miles away for night service. The operator of the local daytimer has excellent reasons for going full-time, even though he can't im-



COLOR TV TAKES A GIANT LEAP FORWARD WITH THE REVOLUTIONARY NEW...



Sarkes Tarzian, Inc. brought a fresh outlook to the problems of color television. We were free to explore all possibilities. We had no commitment—economical or philosophical—to an existing system, with its inherent faults.

We had no hesitation to innovate, where innovation was called for. Likewise, where we found a proven concept, we adopted it.

Results? The revolutionary, full-color Polychrome Camera system—the only color system offering a choice of tubes.

Here is color television previously unknown. Here is color performance to still the remaining skeptics. Here is rare purity of color . . . rigid stability . . . delicate detail.

And while our engineers were at it, they designed out heaviness and awkward appearance—giving the Polychrome Camera a trim, eye-pleasing silhouette in a unique magnesium housing. Like its monochrome predecessors, Tarzian's Polychrome Camera systems feature 100% transistorized circuitry.

The first Polychrome Camera systems are scheduled for June delivery.

Symbol of Excellence in Electronics

Circle 20 on Reader Service Card

mediately visualize the sources of income for the extra hours.

For the daytimer, the short days of winter are his biggest problem—signing off during the peak evening traffic hours. This naturally forces the listener to tune to another station if there is one available. Very clearly, the station last listened to at night will be the one tuned in on the clock radio in the morning. With well-balanced programming, a full-time station has a much better chance of dominating radio dials in its area.

Revenue

The prevailing attitude of advertisers and their agencies often makes it necessary for a station to look elsewhere for revenue to support night-time operation. There isn't a community anywhere that doesn't take pride in its high school athletic activities, and the full-timer has a decided edge over the daytimer when games or events are held at night.

Daytimers can make recordings of basketball

FM Extends Daytime AM

WTTR, Westminster, Md., added an FM facility rather than extend their daytime AM operation. This was the least expensive in their case, since several more towers would have been necessary to go full-time on their regional frequency. The only equipment costs were the transmitter and monitors, transmission line and antenna which was mounted on their single AM tower. WTTR duplicates AM programming on FM until sunset, then continues FM operation until midnight. The bulk of night-time revenue comes from sports—professional baseball and football and local scholastic and college games. However, some commercial time is carried during regular night programming. Mr. Russell H. Morgan, V-P and General Manager, is quite pleased with his full-time operation, and feels it is definitely worthwhile financially. Further, he said that had an FM channel not been available, they would have extended the AM operation. The only promotion they've used on FM was a receiver registration contest in the very beginning. As an indication of WTTR-FM's success, local dealers have reported an increase in FM receiver sales since the beginning of the FM operation. Westminster has no other local radio service, but has good TV reception, particularly from Baltimore, less than 40 miles away.

Full-time is an Obligation

Night-time operation, when technically possible, is a broadcaster's moral obligation just as soon as it is economically feasible—that is, as soon as the station has the necessary capital to invest. One broadcaster said that was his major motive for adding night-time operation. He feels that a full-timer can do a much better job of serving his area and, as a result, the station must eventually benefit. In this case, night-time operation has been more of a liability from an economic standpoint, but if a station were to operate only during the most profitable hours, the public would be denied what it has a right to expect from the broadcast service. This station does have night-time revenue from national and local sports and does a commendable job of living up to its expressed ideal of public service. The manager of this station had some sobering thoughts on added overhead—if a station is operating roughly 12 hours a day and adds another six, he can expect a 1/3 increase in overhead expenses. This, of course, includes the added labor costs, but more rapid equipment deterioration must also be considered. Higher maintenance costs and shorter equipment life must also be added to the overall cost of the extra operation.

Only complete test equipment line designed especially for 75 ohm cable distribution

finest all solid-state all-channel sweep generator on the market

U/V sweep generator, model 4122

Solid-state. Has two switch-selected electronically swept ranges: entire UHF TV spectrum (470 to 890 mc); entire VHF TV spectrum including subchannels (20 to 240 mc).

Sweep widths are continuously variable from 5 mc to the entire VHF or UHF range in one sweep. Center frequency can be tuned across the complete band on each range regardless of the sweep width setting. An output level attenuator is adjustable over a 60 db range. Automatic Level Control (ALC) on both ranges assures constant output. Fully regulated power supply for stable operation.

The sweep oscillator is varacter tuned (no moving parts) for silent operation and long life. For VHF output the UHF sweep is mixed with a fixed oscillator signal at 900 mc and the resultant difference signal is amplified and level controlled to cover the complete VHF TV spectrum.

The horizontal sweep rate of 60 cps, derived from the power line, is available as a sine wave at the front panel for connection to the oscilloscope. Use of the sine-wave horizontal permits oscilloscopes to be fed by available local line voltage for summation sweeps of large distribution systems.

UHF sweep generator, model 4114

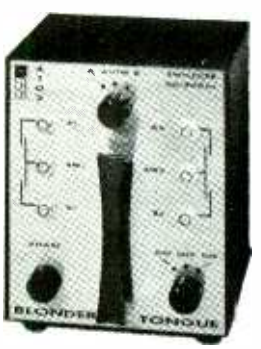
Same quality features as the Blonder-Tongue 4122 UHF/VHF Sweep Generator but covers range of 470 to 890 mc only.

only all-channel field strength meter in a single unit

UHF/VHF field strength meter, FSM-2

Solid-state superheterodyne circuitry. Accurate enough for the lab. Portable enough for field work. Instantly convertible from VHF to UHF with the flip of a switch. Measures RF signals at 75 ohm impedance (VHF/UHF balun supplied for 300 ohm measurements) in two ranges: VHF (52 to 216 mc) and UHF (470 to 890 mc). Sensitivity variable from 100 microvolts to 3v. for full scale meter deflection. Reads both average and peak level. AC line or integral battery operation. Fully regulated power supply. Indispensible for field strength surveys, MATV/CATV system maintenance, loss and gain measurements and percent modulation tests. Precise amplifier gain and attenuation measurements.

RF switcher (dc to 900 mc) 4102



Electronically-actuated, high-speed switch, solid-state, permits two signal tracings to be simultaneously displayed on an oscilloscope, either superimposed or alternately, at the rate of 30 cps. Either tracing can be seen independently for making direct, immediate comparisons between input and output voltages of any circuit under test for precisely measuring VSWR, amplifier gain, or attenuation and other applications involving equipment performance evaluation against given standards. Provision for 360 degree phase adjustments.

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Blonder-Tongue offers a complete line of color-approved products for CATV: Amplifiers (trunk line distributed, high output, single-channel and broad band); converters (crystal-controlled); accessories (Tap-offs, splitters, mixers, matching transformers) and the famous "Stinger" pressure taps. For details write.

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or football or any activity and play it back the next day, but these delayed broadcasts lack the spontaneity of live broadcasts. If there is a local college or university, so much the better, for this will have an even wider audience appeal. In many cases, a station can use its full-time facilities advantageously for professional sports, especially night baseball games. More than a few stations pay for their full-time operation and even manage to make a profit from sports. Likely sponsors are professional groups like the telephone company, building contractors, and similar organizations and groups, many of which are owned or operated by alumni or individuals who are quite civic-minded and feel obligated to do something for the community. Also, in many areas, a prosperous drive-in or a chain of drive-ins would buy blocks of time on a more or less wholesale basis and run popular music which would appeal to the teenage and young adult set.

Additional Operating Costs

An average of an extra six hours daily operation need not add a great deal to overhead expenses. For example, a 1-kw daytimer would probably have a night power of 500w. Transmitter power consumption would be less than for daytime operation, particularly if the station normally keeps transmitter filaments on for 24 hours anyway. Only one man need be on duty; therefore, other lights and power-consuming equipment could be turned off.

Labor cost will be higher than anything else, especially if you can't avoid overtime. If you are already using a form of automation, the need for an engineer/announcer would be eliminated by recorded programs and announcements. At least one station records segments of daytime programming, making necessary changes in announcements (time, etc.), and rebroadcasts the material with all commercials. Sponsors are charged something like 25% extra for the second exposure.

Full-Time Operation

Twenty-four hour operation sounds fine on the surface, but what does it add—other than prestige—to an operation? A large floating audience must be available to justify the economics of such an operation.

Of course there are some markets, such as Las Vegas, where day and night are indistinguishable. In Vegas, a 24-hour TV station reportedly repeats its programs every six hours, but most cities cannot support this kind of programming. Also, if you consider 24-hour programming you must consider maintenance. When can it be done? Most stations who do not have a standby transmitter schedule a few hours of downtime each week at a time most suitable to their market's characteristics.

Approximate Costs of Adding Night-Time Operation

Engineering: Approximately $1,000 per additional tower.

Construction: Approximately $3,000 per tower installed (guyed). New transmitting equipment, phasor, phase monitor lines, etc, averages out to about $700 per tower but not linear as number of towers increases.

Proof-of-Performance: From $4,000 up, unless already directional and only small changes required.

Operating: Depends on local labor rates. First class operator is required at higher rate for DA. If non-DA, rates lower. Electricity proportionately higher depending on power and number of hours of operation.

NOTE: Every case is different so that these figures can be used only as an extremely rough guide in preliminary planning.

Engineering Costs

The first step toward researching a full-time operation is to have your consulting engineer check on your present frequency—it may cost up to $1,000 to find that you can't use it, or as little as $100 to find that you can. The engineer may tell you that you will have to change frequency, especially if you are on a clear channel where night-time operation is impossible.

If your consultant finds you can operate on your present frequency, you will most likely need a directional antenna system, and in some cases where complicated protection problems are encountered, and as many as eight towers are required, the fee could run close to $10,000, especially if a hearing appears inevitable.

Antenna problem solutions may lead to property problems—particularly if your proposed array consists of 4, 6, or 8 towers. Even if you now have a two-tower array, the land may not accommodate the extra elements. Naturally, your engineer will take this into consideration and try to design an antenna suitable to existing land, perhaps with some small extra right-of-way or easement agreements. However, this could require towers higher or lower than the present ones, which complicates design and tuning problems. What you save on land costs could be lost on additional engineering costs for proof-of-performance. In some areas, of course, acquiring extra land may also lead to zoning complications.

After your antenna and land problems are solved, you will then face possible transmitter changes. If you have a 1-kw transmitter operating daytime and intend to use it with reduced power at night, it must have provision for power cutback. Some transmitters are designed for this purpose — if yours isn't it must be modified. These plans must be approved by the FCC, and you will have to apply for modification permission by furnishing full technical details and operating data on the new power. If you will increase power, a new transmitter may be necessary. Your old transmitter can be traded or kept for standby, whichever best fits your financial picture.

Other technical changes should be few, apart from a new phase monitor, transmission lines to the new towers, and phasing equipment. If towers are added, it's a good idea to inspect the ground system of your present tower array. If the system is old or will have to be greatly disturbed, it's often a wise investment to replace it. Frequently, faulty grounds with dry or corroded joints will distort the desired pattern and create many problems in array adjustment.

Conclusions

If you can justify night-time operation, and its cost will not cripple you financially, apply for it. The FCC is allowing more freedom in automated operation. The time may come when completely unattended operation will be possible. This will eliminate the biggest single overhead item and make night-time operation economically feasible in areas where it is now doubtful. So if things look as though your area needs night-time service, get your name in the hat! ●

Design of Directional AM Antennas

By John H. Battison

Part 2: Two-tower theory applied to DA pattern shape and size.

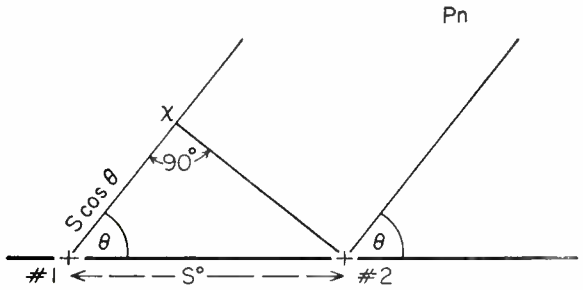

Fig. 1. Trigonometric relationships used to compute the shape of a DA pattern. Symbol designations: ϕ = electrical phase; S = spacing in degrees; B = horizontal angle from center of array; 1/ 0° expresses unity current in reference tower; B/ ϕ° expresses current in #2, B times that in #1 and leading by ϕ°.

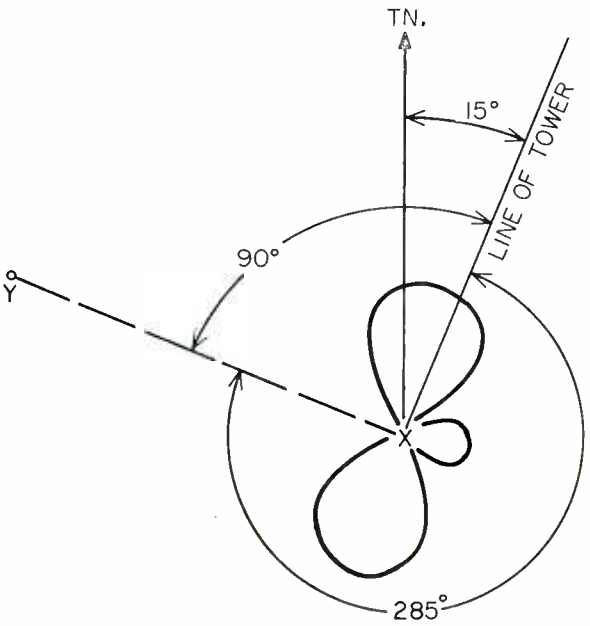

Fig. 2. Illustration of the relationship between the line of towers and azimuth bearings.

THE DESIGN of a two-tower directional antenna system requires computations for both the *size* and *shape* of the radiation contour pattern. Pattern size, of course, is determined by radiated power; however, before you can compute radiation you must know how far you want your signal to go in each direction. Thus, the shape of the pattern must be determined first.

Pattern Shape

Signal strength at any point around the array is determined by the phase and magnitude of the arriving waves; therefore, a prediction of signal strength at any particular position requires the addition of vectors. Assuming the currents in each tower are equal, and that the towers have the same height, the only remaining factor which can influence the signal at any point is the phase relationship between the respective waves.

Two factors control the phase relationship between the arriving waves—current phasing in each tower (in our example they are equal) and space phasing (the difference in path length between the towers and the reference point). Fig. 1 shows the mathematical relationship between these factors. It is usual to refer to Tower #1 as the reference tower. Since we are interested only in the pattern *shape* at this point, we arbitrarily say that Tower #1 is carrying unity current at the reference phase, expressed as 1/0°. The current in Tower #2 is then referenced to #1, with its magnitude stated as "B" times the current in #1 and its phase designated by ϕ (Greek letter Phi). Point P in Fig. 1 can be anywhere in a 360° arc (always the same distance from the array).

In Fig. 1, a right triangle is formed by the towers and point X. Side S° is the spacing between towers, expressed in degrees, and angle θ (Greek letter Theta) indicates the horizontal angle from the center of the array. Obviously, the distance from P to Tower #1 is greater than the distance to #2 by the measure from X to #1, expressed as S cos θ. This means that the signal arriving at P from #2 will lead the signal from #1 by the distance from #1 to point X (determined by multiplying S° by the cosine of angle θ). Since this relationship is consistent, all we have to know to predict space phasing, or the relative strength of

Mr. Battison is a consulting engineer based at Annapolis, Md.

the signals arriving at P, is the tower spacing in degrees (S°) and the horizontal angle θ. The field intensities, of course, at P are proportional to the antenna currents; in this case we set them at unity, or equal to each other.

Center of the Array

Whenever referring to a directional antenna, the coordinates are always given for a position at the midpoint of the array. This means midway between two towers, the middle tower (or middle) of a three-tower array, the center of a rectangular array, etc. To plot the directional pattern, polar coordinate paper is used, and the center of the paper is assumed to be the center of the array. Therefore, the angular value θ is based on a line from the center of the array to P, and determined by the location of P in a complete circle around the array. When computing field intensity contours using the radiation pattern, all radials and radiated powers are measured from a map location which represents the midpoint of the array. A tower (unless it is the middle point in a 3-tower array) should never be used as a measuring point when plotting coverage or completing Form 301.

Computations for two-tower arrays with equalized powers are the simplest to work with since only half or one side of the pattern shape has to be determined. (Since there are only two towers, the pattern has to be symmetrical. An angle of 110° will have the same radiation as an angle of 250°; i.e., each side of the line of towers is the same at a corresponding angle.)

Line of Towers

The line of towers is very important in directional antenna design. Up to this point, we have considered only the pattern shape, without regard to the orientation intended for it. We can take a specific pattern and rotate it through 360° on a map until its nulls and major lobes point in the proper directions to provide the desired coverage. The line of towers may (but generally do not) line up with the bearing joining the proposed site to the area to be protected or covered. In Fig. 2, we have a proposed site X with a broken line running from it to a city Y which must be protected. This angle is

Pattern Shape Computations

The field intensity at P in Fig. 1 can be expressed as:
$E = 1\angle 0° + B\angle (\phi + S \cos \theta)$
S is the spacing in degrees between towers
B is the ratio of the tower currents
ϕ is current phase (leading or lagging)
θ is the horizontal angle from the center of the array, generally measured in steps of 10°, except in cases where a small angular change is important.

Computing the Pattern

The data in Table I is often called a matrix, although it is really a tabulation. Assume the directional pattern to be computed is expressed by the following:
Spacing (S)=80°
Tower currents: $1.0\angle 0$
$1.0\angle 100°$
Current ratio 1:1
Current phasing 100° (Note: this can also be written $\angle -50 : \angle 50$)
Pattern Shape Factor equals: $1\angle 0° + B\angle (\phi + S \cos \theta) = 1.0\angle 0° + 1.0\angle (100° + 80° \cos \theta)$
The operation shown at the top of each column in Table I is performed, and each column in turn is processed by the next one. The operation between columns 4 and 5, the conversion of degrees into rectangular vector coordinates, may not be obvious. Column 4 is the magnitude and phase produced by adding 1.0 at phase angle 100°; i.e., the value of column 4 for $\theta = 0°$ is $\angle 100°$. Column 6 is merely the addition of the signal from #1 tower. This is $\angle 0°$, written 1 + j0. Column 7 is completed by converting the rectangular coordinates into polar form to give the magnitude of the radial. The angular (phase) data provided by this conversion is not needed, so only the magnitude is entered in column 7. Pattern shape can be plotted in terms of relative values, but to compute coverage, radiation along each radial must be converted to millivolts per meter (mv/m). Pattern value can be computed as follows:

$$\text{Radiation} \times \frac{\text{Radius}}{\text{Radial length}}$$

$$\text{at desired azimuth for } 180° = 196 \times \frac{3.9 \text{ mv/m}}{2.73}.$$

Column 8 has been completed using this formulation. Fig. 3 can also be used to scale off any other desired azimuth values.

Table I. Pattern Shape Computation Matrix

(1) θ	(2) Cos θ	(3) 90 Cos θ	(4) (3)+100	(5) (4)+1.0	(6) (5)+1/0	(7) P_{sf}	(8) Rad. mv/m
0	1.00	80.00	180.	−1+j0	0+j0	0<0	0
10	0.9845	78.45	178.45	−0.999+j0.2705	0.001+j.027	0.02705<87.88°	0.94
20	0.9379	75.00	175.00	−0.996+j0.0872	0.004+j0.0872	0.0872<87.36°	19.4
30	0.8660	69.40	168.40	−0.976+j0.218	0.024+j0.218	0.2309<83.78°	30.06
40	0.7660	61.20	161.20	−0.946+j0.322	0.054+j0.322	0.3264<80.47°	62.5
50	0.6428	51.40	151.40	−0.878+j0.479	0.122+j0.479	0.4825<75.7°	91.8
60	0.5000	40.00	140.00	−0.766+j0.643	0.234+j0.643	0.684<70°	101.0
70	0.3420	27.30	127.30	−0.616+j0.78801	0.384+j0.788	0.876<64°	121.2
80	0.1736	13.80	113.80	−0.394+j0.919	0.606+j0.919	1.102<56.3°	159.0
90	0.0000	00.00	100.	−0.174+j0.984	0.826+j0.984	1.283<49°	185.5
100	−0.1736	−13.80	−86.2	0.066−j0.998	1.066−j0.998	1.461<42°	208.0
110	−0.3420	−27.30	−72.70	0.297−j0.955	1.297−j0.955	1.610<−36.4°	232.0
120	−0.5000	−40.00	−60.00	0.500−j0.866	1.500−j0.866	1.734<−30°	248.0
130	−0.6428	−51.40	−48.6	0.669−j0.743	1.669−j0.743	1.829<−24°	260.0
140	−0.7660	−61.20	−38.8	0.788−j.616	1.788−j0.616	1.890<−19°	268.0
150	−0.8660	−69.40	−30.6	0.866−j0.5	1.866−j0.50	1.932<−15°	275.0
160	−0.9379	−75.00	−25.00	0.906−j.423	1.906−j0.423	1.953<−12.5°	277.0
170	−0.9845	−78.45	−21.55	0.930−j.367	1.930−j0.367	1.960<−10.8°	281.0
180	−1.0000	−80.00	−20.00	0.940−j0.342	1.940−j0.342	1.972<−10°	284.0

285° from True North, measured in a clockwise direction. The proposed pattern is designed to serve X and protect Y; therefore, the line of towers is oriented as shown—in this case, at 90° to the line from X to Y, or 15° from True North (285° plus 90°). Thus, radiation has to be specified with reference to one meridian or the other, and it is very important to state clearly whether a given radial is with respect to the line of towers or True North. The term *azimuth* is used when referring to True bearings from North.

Nulls and Lobes

If the currents in the towers are not precisely equal (as they are in our example), radiation in the null areas can *never* reduce to a zero value. This is quite important in practice; if the FCC receives a DA application in which the radiation in the nulls diminishes to zero, it is quite certain that the proposal will be carefully scrutinized by Commission engineers, and the odds are about a million to one that it will be rejected—especially if the proposal depends on zero radiation in a critical direction. Absolute zero is impossible to achieve because of the multitude of external factors which can affect an antenna pattern (guy wires, transmission lines, towers, etc.).

On the other hand, by allowing a small pip of radiation in the center of a null; it is very often possible to obtain a broad null which quite easily provides the required protection. The importance of this design will become obvious when the engineer attempts to adjust the antenna. Antenna adjusment is very critical for sharp and deep nulls, but for a broader one, say 60° wide, with a small pip in the middle and no lower than 10 to 15 mv/m, adjustment becomes far easier. Also. even though calculations work out beautifully in theory, actual performance is usually very different. So whenever possible. it is best to make allowances by developing an MEOV (Maximum Expected Operating Value). As a matter of fact, the FCC now requires that an MEOV be provided in all critical directions. Some consulting engineers provide an MEOV around the entire pattern to give themselves a buffer.

The MEOV factor is generally computed by taking about 5% of the radiation and adding it to the minimum allowable radiation. One approach is to compute the absolute maximum permitted, then subtract 5 to 10% and use this figure as the desired minimum radiation. Generally, MEOV is shown on the pattern as a dotted line around the solid line of the computed contour.

Interference contours must always be calculated using the MEOV radiation, not the base figures. The reason for this is that the FCC, when making allocation studies, relies on the anticipated *maximum* radiation that could be permitted under the specifications of the construction permit. If they do this, and if everyone does it when preparing new station applications, there will be no difference between FCC figures and those of applicants. If the applicant allows himself an adequate MEOV in a null area, and during the proof encounters difficulty in meeting pattern minima, it is frequently possible to bring the pattern within the MEOV figures and thus meet the CP requirements. Many a station has been able to get on the air more easily because of the existence of the MEOV cushion.

Computing Power

In order to relate the pattern shape to actual power in mv/m, a reference is needed. Fortunately, we have such a reference—the standard of X mv/m at one mile. Depending on the proposed power and tower heights, an appropriate radiation value such as 196 mv/m at one mile for a 90° tower can be used. It is only necessary

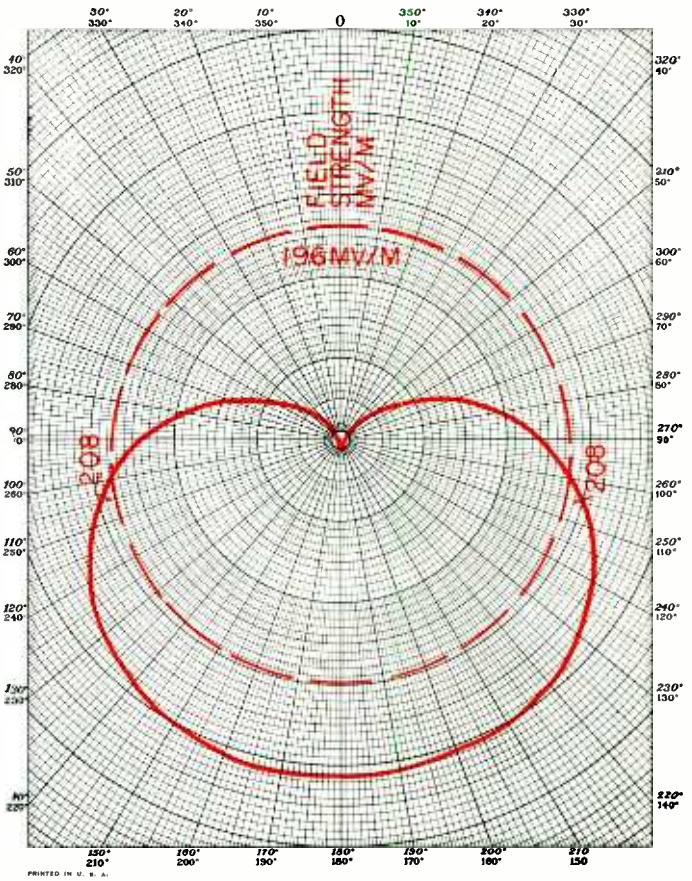

Fig. 3. Dashed circle shows field strength of 196 mv/m for 1 kw. DA radiation values may be scaled off.

to compute the area bounded by the pattern already computed, and then convert this to a circle of equal area by using the formula for the area of a circle ($A = \pi r^2$; $r = \sqrt{A/\pi}$).

Fig. 3 depicts the 196 mv/m circle (with 1-kw transmitter power) drawn on the DA pattern shape. Using the lengths of the various radials to the DA pattern, we can compute the actual pattern values (see box). The pattern shown in Fig. 3 is based strictly on the relationships between the various magnitudes and angles, and therefore does not have any meaning as far as actual operation is concerned. The shape is what we are after.

Next month's installment will cover pattern area computations, the vertical radiation pattern, and tower heights. ●

CATV Proposals- Ordinance Vs. Franchise

By Robert B. Cooper, Jr.

Securing a CATV franchise is one thing, but the ordinance dictates the terms of agreement and the acceptable system standards.

LAST JULY we reviewed a number of salient points concerned with the procurement of a CATV operating franchise under competitive (bid) situations. Of equal and perhaps even greater importance to the prospective franchisee are the actual terms of the CATV *ordinance* which establishes the specifications for the system. *The franchise is a product of the ordinance. A franchise can be considered a contract, and the ordinance a "request for bids" which outlines minimum standards,* specifications, and terms of operation.

There are many model CATV *ordinances* available, and most city attorneys will study several of them before developing a draft of their own. It is during this phase that you want to offer your "experience in the cable field." Only a very small percentage of communities have qualified people available to study the various existing model ordinances.

Favorable Sequence of Events

In the area of setting up a logical sequence of events for the ordinance study and letting of a cable franchise, any influence you can bring to bear on the city fathers is well worth the effort. Usually, one company will file for a franchise in a community. When the news reaches other companies who are interested in the same community, they will scramble to present their applications to the city, fearing that if they do not make their intentions known, the city will act without them. Faced with this situation, the city council will usually use a cut-off date for any additional applications, followed within a few weeks by the release of a suggested city ordinance governing CATV.

Unless you have an "off-the-record" opportunity to go over the fine points of the ordinance draft with the city attorney, the council meeting designated for presentation of the ordinance will be called as a "hearing." At a hearing, you will have an opportunity to see and study the ordinance and make your comments and feelings known before it is adopted in its final form. Once the ordinance has been thrashed over and adopted, the city should then set a time and place for accepting finalized sealed bids from any of the firms that filed an application (or notice of intention to file an application) by the application cut-off date. This final sealed bid should meet all provisions of the final ordinance, and it will constitute your final and best *offer* to the city.

With the sealed bids in, the city will usually take a week to ten days to study them. A special or regular meeting of the city council will then consider the "awarding of a CATV franchise in and for the city of XXX." This item may appear on the agenda of the council meeting as *old business* (in which case discussion may or may not be allowed), or in the form of a public hearing. Usually, the latter practice prevails. You and other interested parties will attend this meeting, and one of the councilmen or the mayor will re-

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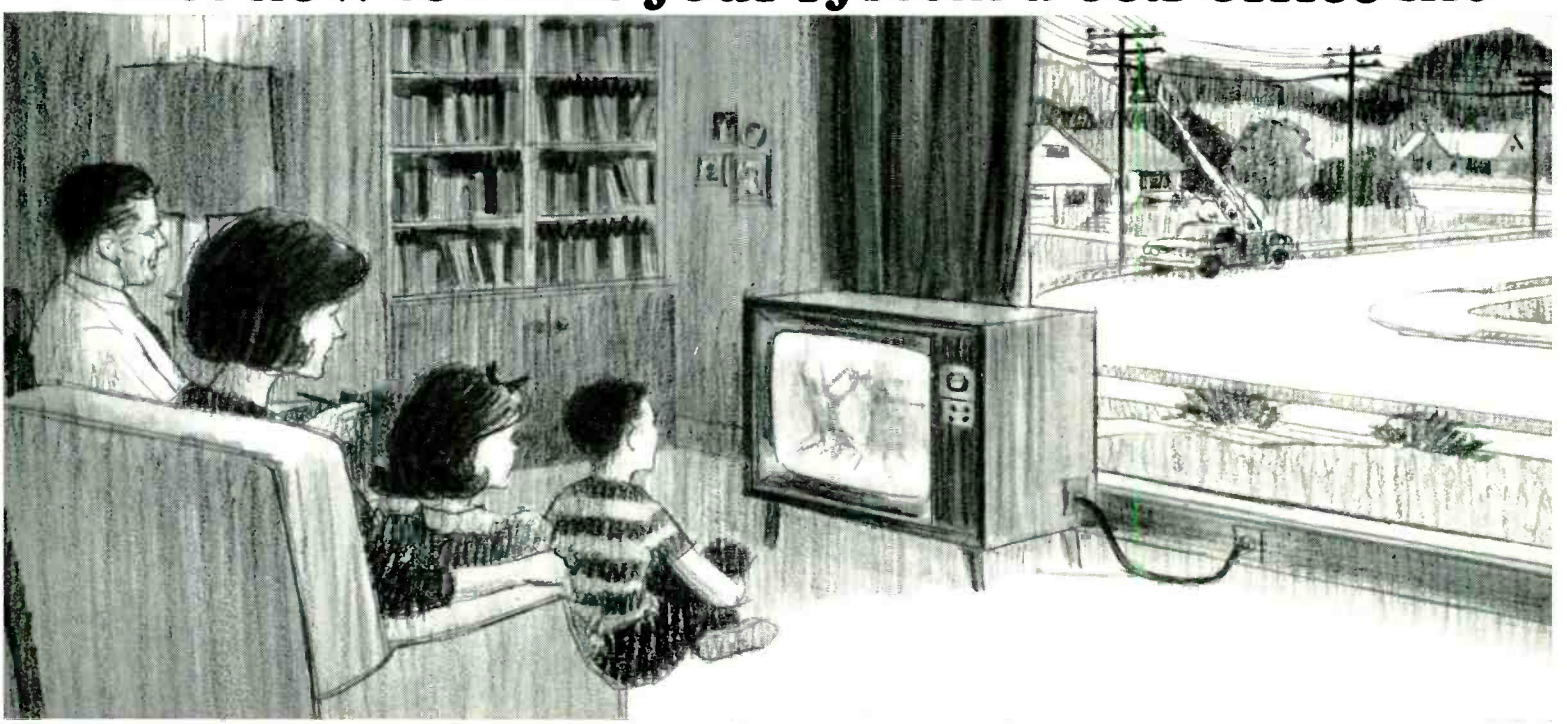
Mr. Cooper is V. P. of operations for Valley Vision, Inc., Modesto, Cal., CATV operating firm, and Pres. of R. B. Cooper Associates, CATV consulting firm.

This is CATV Show Biz

...or how to make your system a box-office hit



Cable: Available in seamless lengths up to ½ mile

Timatch® perfect match connectors

TIMES
CATV CABLE & CONNECTORS

Putting a good show on the home screens of your subscribers is one part of CATV show business. Having the equipment to back up your programming—with clear, dependable pictures that don't ghost, fade or give up altogether—is another.

Times 30db CATV cable—and instantly-installed matching connectors—delivers award-winning performance to your subscribers' homes year after year. It's the surest way to keep them happy and put profits in your system's picture.

Times cable is trouble-free because of the way it's made: in continuous seamless lengths up to ½ mile. This means fewer splices, fewer trouble points, less maintenance . . . and less labor cost. And because it's seamless, it's water and vaporproof . . . won't stop the signal short of target. All in all, you get improved electrical performance from Times cable and matching Timatch connectors. Long after so-called economy cable has been replaced, Times cable will still be a top performer, even while you're upgrading your system.

To take advantage of this direct way to assure your system's pay-out, contact Times for information on its CATV cable

TIMES WIRE AND CABLE/A Div. of The International Silver Co./Wallingford, Conn. /Transmission System Design & Engineering/Standard & Special Purpose Coaxial Cable/Multiconductor Cable/Complete Cable Assemblies

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view briefly the CATV franchise question. He will note the council has studied the terms of the offerings, and that one application has been found to be more acceptable than the other(s). At this point he may call for public questions and discussion from the citizens present. Keep in mind that the ordinance has already appeared in the paper and that local citizens have already had an opportunity to speak up at the council meeting before the ordinance was adopted.

Public discussion closed, a councilman will move that the cable television franchise application of XXX Cable TV Co. be accepted by the city. The move will be seconded, and the mayor or the city manager will read the terms of that specific application (bid). Then a vote will be taken, and if you were careful and prudent, you will have yourself a franchise!

If any of your competitors object to the grant (which the city council carries full responsibility for making), their legal recourse is to appeal the decision in the local court.

The city is not obligated to accept the bid of firm "A" over firm "B" simply because "A" offers a 5% gross receipts revenue and firm "B" offers only 3%. A recent court test of the validity of the city's decision in California, in just such a circumstance, indicates that the city council has the power to decide the franchise letting on the basis of *all factors*, not simply the taxation question. In other words, you cannot assume that you have the franchise in the bag just because you offer more revenue to the city.

Salient Ordinance Points

One day last spring the city administrator of a California town called me on the telephone and asked that I drop in to see him. He had his proposed ordinance "in rough form" and he wanted my reactions. In his office he pulled out a folder filled with excerpts and paragraphs cut out of several model ordinances received from Central California League of Cities. His proposed ordinance was in truth a scrapbook of bits and pieces, taken from four separate model ordinances.

He admitted that he was not in the least bit familiar with what a cable system was, or how it operated. One paragraph was a dandy! To wit: "In no event shall the input characteristics of the system be inferior to an input wherein a master antenna receives a signal strength of not less than 500 microvolts per meter for low band channels (2-6) and not less than 800 microvolts per meter for high band channels (7-13) for at least 50 per cent of the time at a dipole receiving antenna height of (30) feet above ground."

Engineers will immediately recognize where that phrase came from—the FCC definition of a grade-A coverage area! In other words, if this section of the proposed ordinance stood, the CATV system could carry only those channels which were received with grade-A quality! With that kind of reception, and limited to just those stations, *who needs a cable television system*?

A good ordinance will begin by defining the terms it is about to use. This will include such items as "City," "Council," "Franchise," "Public Way," "Community Antenna Television System" or "CATV," "Subscribers," "Gross Receipts," "Local Television Stations," "Pay TV," and "Commence Installation and Service." Most of these terms should be obvious to the reader; two deserve additional discussion.

Gross Receipts: Most cities will define gross receipts as ". . . *all* of those yearly gross receipts of the franchisee." The city here obviously wants to be paid not only a percentage (tax) for monthly subscriber revenue, but also for the receipts from the *installation* charge. You can try to argue that the installation charge covers costs only, and that this is a part of your capital investment (i.e., the drop line, taps, matching transformer, etc.), and is therefore not gross revenue. You can *try* to argue this, but you will probably not make your point if the city has any idea what this might amount to annually.

Pay TV: Here the city will want to restrict your operation as a master antenna service, to the exclusion of any future use of the system as a vehicle for distributing programs for which specific viewing charges are made. You can argue that your proposed plant will be designed as a one-way system and that a pay TV system (such as STV) requires a two-way system (the connotation being you couldn't handle an STV type operation if you wanted to), but the city will probably counter with "well then you won't mind our leaving this point in if you couldn't operate pay-TV through the system anyhow." Let your own future plans be your guide here.

Terms of the Franchise

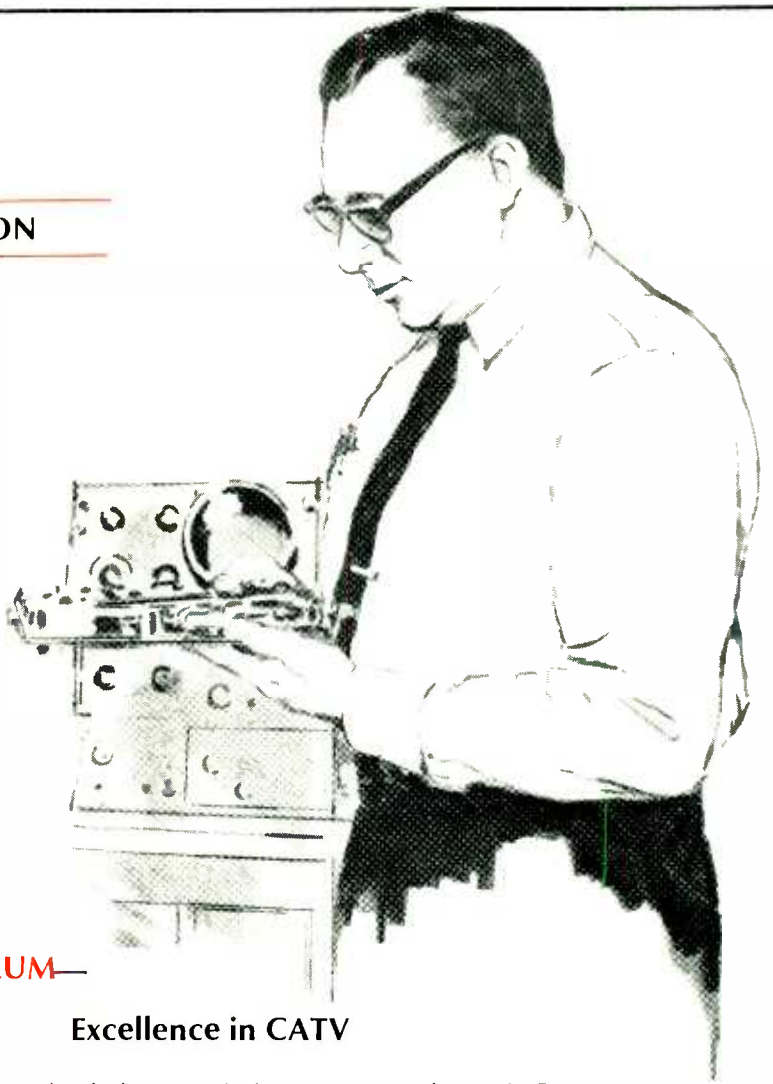
The next area of the ordinance will cover the term of the franchise (usually 20 years), and spell out the legal base under which the city is operating in granting the franchise (in California, Section 53066 of the Government Code is the applicable section). This section may also spell out the uses of city property and the easements the cable franchisee will have. The city will spell out the *minimum* franchisee fee (usually at least 2% of gross receipts), on the theory that under competitive bidding they will probably receive more than the minimum required.

The city may set a minumum monthly fee (such as $100) to be paid by a certain day each month, and then make provisions for either refunding an excess or receiving payment for any additional funds due at the end of the operating year. The city will probably require that the year-end balance sheet (and probably the monthly books) be made available for their inspection should they so desire, to verify the amount of tax due them. Experience has shown they will probably perform this type of audit during the first year or two of operation.

In a general section termed "Limitations of Franchise" the city will define the extent of their liability, and state that unless specifically exempted in other sections of the ordinance, the ordinance shall not relieve the franchisee from responsibilities under other city ordinances which may cover such areas as street, alleyway, and other cable uses.

The city shall also specify a time of performance. An acceptable wording here will read something like this: "Franchisee shall proceed within 30 days after franchise is granted hereunder to secure all permits necessary for the

MEET ENTRON



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installation; shall commence operation within 150 days after all necessary permits are granted; shall accomplish 30% of the coverage within 180 days after installation is begun; and, shall complete installation to cover all of the city within two years of said franchise grant . . ." This should allow you plenty of time to perform, except in the largest cities, under a realistic program of progress.

The city will almost always require a *faithful performance bond.* The amount will vary widely, as will the terms of the bond. Its purpose, obviously, is to indemnify the city should your company fail to provide the service specified within the terms and conditions of the franchise. A recent bond in California, in a town where the cable investment amounted to $140,000 and the cable potential was around 2,500 homes, came to $10,000.

Points to Watch for in Ordinances

A recent franchise ordinance in California called for "one educational television channel, and at least eleven other channels from outlying metropolitan areas . . ." This, of course, totals 12 channels. Where would the information channel go? If your company favored a time and weather data channel, specified by your proposal to the city, you would lose this competitive feature under the terms of the ordinance.

Another recent franchise ordinance specified that ". . . any such franchise shall be a privilege to be held in personal trust by the original franchisee. It cannot in any way be sold, transferred, leased, assigned or disposed of . . ." Suppose you wanted to finance your system with a manufacturer, who in turn asked for an assignment of a percentage of your cable company for collateral? Under these terms you would be out of luck.

Yet another franchise ordinance specified that ". . . franchisee shall proceed within 30 days after any franchise is granted to commence operation in at least 30% of the city . . ." This is an extremely important section, because of the time required to secure your pole line attachment agreement **after** the franchise is let. In most states, telephone companies will not talk about pole line agreements until you have a franchise. And with most telephone companies, the talking will require a minimum of 60-90 days and often as long as a year. If you are obligated to begin operation in even 1 per cent of the city within 30 days, or 60 days, or within any period of time that does not begin **with the date you have a pole line attachment agreement** in hand, you are in trouble.

The city will also require that your company furnish a general, comprehensive, liability insurance policy. Here again the amount and the terms will vary widely. The same California town required a policy that produced $300,000 for personal injury or death of any one person, or $600,000 for the personal injury or death of any two persons, and $50,000 for damage to property resulting from any single occurrence. This will protect the city and all its officials, employees, etc., from claims which might arise in the case of accidents involving your men, materials, or equipment while meeting the performance requirements specified by the franchise grant.

The city may also provide a list of technical specifications or standards of operation. These may cover such involved areas as minimum signal level to be delivered to each receiver, on each channel: all-band, 24-hour operation; signal-to-noise ratio on the system; percentage of hum modulation of video signal; VSWR of system components; etc. This is a field which your engineering personnel can get involved in, to your benefit. This is *one* area where the city *will* listen to your comments, and be eager for your advice.

The ordinance may or may not specify the service charges of the system. Most cities will not get into the area of actually setting rates. The city will insist, usually, that once your rates have been established and made public, any changes in these rates may have to go before the city council. Obviously, the city won't require your appearance before them when you want to run a special offer of reduced rates, but when you seek to *increase* rates, expect the council to want to see you first.

The city will probably include (at the insistence of the local television sales and service people) a provision that your company shall not engage, within the city limits, in the business of selling or servicing television receivers. Very few operators do this anymore, of course.

The city, as a result of recent national publicity, will also insist that your cable system carry the programs of any local television stations. The city may even pin this down to any and all stations within a 75-mile radius of the system. One recent ordinance also specified that programs brought into town on cable, from outside the "local area," must not duplicate the programs of the "local" station(s). This provision was promptly struck out of the ordinance in question when the cable applicant's attorney pointed out that this paragraph constituted censorship on a local level over a federally regulated industry.

Finally, the city will set forth in their ordinance the physical form which the application(s) must take. They will probably require a detailed list of the participants in your company, a statement of your company's financial position as certified by a CPA, a list of the proposed charges to the public, the amount of gross receipts tax you offer to pay, and so on and so forth.

Conclusion

There is little question that today's CATV franchise activities have become much more sophisticated from those of just a few years ago. Community fathers now have the experience of those who have gone before, and the many local and regional associations of municipalities are doing a yeoman's job of keeping newly affected cities informed of the latest trends. However, a prospective CATV franchisee should do his utmost to make sure the ordinance will not be unfavorable to his proposed system. ●

BROADCAST EQUIPMENT

Master Tape Improvement System

Fairchild Recording Equipment Corp., Long Island City, N.Y., has introduced a tape electronics system designed to improve the signal-to-noise ratio and distortion characteristics of existing tape recorders. The unit, said to be compatible with all professional transports, uses a focused-gap field head design, heavier bias at a higher frequency, and direct coupled silicon transistor circuitry. At 15 ips and 75-mil track width, the system makes 3-channel recordings on ¼" tape.

Multiple generation recordings are better as a result of the improved noise and distortion characteristics, a minimum of 72 db signal-to-noise ratio with a 75-mil track. Distortion is 0.25% with zero line level input. Prices vary from $1495 for single track to $2575 for 4 tracks.

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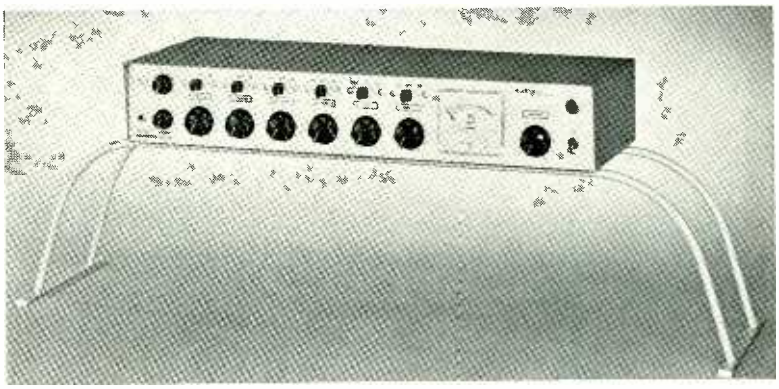

Compact Audio Console

A compact, transistorized program console, suitable for remote broadcasts, is available from United Radio Supply, Inc., Portland, Ore. The unit has dual turntable, tape, and mic inputs, plus program, monitor, and cue outputs. Cue-On-Off switches allow cueing during broadcasts. Harmonic distortion is said to be 0.5% or less, and hum to 15 kc, ±1½ db. Removable legs are designed to straddle two turntables. Priced under $500.

Circle 49 on Reader Service Card

Solid-State 7-kmc TV Relay

Microwave Associates, Burlington, Mass., has introduced the Model MA-7 solid-state microwave TV relay for STL, RPB, and intercity or multi-hop applications. Operating in the auxiliary TV relay band, it meets or exceeds FCC and CCIR standards (color and b & w). Features cited include: tight differential gain and phase characteristics; no warm-up time and low power consumption; and small

size and weight. Transmitter and receiver are housed in separate weather-tight cases which include interchangeable power packs for operation from 12v or 24v DC and 110v or 220v AC. Transmitter RF output is ¾w with only 35w input; receiver is crystal-controlled, draws 25w. Noise figure is 12 db nominal, 7 db with optional RF preamp. Rack mount size is 19" x 8½" per unit. System price is $9,400; delivery 90 days ARO.

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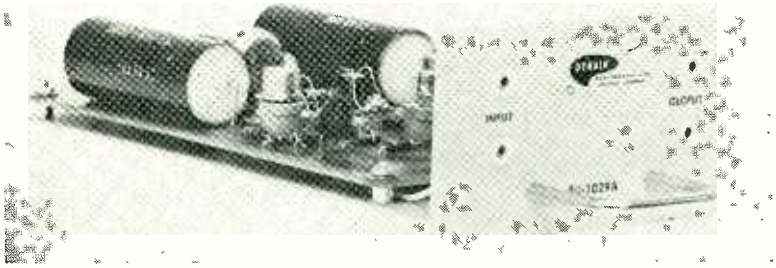

Video Distribution Amplifier

Dynair Electronics, Inc., San Diego, Cal., has introduced an economical video distribution amplifier module incorporating hum-cancelling circuitry. The BU-1029A solid-state Balanced Universal Amplifier is available with any of four input-output arrangements: differential input to unbalanced output; balanced line input to unbalanced output; differential input to balanced line output; or balanced line input to balanced line output. By using various other Series 1000 modules in conjunction with the BU-1029A, video signals may be transmitted several miles without deterioration. Basic amplifier module is $170. EQ-1070A equalizer is $350; BO-1040B balanced output amp is $325.

Circle 53 on Reader Service Card

Four-Tube Color Camera

A fully transistorized color camera using 4 Plumbicon pickup tubes has been announced by The Marconi Co. Unit is available in the U.S. from Ampex Corp. The

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Kay 154: 50 KHz to 100 MHz
Kay 159: 1 MHz to 300 MHz

PM 7650 Plug-in: Pulse Markers 0.5 to 100 MHz

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These solid-state sweep and marker generators cover the range in a single sweep; provide a continuously-variable narrow sweep.

Performance characteristics include line-lock, cw, manual and variable sweep rates, and external input.

PM 7650 and PM 7660 plug-in marker heads offer up to eight optional, individually-switched crystal plug-in markers per head.

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External modulation from dc up to more than 15 KHz, a built-in detector and switched attenuator are standard features. Sweep high-to-low or low-to-high.

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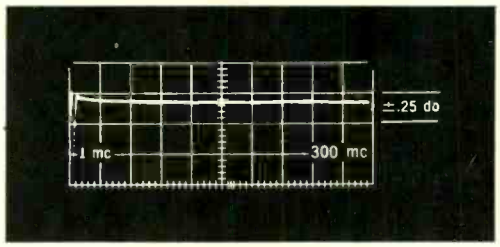
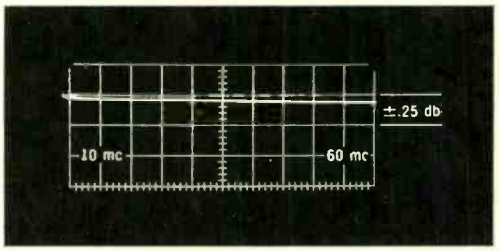
Wide-Sweep Generator

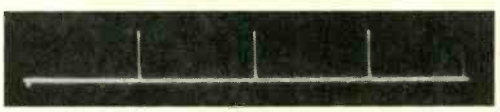


Full 300 MHz Wide Video Sweep

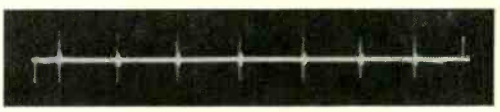


Programmable, Voltage Controlled Oscillator

Marker Generator

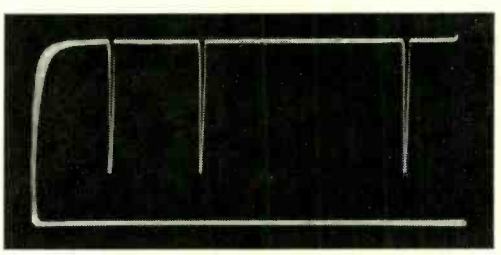


Pulse-Type Markers

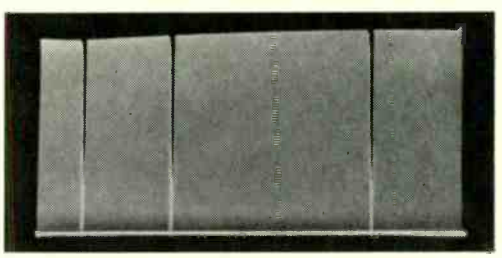


Harmonic (or Comb) Birdie Markers

Single-Freq. Type Birdie Markers



Detected Turn-Off Markers

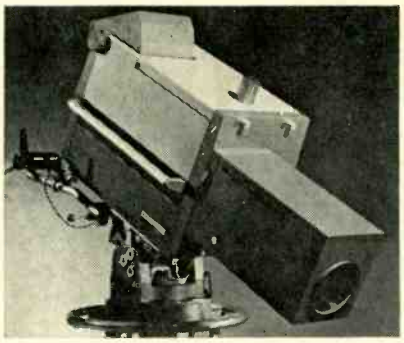


Undetected Turn-Off Markers

Visit Kay at the IEEE Show, Booths 3C11 - 3C17

Circle 26 on Reader Service Card

Mark VII, said to be stable enough for hands-off operation



from a studio control panel, may be switched to either the 525- or 625-line standard, and will provide suitable signals for coding to any of the proposed NTSC, PAL, or SECAM systems. The camera also features a built-in relay optical system which enables the use of standard I.O. lenses, a tilting viewfinder, and operation with 230 ft. candles of illumination at a color temperature of 3000° K with a lens aperture of f/8.

Circle 51 on Reader Service Card

Vidicon Camera

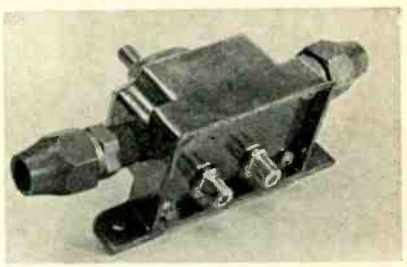
A low light level vidicon viewfinder camera for CCTV or broadcast applications has been developed by Maryland Telecommunications, Inc., Cockeysville, Md. The VC-6 is said to be capable of producing in excess of 800 horizontal lines at 0.3 ft candles of target illumination, and over

500 lines at 0.04 ft candles. Camera circuitry features a cascode input Nuvistorized video preamp, non-microphonic video amplifier with 10-mc bandwidth, sweep protection, and linearity of both horizontal and vertical axes within 2%. Electrical focus and target adjustment for light level changes (4000:1) are automatically regulated, and the power supply is regulated within 1%. The camera has a 4-lens turret and tally lights. Weight of the camera-viewfinder is less than 35 lbs, and the control unit weighs less than 8 lbs. Price is $3995.

Circle 91 on Reader Service Card

2-Output Line Tap

Viking Industries, Hoboken, N.J. has introduced a directional line tap with two outputs, which provides matched, isolated signals for use as distribution amplifiers or individual taps. The 573 offers



30 db isolation between the taps and the outgoing line, and has a 1.15 max. line VSWR and 20 db isolation between taps. Available with all types of fittings and with provision for strand or pole mounting, the unit is housed in a weather-proof "Vik-O-Process" plated die-cast housing which eliminates the use of jumpers and saves installation time.

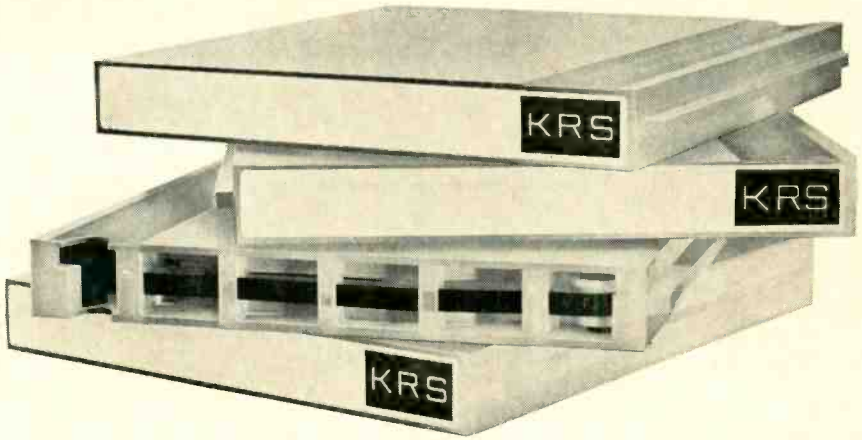
Circle 55 on Reader Service Card

Cameraman's Headset

A headset equipped with a microphone and binaural earphones

AUDIO

AUTOMATION



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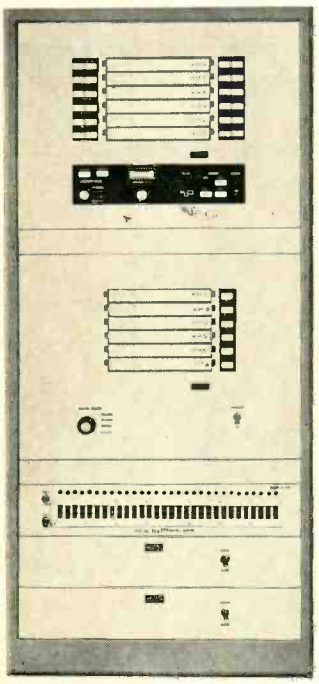

STACT* BROADCASTERS — KRS audio automation starts with the NEW SB6A 6-STACT* Broadcaster — six professional quality tape recorders in 14 inches. Available as 6-deck playback with front panel and remote controls or remote controls only. Also as 5-deck playback plus one deck combination erase/record/playback (one deck or six decks reversible). Separate erase for cue tones and/or program provided.

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COMPANION PRODUCTION UNITS — Model SB1RPF 1-STACT* Broadcaster, with fast forward and fast reverse, for cartridge production and general studio use.

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to simultaneously monitor programs and receive instructions, is available from Roanwell Corp., N.Y.C. The 106080 TV Special uses an RN-1C carbon noise-can-

celing mic with 30-ohm impedance and frequency response of 300-3500 cps. The 275-ohm receivers are housed in noise attenuating earcups. The unit is equipped with a 5′ straight 6-conductor cord.

Circle 69 on Reader Service Card

Dynamic Mic

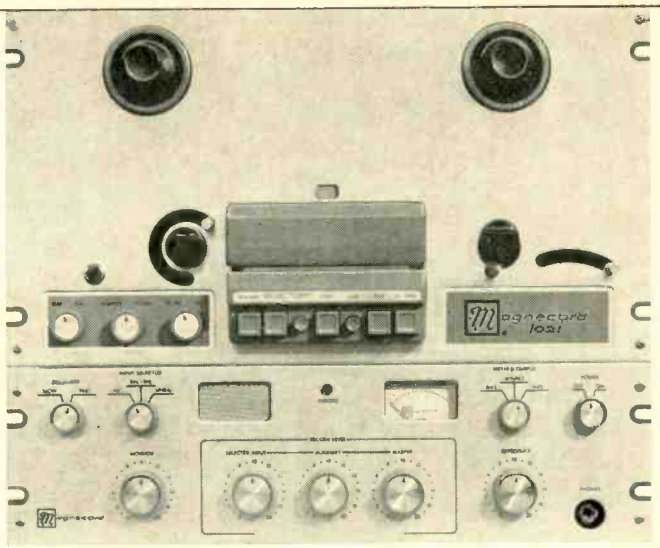
Shure Bros., Inc., Evanston, Ill., is marketing a dynamic omnidirectional mic with built-in windscreen, said to virtually eliminate wind noise and explosive breath sounds during remote interviews,

news, and sports pickups, and in studio applications. Frequency response of the SM50 is 40 to 15,000 cps; output at 1000 cps is —58 db; selectable output impedances are 30-50 ohms or 150 or 250 ohms. Each mic is supplied with 20-ft, 2-conductor shielded cable, fitted with a Canon XLR-3-11C connector and 90° slip-on swivel mount that fits ⅝"-27 threads. Price is $125.

Circle 52 on Reader Service Card

CATV System Engineering

CATV system planning and installation techniques are discussed in-depth in a new book, "CATV System Engineering," just published by TAB Books, Thurmont, Md. Written by William A. Rheinfelder, engineering



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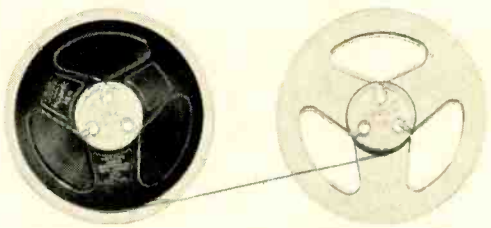

(You have to put a tape on it)

Just add a reel of tape and you are ready for production with the most versatile and complete monaural recorder/reproducer in the field.

Truly a broadcast ready instrument, the Magnecord 1021 requires no accessories. Broadcast standard input and output connectors, standard impedances, an inbuilt cueing speaker with separate level control, a mixing auxiliary input and an amplifier which will drive an external speaker are already incorporated into the design.

Ease of operation is built right in, too. You can one-hand cue if you like, and the cue button lifts tape to the heads, releases the brakes and applies low, even torque to the reels. A single pole, single throw switch controls remote start-stop in a preset mode. The Model 1021 features a fine hysteresis synchronous capstan drive and is engineered for safe, gentle tape handling and braking, even with the thinnest tapes.

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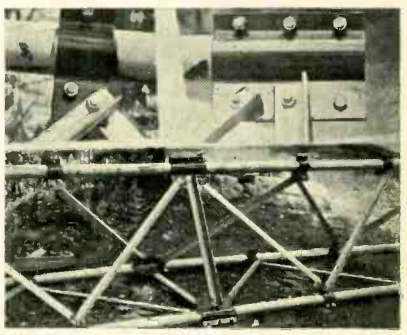
consultant and formerly in charge of engineering at Ameco, the volume covers planning, designing, and operating a CATV plant.

"CATV System Engineering" analyzes fully-integrated system concepts, while also thoroughly covering systems composed of uncorrelated components. Older system modernization, using available new equipment, is also discussed. Complex mathematical terms have generally been avoided; however, the more important derivations are contained in the extensive Appendices.

Circle 73 on Reader Service Card

Customized Towers

Optimum Designs, Inc., N.Y.C., is offering custom designed towers for broadcasting, CATV, and microwave at a cost lower than most off-the-shelf units, according to the firm. A new, patented method of tower construction,

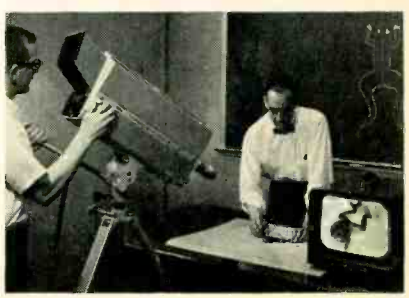


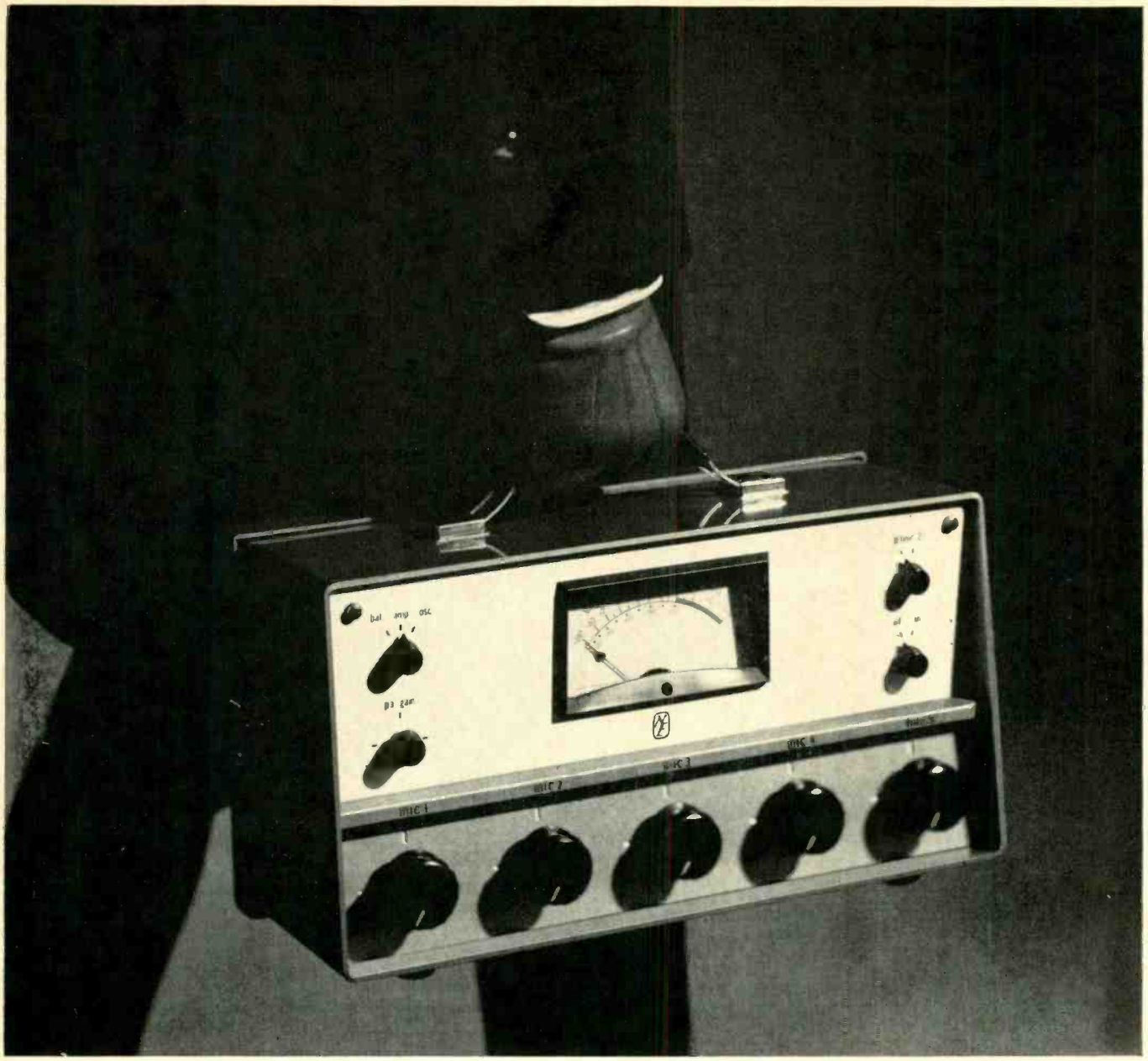
using frictional clamps to cut down on erection time and costs, is utilized. The legs of each tower section are butted together and held by the clamp; tower sections are assembled with similar smaller clamps with the angular cross-members bolted in position. The clamps may be designed for tubular, rectangular, and oval leg cross-sections.

Circle 72 on Reader Service Card

Basic ETV System

Diamond Electronics, Lancaster, O., is offering a closed-circuit ETV system which uses modular components in a readily expandable system. A "starter" camera-





Take me out to the ball game

And if you want to know the name of the game, it's called PROFIT. This solid state portable audio broadcast console lets you handle *any* remote with complete equanimity. (You can even run two or more in tandem for complicated multi-mike jobs.) And this is a truly *failsafe* unit: optional rechargeable NiCad batteries float across the AC supply as insurance against local power failure; you have two-line alternative outputs at +18 dbm. Now take off the snap-on front and back covers. You'll find four microphone inputs with XLR connectors; a line level input +18 dbm; built-in 1000 cps test oscillator; PA output with separate gain control; headset monitoring jack; even provision for order wire and telephone handset.

With all these solid state features going for you, the price is almost ridiculous. *A mere $680, US funds, FOB Toronto, duty and brokerage included.*

Northern Electric
COMPANY LIMITED

For specifications, write Dept 9950, Belleville, Ontario, Canada.

1065-3

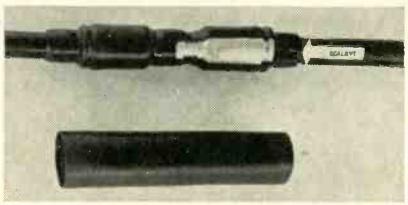
Circle 32 on Reader Service Card

monitor chain for teacher training and image classroom magnification costs $1500. A basic Diamond system costs approximately $11,000, which includes two viewfinder cameras, another camera for film chains, microscopes and similar equipment, a projector, two monitors and all controls.

Circle 57 on Reader Service Card

Heat Shrinkable Splice Cover

Thick-wall heat-shrinkable tubing, designed to waterproof, insulate and protect in-line coax cable splice connectors in aerial and underground CATV cables, is available from Sigma Industries, Inc. Menlo Park, Cal. The

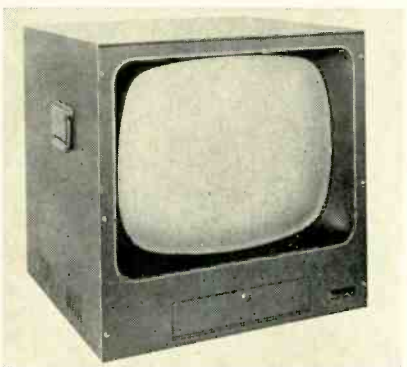


tubing, a modified polyolefin material, has a factory applied sealant which melts and flows at the cable entry points as the cover is shrunk over the connector. The Sigmaform splice cover is available in 3, 6, and 9″ lengths. Three minute installation is accomplished by shrinking the cover at 250° F with a hot air blower (heat gun) or torch.

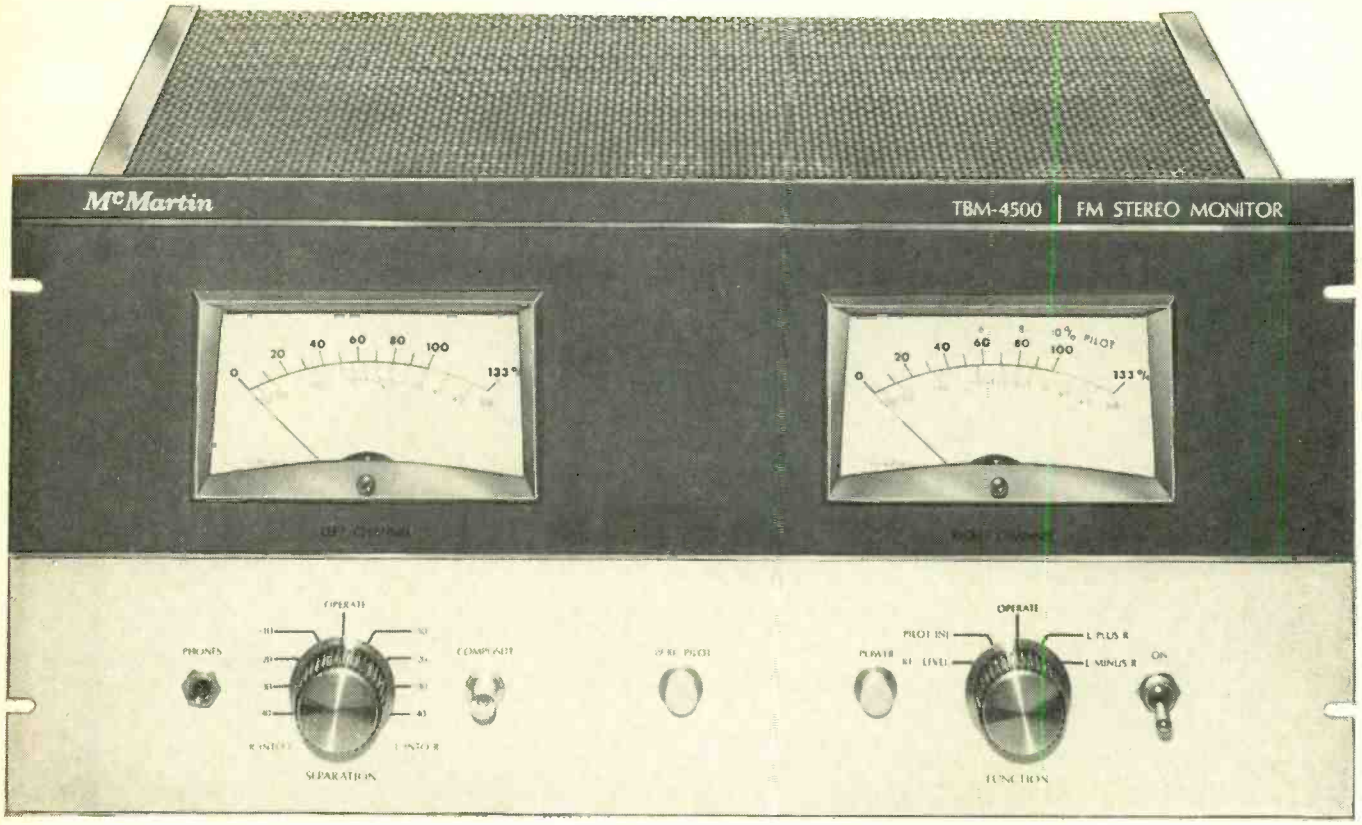
Circle 59 on Reader Service Card

TV Monitors

Miratel Electronics, Inc., St. Paul, Minn., has announced a series of high line rate TV monitors. The 30-mc video bandwidth units operate within a 525 to 1203 scan rate range and offer



1000-line resolution. The HLB series feature a bridging video input with a built-in emitter-follower amplifier, and an optional dual scan rate operation switch permits selection of any two line rates. Available in 14″, 17″ or 21″ sizes, the equipment may be



McMartin TBM-4500 FM|STEREO MONITOR

What's new?

An FM/Stereo transistorized Monitor that does three things no one else can do:

1. Simultaneously reads right and left channel modulation. This feature meets provisions of the new FCC proposal.
2. A 19 kc pilot indicator light shows that the station is transmitting stereo.
3. Measures pilot injection at any time without affecting modulation.

The TBM-4500 is a completely self-contained monitor with distortion of less than 0.375% on stereo from 50-15,000 cycles; has a signal-to-noise ratio better than -60db. Separation or crosstalk of either channel can be measured down to -50db directly on the meters. L plus R, and L minus R can also be measured directly on the meters. The amount of suppressed carrier at 38 kc can be measured.

Notice the new styling. It features "McMartin" blue on the upper panel and brushed aluminum below.

Write broadcast marketing manager for full details.

McMARTIN INDUSTRIES, INC.
605 North 13th Street
Omaha, Nebraska 68102

McMartin®

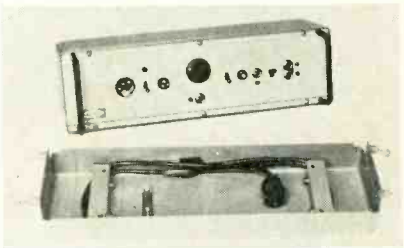
Circle 36 on Reader Service Card

rack-mounted or mounted in a standard cabinet.

Circle 123 on Reader Service Card

Portable TV Clamper

A portable Type B clamper amplifier designed by Raytheon's CADPO Div., Lexington, Mass., for microwave radio or cable circuits, is capable of handling NTSC color or monochrome TV.



The Model 10255 is one of a line of three, all of which offer solid-state, plug-in printed circuit modules. The clamper is suitable for intercity relays, STL, and remote pickup applications.

Circle 109 on Reader Service Card

Xmitter Remote Control

A remote control system for radio and UHF-TV transmitters is available from Teletronix Engineering Co., South Pasadena, Cal. The model RC 24 is said to meet all FCC requirements for single phone line or STL radio operation. Solid-state design eliminates sensitive relays in the 24-channel circuitry— all channels include control and metering. The direct readout chart system indicates position and function on three large meters, plus frequency and modulation meters. Each unit is mounted behind a 12¼" x 19" panel on a 16" deep slide-out chassis.
Price is $1292.50.

Circle 70 on Reader Service Card

All-Channel TV Antennas

Jerrold Electronics Corp., Philadelphia, has introduced a new line of all-channel antennas covering 82 UHF and VHF TV channels, and the FM band. The Pathfinder series antennas are hinged, enabling UHF and VHF sections to be aimed in different directions. Mechanical features include: square-boom construction; Golden Armor corrosion-resistant finish; insulators made of Cycolac; and self-cleaning wedge-snap locks which only tighten when the antenna vibrates in the wind. Five 300-ohm models range

v.i.t. displays with TEKTRONIX video-waveform monitor

with capability for sine-squared testing

Type RM529

frequency responses—Four response characteristics necessary to monitor Video Test Signals are provided:

1. FLAT to 5 MHz ±1%, to 8 MHz ±3%. *This flat response position to 8 MHz assures waveform fidelity and makes the video-waveform monitor ideally suited for sine-squared testing.*
2. HIGH PASS 3.58 MHz center frequency, 30% down at ±400 kHz.
3. LOW PASS -18 dB at 500 kHz.
4. IEEE 1958 STD 23-S-1. Color subcarrier -20 dB.

YRBG or RBG display capability—For monitoring output of color processing amplifiers.

line selector—Provides stable displays of the Vertical Interval Test signals. Adequate brightness is provided even at the fastest sweep speed. Can display any line desired. Brightening pulse automatically intensifies the displayed line as viewed on the associated picture monitor. No modification to the picture monitor is required.

field selection—Positive acting circuit allows selection of field one or two for display. Noise will not cause random field changing.

dc restorer—A feedback-type restorer acts during the backporch time. Not affected by presence of color burst. Does not distort the burst. Front-panel switch can disable the restorer—when other than video waveforms are viewed.

Cabinet Model also available. Same features as RM Model and designed for side-by-side mounting with a picture monitor in standard racks. Takes only 8¾" of rack space. Field case offered as an optional accessory for Type 529.

Type RM529 Video-Waveform Monitor	$1100
Type 529 Video-Waveform Monitor	1050

U.S. Sales Prices, f.o.b. Beaverton, Oregon

Available throughout the world

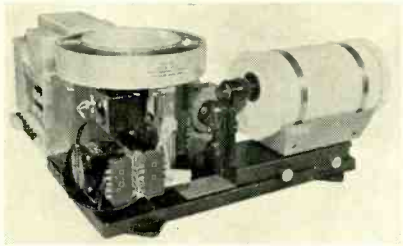
Tektronix, Inc.

Circle 39 on Reader Service Card

in price from $21.95 to $69.96, while five 75-ohm models are priced from $18.50 to $66.50.
Circle 56 on Reader Service Card

Random Access Slide Projector

With the Model 136-5V, any one of 256 slides or overlays can be projected at random in 3.1 seconds average time after request, in either forward or reverse sequence at 1 second intervals, according to Mast Development Co., Davenport, Ia. Slide requests can be made with rotary or push-button switches or by computer command. Additional slide capacity may be obtained by multiplexing projectors. The 41mm f/2.0 projection lens support is mounted on the camera carriage,



which is adjustable for image magnification and placement of the vidicon tube. Price is $4990.
Circle 54 on Reader Service Card

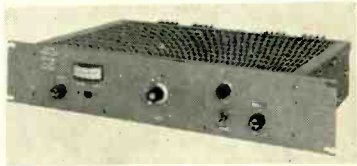
SLT Turntable

A Straight Line Tracking Turntable—SLT-12—has been developed by the Marantz Co. Unit features a free-floating tone arm assembly said to be unaffected by friction and inertia. Tracking error is virtually eliminated,

since the SLT arm holds the stylus tangent to record grooves. A cueing control automatically places the arm in the desired record groove. Frequency response is 20 cps to 20 kc; rumble, —112 db; output, 6 mv; and speeds, 33 1/3 and 45. Price: $295.
Circle 66 on Reader Service Card

Monitor Amplifier

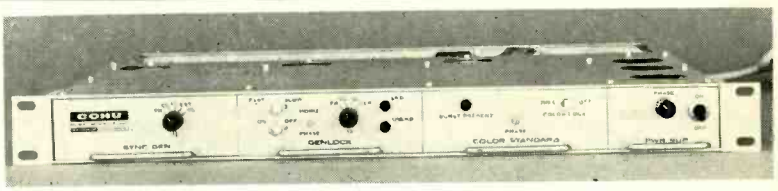
A solid-state 50w monitor amplifier with regulated and short-circuit proof power supply is available from Melcor Electronics Corp., Farmingdale, N.Y. The Model A-47, designed for studio sound distribution, is also said to be an excellent driver for disc



cutting heads. Its Class B output circuitry feeds an integral output autotransformer, providing a 70v line. Power supply voltage and current may be continuously monitored on the switchable panel meter. A current limiting feature automatically cuts off the power supply should a short-circuit occur. Price is $280.
Circle 60 on Reader Service Card

15-kw FM Xmitter

A 15-kw FM transmitter designed by Rust Corp., Everett, Mass., is capable of monoaural, stereo, or multiplex operation. The compact FMT-15 employs solid-state power supplies and has built-in samplers.
Circle 107 on Reader Service Card



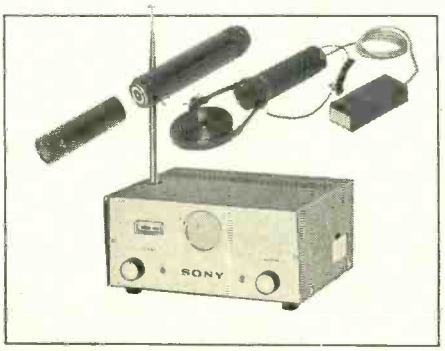
Sync Generator

A solid-state sync generator and accessory system for TV studio operation in b & w and color—contained in a 1¾" high rack panel—is available from Cohu Electronics, Inc., San Diego, Cal. The 2470 series plug-in assemblies include a 525-line sync generator, color standard, and power supply; outputs are compatible with EIA and FCC standards. Additional accessories, include dot bar generators and changeover switches. The changeover switch provides preset choice of local, remote, or automatic changeover in the event of sync failure, plus switching for all system outputs, including color subcarrier and burst flag. Other sync generators are available for 729- 873- and 945-line scan rates. The basic system, Model 2471-100, (525-line sync generator, power supply, rack cabinet) is priced at $945. The complete system, including genlock and colorlock, is $2240.
Circle 62 on Reader Service Card

Feel Free to Speak!

Cordless Sony CR-5 Microphone frees you to speak and move anywhere!

Entertainers, teachers, lecturers, square dance callers... everyone and anyone whose performance has been restricted by microphone wires and microphone stands can now speak and move freely. The miniaturized Sony CR-5 Wireless Microphone system was made strictly for freedom of speech and movement. Sony-designed to professional recording studio standards, the CR-5 uses a condenser microphone with a transistorized FM transmitter, packaged into a compact cylinder less than three inches long. Two battery packs are included, one connects directly to the FM microphone/transmitter forming a handheld probe mike, the other is a small, pocket power pack allowing the three inch transmitter mike to be worn as a lavalier. Move freely up to 300 feet in any direction from the FM receiver. Features: distortion-free direct frequency modulation, interference-eliminating automatic squelch circuit, automatic frequency control, 100 to 10,000 cps frequency response, +35-db signal-to-noise ratio. How about price? Just half of what comparable quality and performance cost elsewhere. Complete with microphone/transmitter, FM receiver, 2 battery packs and portable carrying case, the CR-5 sells for only $365.



For literature or name of nearest dealer write Superscope, Inc., Sun Valley, Calif., Dept.

SONY SUPERSCOPE *The Tapeway to Stereo* ®

Circle 41 on Reader Service Card

LITERATURE of INTEREST

For additional data, circle No. shown on Reader Service Card.

5/10-kw AM transmitter, Collins 820E/F-1, discussed in illustrated brochure, is all solid-state except high-level audio, RF stages. Designed for remote control. **163**

Tape recorder catalog from Ampex includes GSA prices on recorders/reproducers, communications logging, master, magnetic mat, tape duplicators, instrumentation recorders. **136**

Panel/switchboard meter quick reference catalog illustrates cross-section of Hickok's custom-built meters. **186**

Preamp/program amplifier, program/monitor amplifier units, described in data from Melcor Electronics. **157**

VTR, portable broadcast type MVR-65, illustrated in brochure from MVR Corp. **131**

Video converter, analyzer, data camera, lab sync generator, described in data from Colorado Video. **133**

Photographic equipment illustrated in 146-p catalog from Burke & James. Includes graphic arts, lighting, projection-viewing, lab equipment. **134**

Broadcast engineering technical information bulletin, issued monthly by Marconi, discusses instrumentation for telecommuications. **135**

Tape recorder specifications, performance data on Magnecord recorder/reproducers listed in 6-page brochure. **138**

Broadcast equipment flyer briefly describing complete product line from Moseley Associates. **142**

Zoom scale for 12-120 zoom lenses described in catalog sheet from Birns & Sawyer. Includes specifications, prices. **137**

CATV line extender amplifier, using all-silicon transistors for low-band and FM, described in engineering bulletin from Kaiser Aerospace and Electronics. **174**

"Tech-topics", published monthly by Switchcraft, reports on applications of switches, jacks, cable assemblies, connectors. **126**

Closed circuit ETV system capabilities outlined in Sylvania booklet, "Is Your School Ready for ETV?" **113**

TV cameras, transistorized vidicon, I. O., and film units illustrated in new literature from G.E. **139**

Microwave towers, 15-30 ft., illustrated in "Q" series catalogs from Microflect. Includes specifications, antenna mounting data, etc. **150**

Automatic ETV systems booklet from Blonder-Tongue discusses Versa-Lock classroom system. **144**

16mm action viewer, sound reader described in brochure from S.O..S Photo-Cine-Optics. Includes specifications, prices. **145**

Spectrum analyzer plug-in units, offering phase lock, 100-mc dispersion, described in technical data from Tektronix. **148**

2500-mc ETV antenna catalog from TACO lists receiving and transmitting types. **140**

Automated programming systems spec sheets from Schafer Electronics includes prices and systems applications, data on program logger. **170**

"The Directional Microphone Story" published by Electro-Voice. 22-pages of directional mic characteristics. **121**

Books on all phases of radio-TV-CATV, many unavailable from other sources, fully described and illustrated in 8-page catalog from TAB Books. **164**

Standby electric plants, a guide to selection and installation from Onan, includes plant capacity, engine type, output, etc. **143**

Prefabricated buildings for housing tower site equipment described in brochure from Ft. Worth Tower. **151**

CATV advertising aids offered in AD-101 ad package from Ameco. **132**

CCTV systems detailed in technical application bulletins from Cohu Electronics, Inc. **146**

Spectrum analyzer plug-in for Fairchild scope designed for broadcast band described in data sheet from the Company. **141**

Cleaning cloth, containing silicones for film, records, lenses, etc., in brochure from FilMagic. **147**

DC voltage measurement, 40-page application note from Hewlett Packard. "Which DC Voltmeter" describes types and uses. **176**

Field strength meters, covering all TV and FM bands, described in two data sheets from Sadelco. **149**

Quartz TV lighting concepts discussed in catalog from Kliegel Bros. Shows fixture types, operating data, specifications. **179**

Coax switching equipment data from Crooke Engineering Co. includes accessories, applications. **130**

Quartz-iodine lighting equipment portable/powerpack electronic dimmers, explosion-proof fixtures, described in catalog sheets from Colortran. Also price sheets. **188**

Microwave phase bridge, insertion-loss insensitive type, described in engineering bulletin from Weinschel Engineering. **194**

Microwave instruments test equipment catalog supplement from Narda Microwave Corp. Includes power supplies, freq. meters, tunable waveguides, etc. **195**

Equipment cart for testgear storage and transport detailed in Equiptogram #338. **156**

Strand cable-lashing materials and methods, "rapid-lash helix," described in 7-page brochure from Channell Splicing Machine Co. **165**

Electronic measuring instrument catalog, including voltmeters/ohmmeters, decade amplifiers, calibrators, capacitance meters, converters and voltage standards descriptions, offered by Ballantine Labs. **120**

TV sound mixers, 8-, 16-, and 24-channel, solid-state modular EMI units illustrated in brochures. **154**

Tone multiplexing equipment described in catalog sheets available from Metro-Tel. **158**

Electronic cabinets and consoles, welded aluminum, described in 12-p catalog from Zero Mfg. **153**

TWT, Magnetrons specifications listed in technical bulletin from Litton Industries. Also klystrons, CRT's, backward wave tubes. **181**

"Q" determination from "C" or "L" measurements provided by two nomographs in 4-page technical folder from Boonton Electronics Corp. **75**

TV camera remote control, Autocam equipment price list from Television Zoomar Co. **155**

Microwave by wire system is described in technical information from Surface Conduction, Inc. Covers CATV applications and other uses. **118**

Transmission line dehydrators, pressurizers and mobile units described in literature from S & G Mfg. Co. **177**

Microwave equipment, described in 32-page bulletin from Lectronic Research Labs, includes waveguides, test equipment, power supplies. **171**

Wire, cable, tubing, switch, electronics hardware catalog describes Birnbach Radio line. **152**

Autotransformers, continously variable AC Variac, described in brochure from General Radio. Includes ratings, prices. **159**

Component selector, 128-p catalog listing application charts, type selector charts, standard rating selector tables, from Cornell-Dublier. **160**

Sync pulse generator, transistorized Marconi B36000 discussed and illustrated in brochure from Ampex Corp. **161**

BM/E

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Yoshi Yamamoto

BROADCASTERS SPEAK

In your recent article, "Requirement for Station ID's," (December issue), you state TV ID's must be given both aurally and visually at the beginning and ending of each time period of operation, and during the operation on the hour. I believe only the beginning and ending announcements need be by aural *and* visual means. Other ID's, on the hour, may be either aural or visual, not necessarily both. Please clarify.

Thomas E. Bolger, Gen. Mgr.
WMTV Madison, Wisc.

You are absolutely right!

For a number of years we have been factory representatives for electronic product manufacturers. As such we sell to stations in Puerto Rico.

Aside from the above be advised that on September 1965 we filed an application for a CP for a new FM broadcasting station. We are very interested in receiving your magazine and hope the above information will qualify us as subscribers.

Jose Arturo Fernandez
Puerta de Tierra, P.R.

It certainly does?

I just read through your November issue and found it most interesting and informative, as usual.

We are a new company entering the CATV business. To date we have not built our first system, although we hope to start our first unit by January 1st. In that respect, I want to take up your offer of help. In explaining our proposed system to our stockholders, I have no past system performance to which I can refer. This makes a financial presentation difficult. I have need for some typical cash flow statements for systems between 5,000 to 15,000 subscribers.

Samuel A. Buffone, Opns. Mgr.
Westmoreland Cable Co.
New Kensington, Pa.

See November issue and watch for appearance of article now in preparation.

The article in the October issue, "'Rate Increases—Actions & Reactions," was of special interest. We are facing this problem and I would appreciate getting as much information on rate increases as possible. If you could possibly send me additional information I would appreciate it.

In each issue of BM/E there is always an article of special interest. BM/E is good reading.

Robert Douglas
Gen. Mgr. KTIL
Tillamook, Ore.

If you have more advertisers than availabilities, raise 'em!

I must take just a moment to tell you the high opinion we have of BM/E. We really save and use this publication; it has a value we can see, feel, and touch.

I hope that you will, sometime soon, give us your ideas on the best ways to meet the FCC's new recommendations for a program log.

I have found other material in recent issues—about the Fairness Doctrine, the way to keep a Public Information file, etc.—to be very valuable.

George L. Brooks
Pres. & Mgr., KCUE
Red Wing, Minn.

NAB's general counsel Doug Anello presented about the best thing going on Program Logs at the recent Fall Conferences. Now our legal experts start a 2-Part coverage in this issue.

It would be appreciated if you would send a sample copy of BM/E for the program part of our operations to: Georgia TV Center, Atlanta, Ga.

Lou Peneguy
Georgia Dept. of Education
Atlanta, Ga.

Done! And best of luck in your new position.

Presently I am doing some extensive research on the problems of growth of UHF TV. My specific topic is "The Politics of UHF-TV," which includes the conflicts of frequency allocation and the "mistakes" that were made.

I realize that BM/E is new, but it is obviously composed of learned and experienced minds in the broadcasting industry . . . undoubtedly familiar with the problems. Any information you could possibly supply me with would be appreciated.

James Williams, Jr.
Gen. Mgr., WNDY
Crawfordsville, Ind.

Flattery will get you . . . this letter in print so that other interested parties will come to your aid. When you finish the job, we'll be happy to consider the material for publication.

Our station has been granted permission to begin construction of new FM facilities. We have been quite interested in your 6-part article, "Building an FM Station—From CP to Sign-On," and would like to know if the material can be secured in its entirety.

Jan R. Caddell, Production Mgr.,
Santee Broadcasting Co., Inc.
Kingstree, S.C.

We are thinking of making it available in 5½ x 8½" booklet form following publication in BM/E.

The answer to Mr. Haeberle's request for information on a record cleaning solvent might be addressed to the Pfanstiehl Chemical Corp., Waukegan, Ill. I have used their "Pfan-Stat Liquid" for cleaning LP's before recording them on our FM music tapes. There are also several spray-on solutions which are effective.

Keep up the articles on how stations are keeping "operator errors down" by equipment engineering and operation.

Jack Thomas.
Production Mgr.
WATH Athens, Ohio

Another record cleaner is "FilMagic," available from The Distributor's Group, Inc., 204-14th St., N.W., Atlanta, Ga.

Please accept my sincere congratulations on your excellent publication. I have found the articles and features to be of outstanding value in our daily operations.

Dick James
General Mgr.
WBBW-AM-FM
Youngstown, O.

MANAGEMENT

ROUNDTABLE

Call-In Shows: Curse, Craze or Creation?

A U. S. SENATOR recently called for an investigation of "call-in" or open-mike radio programs, citing alleged cases of "unfairness." He suggested the FCC instigate rules and regulations to control these fast-developing "talk" programs. It's reported some FCC sources are interested in a closer survey of "call-in" programs on radio, and to a lesser extent on television.

What are these "call-in" programs? Who does them? Are they good programming? Do they build audiences? A recent survey of several radio-TV stations from 50-kw giants in top 50 markets to 250 watters in whistle-stops gives examples of some of the problems and values of "call-in" shows.

Answers to several key questions are of interest to broadcasters. Do "call-in" or telephone-talk programs help ratings? Do they produce extra revenues or sell at a premium price? Are preliminary interviews with guests advantageous? How do you delay these programs, if you do? What time limits are imposed and how do you handle habitual callers? Are there any taboo subjects on these programs? Let's get the answers from leading broadcasters:

No. 1 rated, top-40 station in top-30 Southeastern market, 5-kw full-time: "Our call-in program from 10 p.m. to midnight boosts our ratings. Audience composition is broadened in a traditional 'teen time' so that adults become an important factor. Extra revenue is produced and premium rates apply. Many times subject matter makes an ideal lead into a commercial. We do not conduct preliminary interviews for guests, but the program is delayed so we can catch the 'kooks.' The audience is aware of this, too. We use a 6-second delay via a simple tape machine loop and never have problems. Our station implements a 3-minute time limit on all calls, so generally callers have thought out their remarks in advance. As for habitual callers, we announce every third evening that calls from 'regulars' will not be accepted on 'open night.' This is intended to generate new callers, and does. We do accept long-distance calls, prepaid only. There are no 'taboo' subjects on our call-in programs — anything goes. However, we feel the host should be neutral and not opinionated, although on controversial local issues the host will express an opinion after all sides have been exposed."

Southwestern radio-TV combination, in top-15 markets: "We have tried the telephone type of radio and TV programming and found both unsatisfactory. The reasons may be isolated in our market, but our experience shows the same people, day after day, week after week, called the stations. We tried programs on both AM and TV to let the audience discuss any subject they wanted to sound off on. But regretfully, it all ended up on the subject of Communism, the John Birch Society and other minority groups. When callers identified themselves, and if they were the least forceful in their views, they ended up getting 'kook' phone calls after our show was over. When we picked subjects for callers to discuss, we ran into the same problems—only the fanatics utilized the broadcast as an outlet for their opinions."

A 1 kw-daytime, 250-watt, top-40 station in a highly competitive 8-station market offered several unusual and frank opinions: "These programs build big audiences because they are controversial and people like controversy. They also seem to like to listen to eccentric screwballs who are the regular callers. We have never been able to sell our program because the sponsors are afraid of it. We just stick spots in it. We do use preliminary interviews mainly to screen out potential 4-letter word users. Our delay devices are the routine type, simple and effective. We put a 2½-minute time limit on calls, but we allow habitual callers. If they are good, we let 'em talk nightly. If no good, we hang up on them. But they are persistent. We take prepaid out-of-town calls, but don't get many. Several topics are taboo with us—sexual intercourse, alcoholics, and strictly personal problems. We have our show at 8 to 9 p.m., for no particular reason. I think midnight would be better because it virtually eliminates teen-agers. We use a neutral host, but frankly, we think we'll hire an opinionated one. It will be more fun!"

What about preliminary interviews? "We invite guests nearly every night from government to ESP experts. We generally know what type of pattern we are going with. If we are going to embarrass our guest, we warn him ahead of time. We screen each caller through the control room to make sure it is not some teen-ager who might make some ridiculous comment. As for delay devices, we use a 7-second delay device. It is very effective. We have had only one or two minor technical problems in four years."

On the question of time limits, habitual callers, and out-of-town calls, this broadcaster says: "We do not limit time on our calls. The discretion of the on-the-air personality is the important thing. If the caller is interesting, with a good question or declarative statement, there is no reason to cut him off. If it is someone who obviously doesn't know what's what, we ease him off quickly and diplomatically. If he's persistent, we cut him off abruptly. We have discovered our listeners like to know that egg-heads will be cut off immediately. We don't really screen out the habituals and we'll take long-distance calls if they are paid."

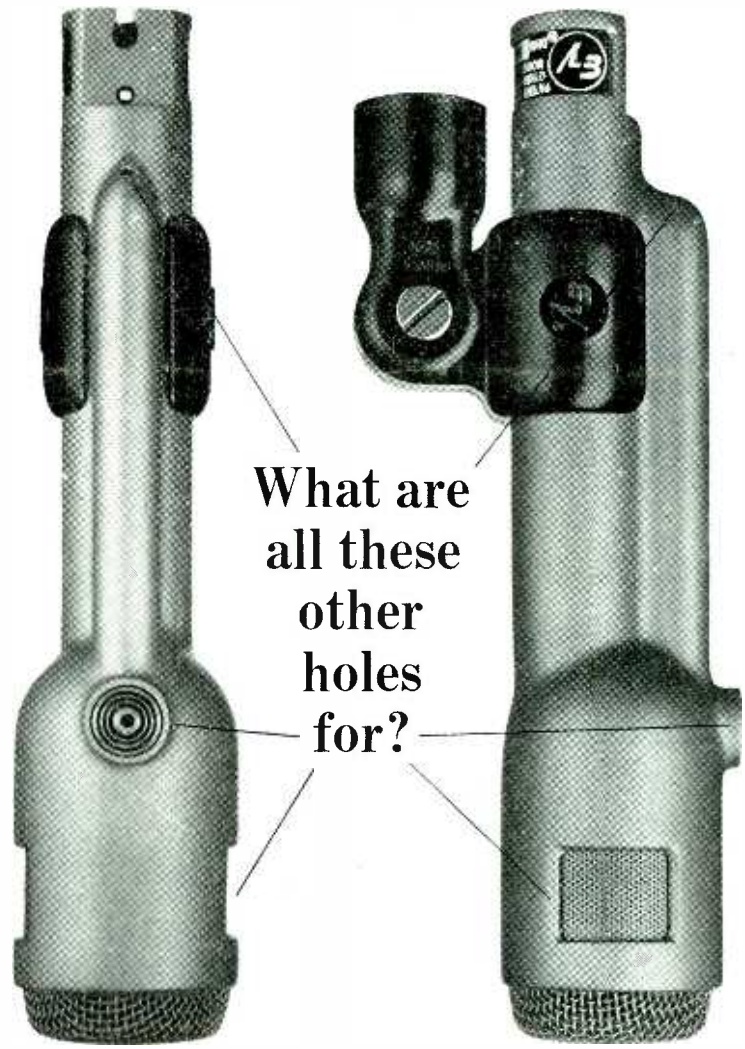
Only two "taboos" were listed by this broadcaster . . . racial and religious issues. As for scheduling, the program runs 11 p.m. to midnight, Monday through Thursday. The station soon will be broadcasting its call-in show live from a booth at a new nightspot "just for the extra promotion."

The broadcaster also notes: "We feel 11 p.m. is the time TV shuts down and radio becomes a key factor. In the next few weeks we plan to begin our call-in program with a general, informal summary of news and some of our topics for the nightly discussion will come from that brief newscast. We think this might help our ratings by beginning with the news approach."

Finally, what about the opinionated host? "We operate with a neutral host, although we've been looking for years for a good opinionated host. We think a host with a specific controversial statement can create more interest in the program and help the mental processes of the public."

There's no one answer to whether call-in programs are creative, a curse or a craze. But more and more are coming on the air, and with the advent of all-talk and all-news stations, as one broadcaster put it, probably with tongue in cheek, "thar's sheckles in those syllables." ●

If the Electro-Voice Model 666 picks up sound here...



What are all these other holes for?

The holes in the top, sides and rear of the Electro-Voice Model 666 make it the finest dynamic cardioid microphone you can buy. These holes reduce sound pickup at the sides, and practically cancel sound arriving from the rear. Only an Electro-Voice Variable-D® microphone has them.

Behind the slots on each side is a tiny acoustic "window" that leads directly to the back of the 666 Acoustalloy® diaphragm. The route is short, small, and designed to let only highs get through. The path is so arranged that when highs from the back of the 666 arrive, they are cut in loudness by almost 20 db. Highs arriving from the front aren't affected. Why two "windows"? So that sound rejection is uniform and symmetrical regardless of microphone placement.

The hole on top is for the mid-range. It works the same, but with a longer path and added filters to affect only the mid-frequencies. And near the rear is another hole for the lows, with an even longer path and more filtering that delays only the bass sounds, again providing almost 20 db of cancellation of sounds arriving from the rear. This "three-way" system of ports insures that the cancellation of sound from the back is just as uniform as the pickup of sound from the front—without any loss of sensitivity. The result is uniform cardioid effectiveness at every frequency for outstanding noise and feedback control.

Most other cardioid-type microphones have a single cancellation port for all frequencies. At best, this is a compromise, and indeed, many of these "single-hole" cardioids are actually omnidirectional at one frequency or another!

In addition to high sensitivity to shock and wind noises, single-port cardioid microphones also suffer from proximity effect. As you get ultra-close, bass response rises. There's nothing you can do about this varying bass response — except use a Variable-D microphone with multi-port design* that eliminates this problem completely.

Because it works better, the E-V 666 Dynamic Cardioid is one of the most popular directional microphones on the market. Internal taps offer 50, 150, or 250 ohm impedance output. Frequency range is peak-free from 30 to 16,000 Hz (cps). Output is—58db.

To learn more about Variable-D microphones, write for our free booklet, "The Directional Microphone Story." Then see and try the E-V 666 at your nearby Electro-Voice professional microphone headquarters. Just $255.00 in non-reflecting gray, complete with clamp-on stand mount. Or try the similar Model 665. Response from 50 to 14,000 Hz (cps), $150.00 (list prices less normal trade discounts).

*Pat. No. 3,115,207

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