A NAFEB PUBLICATION / MAY 1977

BME

NAB CONVENTION REVIEW

BROADCAST MANAGEMENT/ENGINEERING

When you're in command of a Riker switcher, you've got the video right where you want it. Under control. You can select or mix your video sources with new ease and flexibility.

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High performance in differential phase, gain and frequency response ensure excellent picture quality. Switching speeds in the nanosecond range during the vertical interval result in smooth, invisible transitions.

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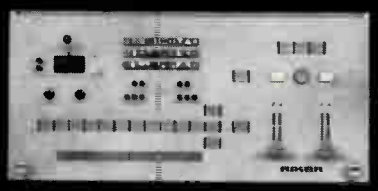


no other switcher lets you do so much with your video

RIKER

PRODUCTS FOR VIDEO ANALYSIS, SIMULATION & CONTROL

RIKER VIDEO INDUSTRIES, INC. 100 Parkway Drive South, Hauppauge, Long Island, N.Y. 11787 (516) 483-5200

Circle 1 on Reader Service Card

before you buy any color processor, ask yourself these 6 questions:

How long does it take to warm up?

Normally it takes most processors 3 to 4 hours to get from ambient 70° to the required 100-110°. With a Treise Color Processor, warm-up takes only 20-45 minutes. (Think how much valuable time you save!)

Once on temperature, does it stay on temperature?

Treise Processors feature a unique "proportional control" system that maintains a close watch over the temperature and provides just the right amount of heat to maintain it at all times. There is no "stop 'n go," no wide fluctuations of temperature. Thus a Treise Processor is more economical to run than any other processor.

Does it provide consistent quality?

No other processor can assure you such unvaryingly consistent quality and performance — end to end, side to side, roll to roll, day to day! This is the kind of performance you should demand from a processor . . . and can take for granted when you buy from Treise.

Is it flexible enough to fully utilize the new films?

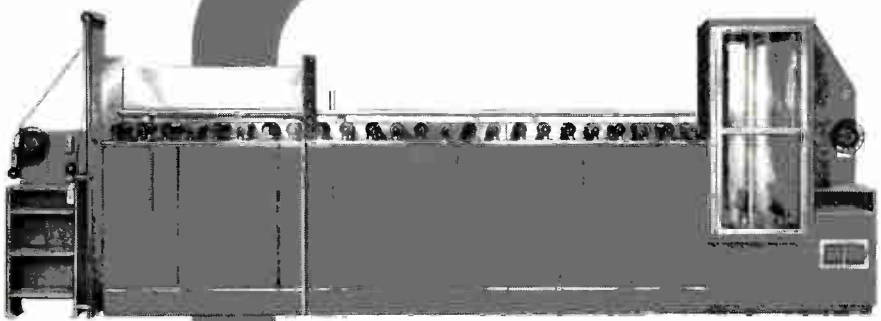
Treise Processors provide for 50% additional first-developer time to permit full utilization of the new EF Ektachrome film. (This feature is important when you consider that news work demands wide flexibility in film speeds to achieve optimum results under all shooting conditions.) To our knowledge, only Treise offers such outstanding flexibility!

Does it "cut corners" to feature a "cut-rate" price?

Treise Processors meet or exceed all film manufacturers' specifications. All chemical solutions are pump recirculated and filtered. All moving parts in the drive system run on ball bearings. All components are the finest that money can buy. Materials and construction make absolutely no compromise with quality!

How easy is it to maintain?

When it comes to maintaining a Treise Processor, there's frankly very little of it. When necessary, however, you'll find that it has been designed with service in mind. For example, the film racks are removable without the use of tools and without disturbing thread-up. This unique feature permits spot inspection of the film transport system and results in minimum "down-time." All pumps, filters, etc., can be easily inspected and replaced in a few minutes, instead of the usual 2 to 3 hours delay!



TREISE MT-20

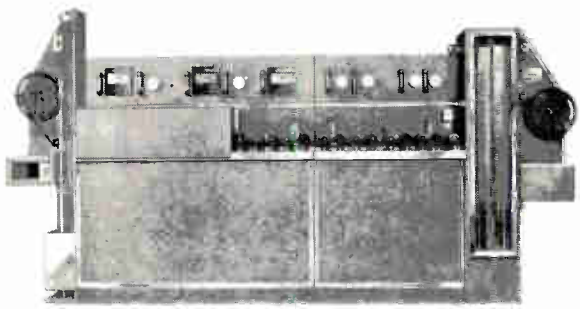
If your requirements call for exceptionally high volume in a short period of time (—and if you want to surpass any other station), we recommend the Treise MT-20 Color Processor. This model accommodates 16mm color reversal film at rates up to 60 fpm and is the finest TV color processor that money can buy!

Write for FREE MT-20 Catalog!

TREISE MTV-30

If your needs are normal and you're on a fairly tight budget, we suggest the Treise MTV-30 Color Processor. This model accommodates 16mm color reversal film at rates up to 30 fpm — the most practicable speed for television needs.

Write for FREE MTV-30 Catalog!



TREISE ENGINEERING, INC.

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MAY 1967/VOLUME 3/NUMBER 5

BM/E

BROADCAST MANAGEMENT/ ENGINEERING

This month's cover: The 45th NAB exhibit extravaganza, cameras, miniskirts, monitors, video, lights, models, automation, fm exciter and excitement in general. Recap starts on p 27.

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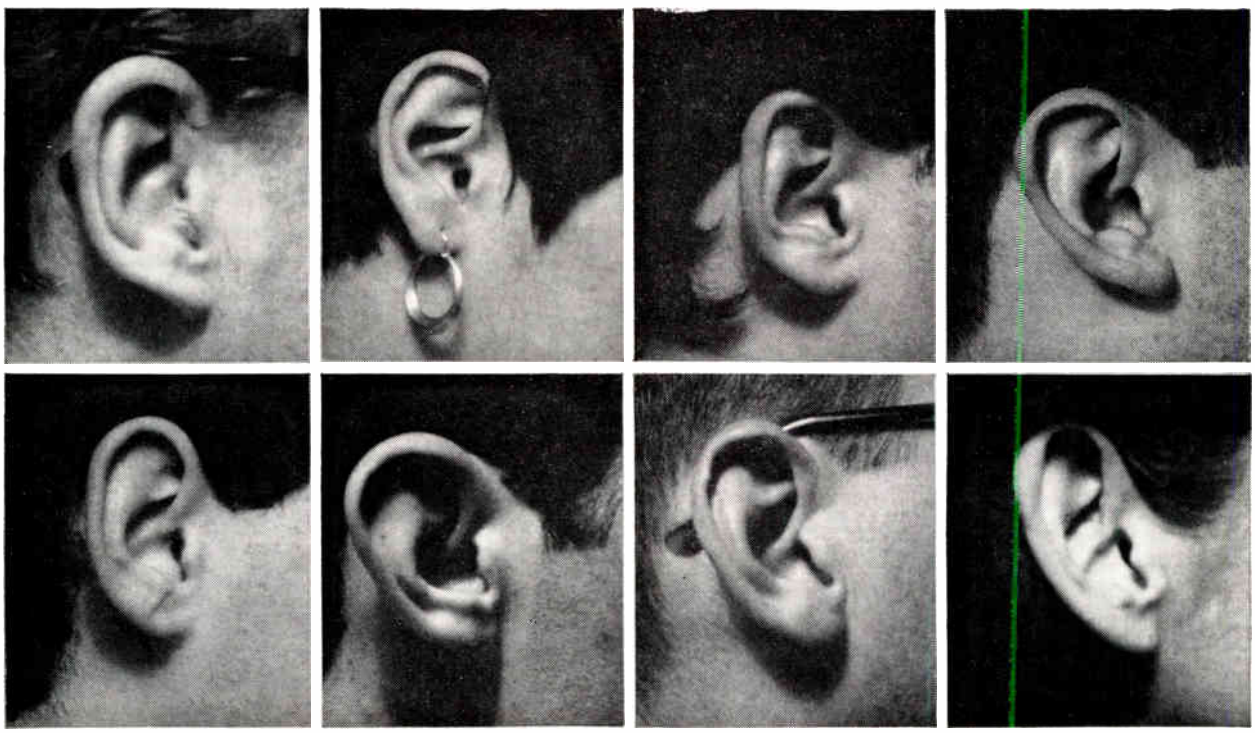
How do you measure loudness?

First, you listen a lot...



And that's exactly what we did! For the past several years, scientists at CBS Laboratories have been using the rigorous techniques of psychoacoustic testing to determine the nature of sensory loudness as it applies to broadcasting. From this research have come significant new data and methods for measuring sensory loudness with respect to frequency content, combinations of complex signals, the "ballistic" response (including impulse and duty-cycle considerations), the signal peak factor, and other related phenomena.

A sensory loudness indicator and a new automatic control for limiting excessive loudness are now undergoing field tests.

Write to us for further information on CBS Laboratories' loudness indicator and automatic loudness control.

PROFESSIONAL PRODUCTS

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

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BROADCAST INDUSTRY NEWS

1966, Record In Consumer Electronic Products

The Electronic Industries Association (EIA) Marketing Services Department recently released total United States factory sales figures for 1966 in consumer electronic products:

- The total United States radio market (including auto radios) grew to 47.6 million units in 1966, roughly 9 percent over 1965. EIA Marketing Services pointed out that this figure also includes any combination incorporating a radio receiver.
- A total of 13.6 million fm-capacity radios (exclusive of auto radios) were sold in the U.S. market in 1966, accounting for 25.6 percent of total sales. In 1965, 7.8 million fm radio sales made up only 23.1 percent of the total radio figure.
- The black-and-white television market last absorbed 7.7 million sets. Nearly 6.6 million of these were table and portable models. Imports accounted for 19 percent of the black-and-white total, but over two-thirds of this percentage was receivers coming into the country under United States brands.
- Factory sales of color sets rose to 5.0 million, including a small number of imports. This was nearly 50 percent over the 1965 factory sales figure of 2.7 million.

Total United States market computations will be further refined, according to EIA, due to more sophisticated U.S. Customs Service categorization of consumer electronic products in effect since January this year.

EIA's Marketing Services Department expects to publish total U.S. market statistics periodically during the year.

Top 100 TV Advertisers Raise Investments

Some dimensions to the record 1966 billings in spot television were provided in the Television of Advertising's announcement recently of its 11th annual Spot TV Report.

Highlights extracted from the individual advertiser and product category expenditures of last year include:

- Spot television's appeal to national and regional advertisers gained momentum among such varied categories as airlines, automotive, beer, gasoline, soft drinks and tobacco.
- Three-fourths of the top 100 spot users were advertisers of products sold in supermarkets, in addition to their more specific retail outlets . . . drug stores, variety stores, candy and tobacco shops, etc.
- Spot television's flexibility for the efficient introduction of new products again gave reason for sizeable budget boosts. Among the top 100, 75 advertisers showed gains. Brand expenditures will be shown in the complete report.

The number of spot advertisers in the million-dollar and over group last year rose to 207, 22 more than in 1965. There were 49 companies in the over $5-million investment class, as against 44 in 1965.

NAB Convention Recap . . .

. . . One of 116 scenes at the NAB convention. For a recap of the convention, turn to p 27.

Seven-Million Households Have Color TV

Seven-million households in the U.S. had color TV sets, as of August 1966 when 26,000 households were interviewed. More than 18-million households had uhf and over 13-million had two or more sets. Multiset households are more likely to have color and uhf than one-set households.

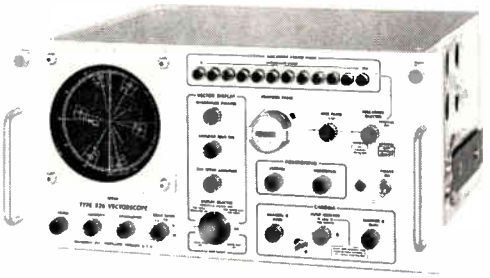
These figures come from a report released by the Advertising Research Foundation entitled "National Survey of Television Sets in the U.S. households — August 1966, Including Color and UHF." Like the previous 12 reports in the series, the August 1966 estimates are based on a survey made by the Bureau of the Census at the request of ARF.

The report shows about 54.7-

Tektronix Television Instruments

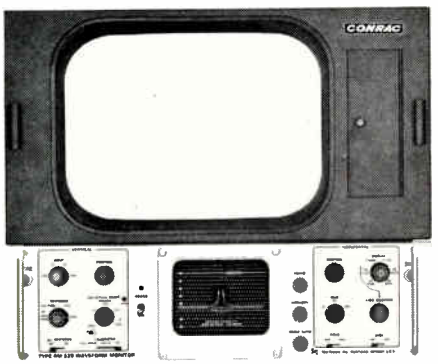
Type 526 Vectorscope for Chroma-Signal Displays

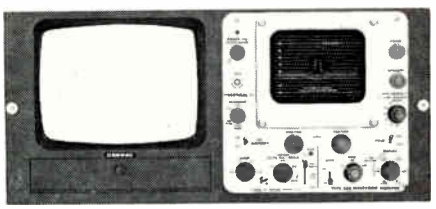
color encoder adjustments
differential phase measurements
differential gain measurements
vertical-interval-test-signal (VITS) displays
video tape-recorder setup

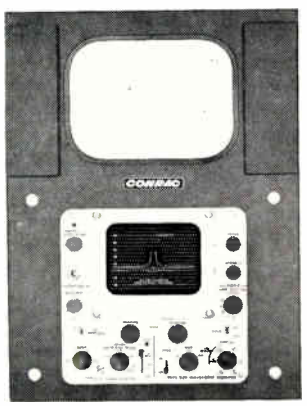


Measuring amplitude changes and phase shifts can be done accurately, conveniently, and independently with the Vectorscope. The Vectorscope presents relative phase and amplitude displays (of chrominance information in the N.T.S.C. color signal). Dual-trace capability permits simultaneous display of two color signals for precise matching of phase and amplitude. In addition to the vector display, the Vectorscope can present the chroma signal demodulated along any phase-angle with respect to time.

Type 526 Vectorscope $1665
Size is 8¾" high, 19" wide, and 18" deep. Weight is ~ 45 pounds. Designed for rack mounting.



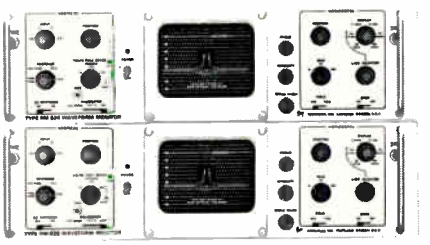




Type 529/RM529 for Waveform Monitoring

vertical-interval-test-signal (VITS) displays
sine-squared pulse and bar testing
transmitter modulation monitoring
YRBG or RBG displays (with color-processing amplifiers)
video signal-level monitoring
bandwidth measurements
differential-gain measurements

In waveform-monitoring applications, the Type 529 and RM529 offer 2 LINE and 2 FIELD displays plus calibrated sweep rates of 0.25 H/cm, 0.125 H/cm, 0.025 H/cm with X5 Magnifier, and 0.005 H/cm with X25 Magnifier. They provide 4 response characteristics necessary to monitor VITS—*FLAT* to 8 MHz (which assures excellent waveform fidelity for sine-squared testing with 2T, T, and 1/2T pulses), *HIGH PASS* 3.58 MHz, center frequency, *LOW PASS*—18 dB at 500 kHz, and IEEE 1958 STD 23-S-1. Other characteristics include a backporch type DC restorer, a positive-going field selector, and a full-field line-selector *including digital VIT line selection.*



Type 529 Waveform Monitor . . . $1050
(8¼" high, 8½" wide, 19" deep, weighs 24 pounds.)

Rack Mount Type RM529 . . . . . $1100
(5¼" high, 19" wide, 20" deep, weighs 27 pounds.)

Power consumption of each model is ~ 80 watts — no fan used.

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

Tektronix, Inc.

For complete information, contact your nearby Tektronix field engineer or write:
Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005

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million households with at least one television set. This represents a growth of 22.6-million television households in the ten years covered by these studies. In all, there are some 69.9-million sets in households, more than twice as many as in June 1955.

The geographic distribution of television households follows the population distribution, since television penetration is over 90 percent in all four regions. In terms of television status, the North East leads in multisets, the West in color, and the North Central states in uhf. As in 1965, the South tends to lag behind the national average on all three counts.

Other cross tabulations show color and uhf sets are least common in nonmetropolitan areas, in households with no telephones, in one-person households and in those that are not husband-wife households.

Copies of the 38-page report are available for $5 each from the Advertising Research Foundation in New York.

TV Academy Proposes Special Program Support

Consideration of a plan under which all sponsors of regular television programming might be required to support a minimum stated amount of special public service was proposed recently by Royal E. Blakeman, president of the National Academy of Television Arts and Sciences.

"The present system sanctions, if not encourages the advertisers' lack of responsibility in the area of special programming even though through their overwhelming use of television time they derive a substantial financial benefit from the use of the public airways. In effect, they have been permitted to become the sublicensees of such airwaves, but licensees without any obligation to serve the public interest.

"The broadcaster, on the other hand, is required by law to serve the public interest. The broadcaster's obligation mandates that it preempt entertainment programs to present public service programs. When faced with this situation the system compels the broadcaster either to secure other sponsorship, when such sponsorship is appropriate, or to carry such programs on a sustaining basis. In the latter case, the broadcaster bears the full cost of serving the public interest. The system's failure to enlist the support of the regular advertisers may result in an understandable reluctance on the part of the broadcaster to incur alone the expense involved in the disruption of its entertainment program schedule.

"The purpose of any such plan would not be to increase broadcaster profits by shifting costs to advertisers. Its aim would be to establish a broader economic base which would support increased scheduling of public service programs and result in greater service to the American viewing public. The serious consideration of this suggestion by all concerned is earnestly solicited."

CATV Helps FCC Fulfill Goals, Broadcaster Says

Traditional television broadcast methods have foreclosed final achievement of two FCC priorities enunciated in 1952 in the Sixth Report on Television Allocation according to J. Leonard Reinsch, president of Cox Broadcasting Corp. These priorities were 1. to provide at least one TV service to all parts of the United States and (2) to provide each community with at least one TV broadcast station.

Commercial television has failed to materialize in many communities primarily because of the economics of the situation. Local advertising has not developed a sufficiently large volume to permit financial reward to the licensee.

CATV, on the other hand, has proven that it is both technically and economically feasible to provide multiple television services to all cities and towns.

Reinsch said, unfortunately, the CATV has done much to handicap its own position by its failure to educate all sectors of society as to CATV's important attributes. Moreover, the true nature of the CATV medium has been misunderstood by many people.

The broadcaster feels that the changing nature of CATV, while doing much to hasten the industry's maturity, has been the cause of many of its present-day problems. The distinguishable trend which identifies CATV today is the changing pattern of system ownership. Prior to the early 1960's, most CATV facilities were single-system operations, controlled mainly by local businessmen. Today, ownership is shifting to national organizations, thereby creating certain basic changes in the character of the industry.

One of the most dramatic results of this realignment and group concentration has been the expansion of CATV into densely populated, urban areas. This has brought opposition from established television systems.

As a result, the CATV industry is presently involved in a maze of legal and regulatory problems which are delaying and frustrating its normal business growth. However, CATV's vast potential for bringing revolutionary new communications services to the home — plus its ability to expand regular broadcast coverage — are beginning to gain for it broad industry support. Said Reinsch, "The CATV industry, by using the creative and production tools of television, serves those communities that are without a means of local television expression . . .

"I would like to see the public service potential of CATV given more prominent recognition, even to the extent of incorporating into federal policies the concept of cable communications. CATV should be recognized as a practical alternate means of local community television expression in towns and cities which do not have adequate local service. I am concerned by the noticeable lack of positive recognition of CATV today by many of those who mold and administer national policy in the communications area, as well as by many of my fellow members in the broadcasting industry."

Propagation Tests Indicate 18-GHz Link Will Work

Propagation tests of the 18-GHz distribution system which Teleprompter Corporation and the Hughes Aircraft Company have been conducting in New York since April 1966 under an experimental license have permitted the collection data indicating that the a-m link (also known as Short-Range Multi-Channel Microwave). Although subject to deep propagation fades during exceptionally heavy rainfall, the system is suitable for wide band local distribution service.

Teleprompter Senior Vice President Hubert Schlafly said at the recent IEEE show in New York, "Laboratory type equipment was developed which up-converted the entire vhf television band and fm broadcast band between 54 and

How would you shrink 180 feet of video cable into one foot?

Shrinking video cable into delay lines is really no great task. The real challenge is in maintaining bandwidth of video broadcast quality. Kappa Networks has met this challenge successfully through a new design approach which yields greater delay-bandwidth from fewer components.

Designed specifically for the video broadcast industry, Kappa Super-η (high efficiency) Delay Lines provide superior performance with the same number of components needed by conventional lines. Alternatively, if performance is held equal to that of conventional lines, Kappa Super-η need far fewer (up to 40% less) components. Consequently they can realize maximum reduction of size and cost where necessary, as well as greatest inherent reliability.

Finally, outstanding uniformity in performance is a marked feature of Kappa Super-η Video Delay Lines. This assures that prototypes are consistently typical of production quantities.

SPECIFICATIONS: KAPPA MODEL 10A503 SUPER-η DELAY LINE

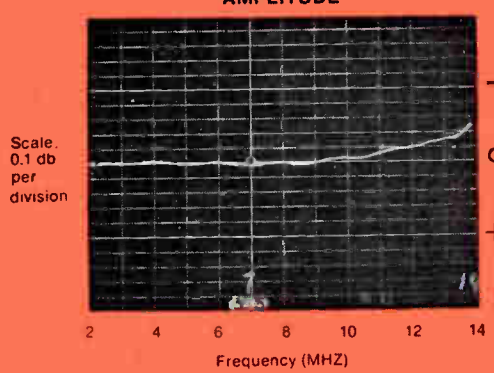
ELECTRICAL

Delay:	260 nsec. ± 2% (replaces 180 ft. of cable)
Impedance:	75 ohms ± 2%
Insertion Loss:	1.5 db.
K Factor:	less than 0.25% for sin² "T" pulse
Cross Talk:	less than 46 db.

MECHANICAL

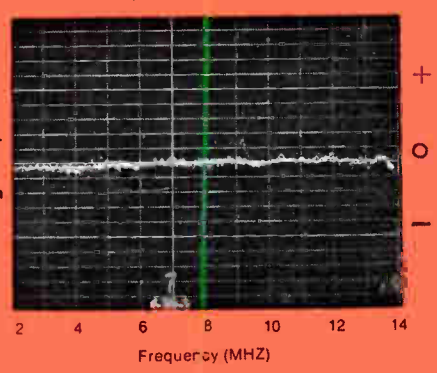
Size:	12" x ⅞" x ⅞"
Case Material:	Electro-tinned brass
Finish:	Mil-spec gray lacquer
Mounting:	(2) 6-32 threaded inserts
Price:	Under $100
Delivery:	4 weeks

AMPLITUDE



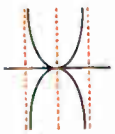
Amplitude Response: Flat within 0.1 db to 12 MHZ
Ripple: Within ± .02 db to 12 MHZ

GROUP DELAY



Group Delay Slope: Linear within ± 0.5% to 12 MHZ
Group Delay Ripple: Within ± 0.5% to 12 MHZ

For prompt engineering assistance call us collect at (201) 541-4226.



KAPPA NETWORKS, INC.

Delay Line Specialists · Manufacturing Engineers

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World's largest manufacturer of broadcast quality delay lines.

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216 megacycles to an identical frequency segment in the 18-GHz region. At the receiver these transmitted frequencies were down-converted to the exact vhf frequencies which appeared at the transmitter input."

Initial operation, Mr. Schlafly noted, "demonstrated that 12 conventional television channels could be received over a 6-mile path from a single transmitter during normal weather conditions without noticeable cross modulation of increase in picture noise. Measurement techniques were refined and a large number of data points were collected starting in early Summer and continuing through the Winter."

Mr. Schlafly said that even if fades result from heavy rainfall, "the path 'heals' quickly — just as fast as the intensity of the rain slackens. Furthermore, when used for a local distribution system — where the effect can be related to an obvious cause, public governmental or military linkage could be expected to be within tolerance level."

Mr. Schlafly concluded by noting that "other atmospheric disturbances — fog, smog and temperature cycling, have shown relatively little serious effect in the way of additional path loss." Snow data, now being analyzed, does not seem to present deeper fades than would be expected from a rainfall of equivalent moisture content.

NAB Opposes Spectrum Space Reallocation

The National Association of Broadcasters recently opposed a proposed FCC rule that would halve certain frequencies presently used by remote pickup stations in broadcasting and assign them to land mobile radio users. NAB urged instead that the new channels should be retained by commercial broadcasters.

The FCC plans to make the new channels by splitting the frequencies, from 100 to 50 kHz, in the 450.5 to 451 MHz and 455.5 to 456.-MHz bands presently used for radio broadcasters and the voice portion of telecasts by remote pickup units.

NAB believes, said General Counsel Douglas A. Anello, "that the rapidly expanding need for facilities dictates the retention of the additional channels resulting from the reduction in band width from 100 to 50 kHz."

Although the Commission has presently assigned 65 channels to the Remote Pickup Service for the U.S., Mr. Anello pointed out that "many of these channels are non-exclusive." This substantially restricts" their use by the Broadcast Service, he said.

In urging retention by broadcasters of the proposed new channels, the NAB general counsel also pointed to increased use of remote pickup frequencies in recent years to relay traffic conditions from helicopters and transmitter metering information.

NAB Proposes Satellite Broadcast System

The National Association of Broadcasters recently called for the creation of a domestic satellite system for the exclusive distribution of radio and television programs with broadcasters permitted to own its ground stations.

In a choice between a special-

ized or multipurpose domestic satellite system at this time, NAB Counsel Douglas A. Anello said, "it is the opinion of the NAB that special purpose satellite system designed to handle television and radio program distribution is to be preferred."

Whatever system is established, Mr. Anello said, "it is of extreme importance that individual stations or groups of stations be permitted to own the necessary ground facilities."

RCA President Calls For Noncommercial TV

Robert W. Sarnoff, president of RCA, recently called for the establishment of a noncommercial TV service as "a vital national objective, in view of its great potential for the further enrichment of American life."

He said that its basic financial requirements could best be met through general government revenues in order to insure adequate and stable financing on a permanent basis. Such financing, he added, would be consistent with the valid principle of the broadest public support and would not preclude additional support from individuals and other private sources.

"If it succeeds," he said, "the service it renders will be distinctive. There will be, undoubtedly, a degree of overlap with the programming of commercial television. Commercial broadcasters should welcome this competition. It can serve as a gauge for some aspects of their own programming and a testing ground largely precluded by the economics of their medium."

"Although noncommercial television may attract only a small fraction of the audience, its value cannot be measured in those terms alone," he said. "It should be measured by the vitality of its services to minority interests. For these are the interests which often constitute the vanguard of experimentation and achievement in the sciences, arts and humanities."

Sarnoff went on to make a prediction for communications technology. "The most dramatic impact will be felt in the home, as the average citizen becomes a new user of advanced technology," he noted. "Today, the home is a primitive communications center connected with the outside world by two-way telephone and one-way radio and television. Tomorrow, it will be transformed into a highly sophisticated electronic information center. It will be able to communicate by two-way voice, sound, picture and data with other homes, businesses, libraries, banks and major communications service centers."

The increasing complexity of communications will inevitably entail greater government regulation, Mr. Sarnoff told his audience of 1500 leaders in broadcasting advertising and entertainment industries. "It is time to recognize that such regulation is a necessity in today's growing society," he added.

Concluding his speech before the International Radio and Television Society at the Waldorf Astoria on the occasion of their 27th annual banquet, Mr. Sarnoff said, "I urge you, as broadcasters, to think in revolutionary terms — not as guardians of the old, but as pioneers of the new."

Definitions Of Broadcast Research Terms

The results of an NAB research program approved and supervised

by the Committee on Local Television Audience Measurement is available in an attractively-presented and carefully-organized 56-page booklet. The fully-indexed booklet is divided into four sections dealing with statistical measures of broadcast audience, statistical populations and sample selection, survey methods, operations and procedures and accuracy and reliability of survey results.

The work done by the Committee and its report have been endorsed by the Broadcast Rating Council and the Advertising Research Foundation, Inc.

FCC Relents On Top-100 Market Rule

Apparently having been convinced of the limited market potential of uhf in the Central Pennsylvania area by seven CATV applicants, the Commission recently granted waivers of petition to cablecasters in the Harrisburg-Lebanon-Lancaster-York area. The waiver grants the CATVs permission to import distant signals from independent and network stations in Washington, Philadelphia and Baltimore.

The action, involving Susquehanna Broadcasting, D and E Cable TV, Inc., Peoples Broadcasting Co., Valley Video Co., West Shore TV Cable Co., Lebanon Valley Cable TV Co., Inc., and H. C. Ostertag Cable Television Co., Inc., affects the choice of television programming of CATV subscribers in 25 separate Pennsylvania communities.

Less successful in their proposals for importation of signals from Washington and Wilmington educational stations were Susquehanna Broadcasting and H. C. Ostertag Cable Television. In this instance, objections of Pennsylvania educational broadcasters proved too strong; however, a hearing of the proposals was ordered.

TvB President Cites Broadcast Achievements

"The television medium, in its 20th operating year as a communications force in the United States, has brought about economic and social changes in a shorter span of time than any other single force in the world," Norman E. Cash, president of Television Bureau of Advertising, said recently.

"In the United States with all but 2 percent of the homes able to receive a signal and with 95 percent of the homes equipped with at least one television set, it is amusing but also pathetic to hear comments from intelligent sources questioning the right of the licensee to continue to serve the American public as he has for these past two decades," Mr. Cash said. "The glib statement is heard that the operations of television should, in some way, pay for the use of the public's air which, the comment continues, has given to the licensee free. . . .

"As a practical matter . . . it is interesting to note the federal income taxes paid by the three large corporations, ABC, CBS, RCA, just since 1960-65 . . . total an amount of $724 million.

Addendum

Illustrations used in Parts I and II of "Analyzing Video System Performance" (March and April/67 *BM/E*) were reproduced with permission of American Telephone and Telegraph Company from "Television Signal Analysis," © 1963, AT&T; and Radio Corporation of America publications.

Don't forget to ask for your copy of catalog CAM-660. Available from your RCA Broadcast Tube Distributor.

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The Most Trusted Name in Electronics

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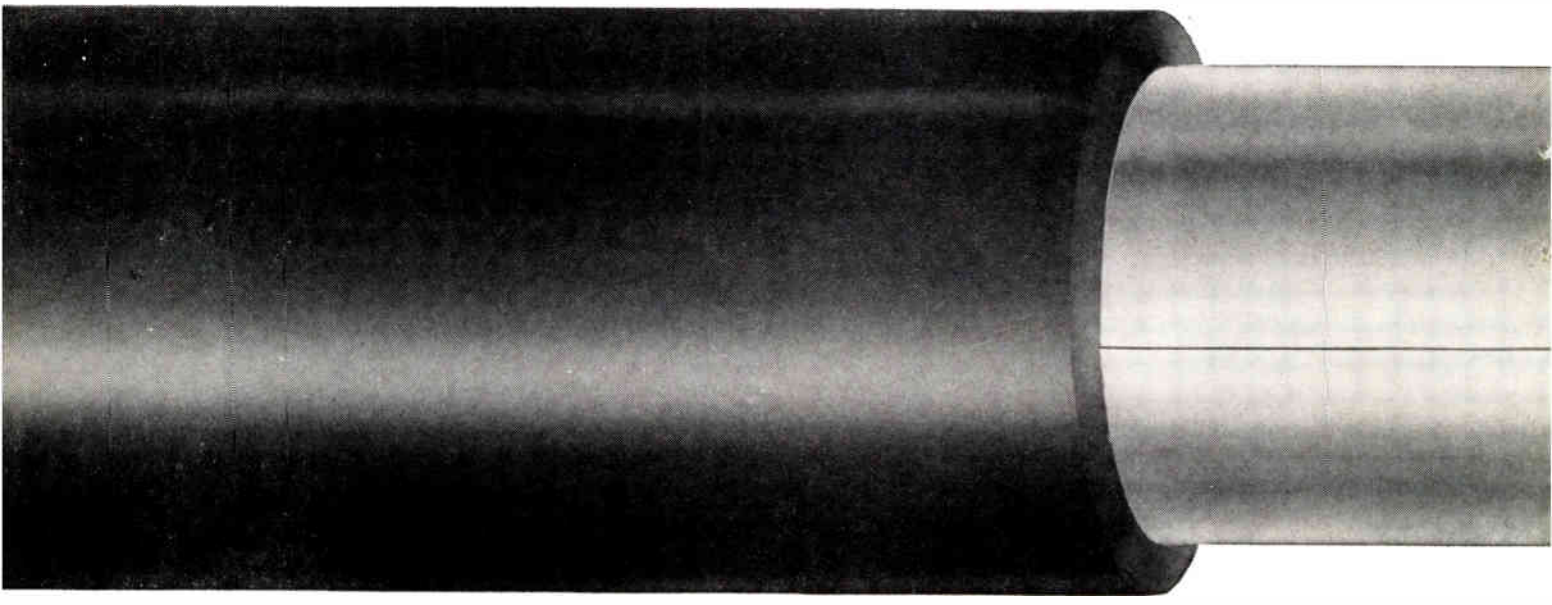
This is Sealmetic® Coaxial– the cable Anaconda designed especially for CATV



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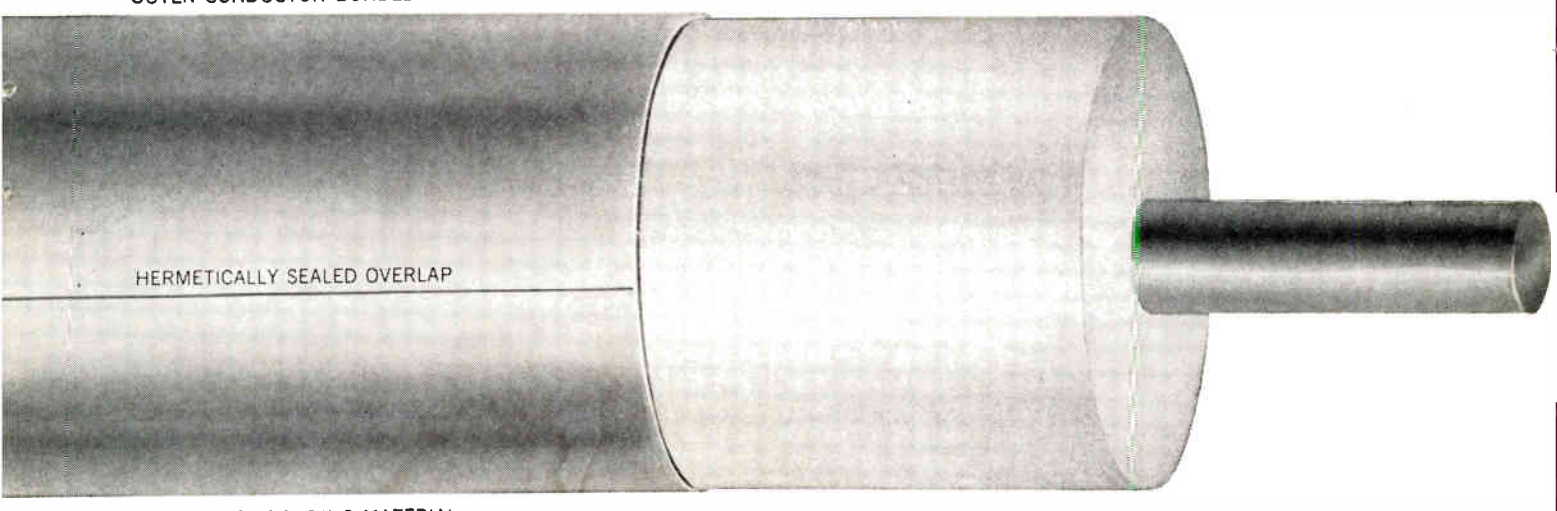

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INTERPRETING THE FCC RULES & REGULATIONS

THE CATV RULES REVIEWED II

IN LAST MONTH'S ARTICLE we reviewed the FCC's actions preceding and foreshadowing its adoption of the CATV rules, and specifically discussed all pertinent and material CATV rules, with comments upon relevant cases—with the exception of the recondite and torridly-disputed "top 100 market" rule (Section 74.1107) and the abstruse and confusing "relief procedures" set forth in 74.1109. The latter two matters, plus other isolated but material CATV topics, will be treated in this article. It is hoped that this information will enable both broadcaster and cablecaster to adjust their antipathetic positions with greater facility and expedition and to afford the broadcaster—who is totally disassociated with CATV—with a firm understanding of the CATV rules and their possible effects upon him.

Section 74.1107 — "Top 100 Market" Rule

Section 74.1107(a) - Requirement for Evidentiary Hearing: Reduced to its simplest terms, this provision requires that those CATV systems —operating in a community which receives a Grade A signal from *any* TV station licensed to serve any market ranked in the 100 largest television markets—*may not extend* the Grade B signal (offer a "distant" TV signal) of any television station *UNLESS:*

(1) a petition for waiver of this requirement is filed with and granted by the FCC; or,

(2) a request for FCC approval is filed, an evidently hearing held, and subsequent Commission approval obtained.

Section 74.1107 (b) - Procedures Relating to Evidentiary Hearing:

After the CATV system has obtained any necessary franchises or has entered into a lease (with a telephone company) or other arrangement authorizing construction of a CATV system in the "top 100 markets," it must file a request (pursuant to Section 74.1107(a) above) for evidentiary hearing. Section 74.1107(b) provides that this request shall set forth:

(1) the name of the community involved;

(2) the date upon which the franchise, or other legal authorization, was obtained;

(3) the signal(s) proposed to be extended beyond their Grade B contours; and,

(4) the specific reasons demonstrating that such approval is consistent with the public interest.

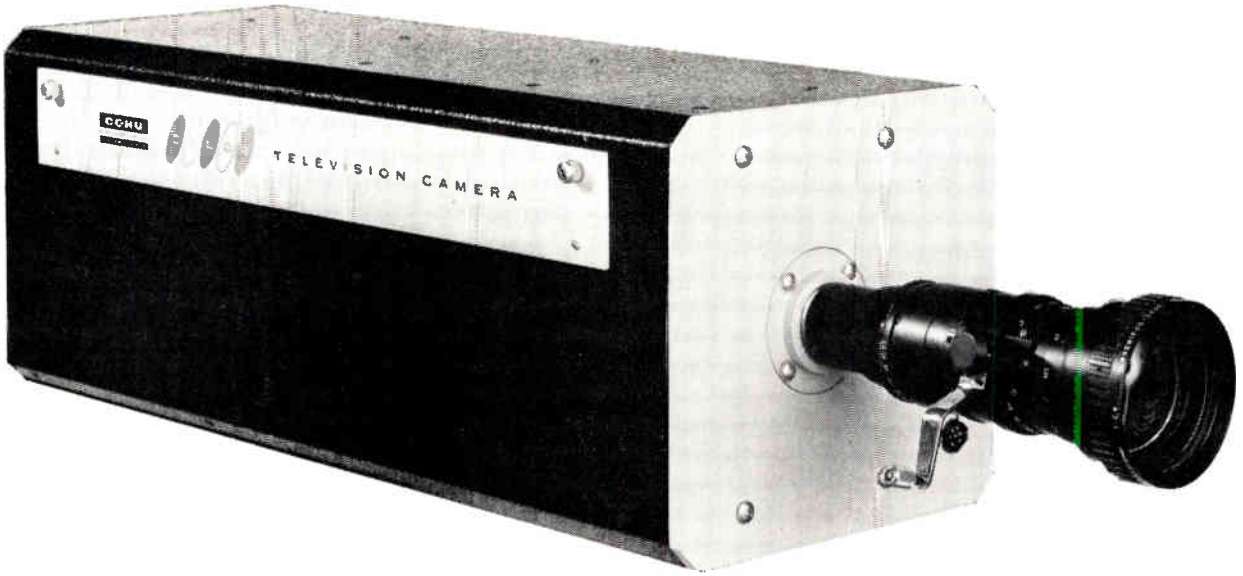
The commission will give public notice of the filing of such requests, and interested parties may file a response or statement (opposition to request) within *thirty* days after such public notice; and a reply to such opposition must be filed within *twenty* days after the latter.

After interested parties have had an opportunity to file pleadings espousing their views, the Commission shall designate the request for approval for evidentiary hearing. Issues will be specified in the hearing order. The *burden of proceeding with the introduction of evidence, and the burden of proof, shall be placed upon the CATV system making the request.* Thus, the CATV is assigned the onerous burden of proving that its proposed operation will not impair the (1) development of new television service and/or (2) healthy maintenance of existing television service in the area.

Effectively, the CATV system must prove a negative, involving questions of potential economic injury. As the reader may know, the Commission has frowned upon and refused to hear economic injury cases advanced *by* broadcasters *against* broadcasters. (See *BM/E,* March 1965 issue, article entitled "The Volatile Question of Economic Injury.") Since few, if any, broadcasters have ever succeeded in proving, in evidentiary hearing or otherwise, that the proposed operation of another broadcast facility would cause sufficient economic injury to force the complaining station out of business, the FCC, in recent years, has denied all requests for hearing. In short, the FCC has not denied a competing broadcast application upon economic grounds.

These salient and probative facts notwithstanding, the Commission *has* seen fit to place the burden of proving economic injury, in a *negative* form, upon CATV operators — that is, the CATV system must prove that it will *not* cause undue economic injury. Thus, the CATV operator must meet a burden of proof— that broadcasters historically have been unable to sustain against applications in the *same* broadcast service—concerning an indirectly related service (TV vs. CATV). Moreover, there is no precedent, in either broadcast or cable law, to establish the type and quantity of evidence necessary to meet this burden. In brief, the Commission has created what is tantamount to an "air-tight" case for the broadcaster. In so doing, the FCC

This section, providing broad interpretation of FCC rules and policies, does not substitute for competent legal counsel. Legal advice on any given problem is predicted on the particular facts of each case. Therefore, when specific problems arise, you would be well advised to consult your own legal counsel.



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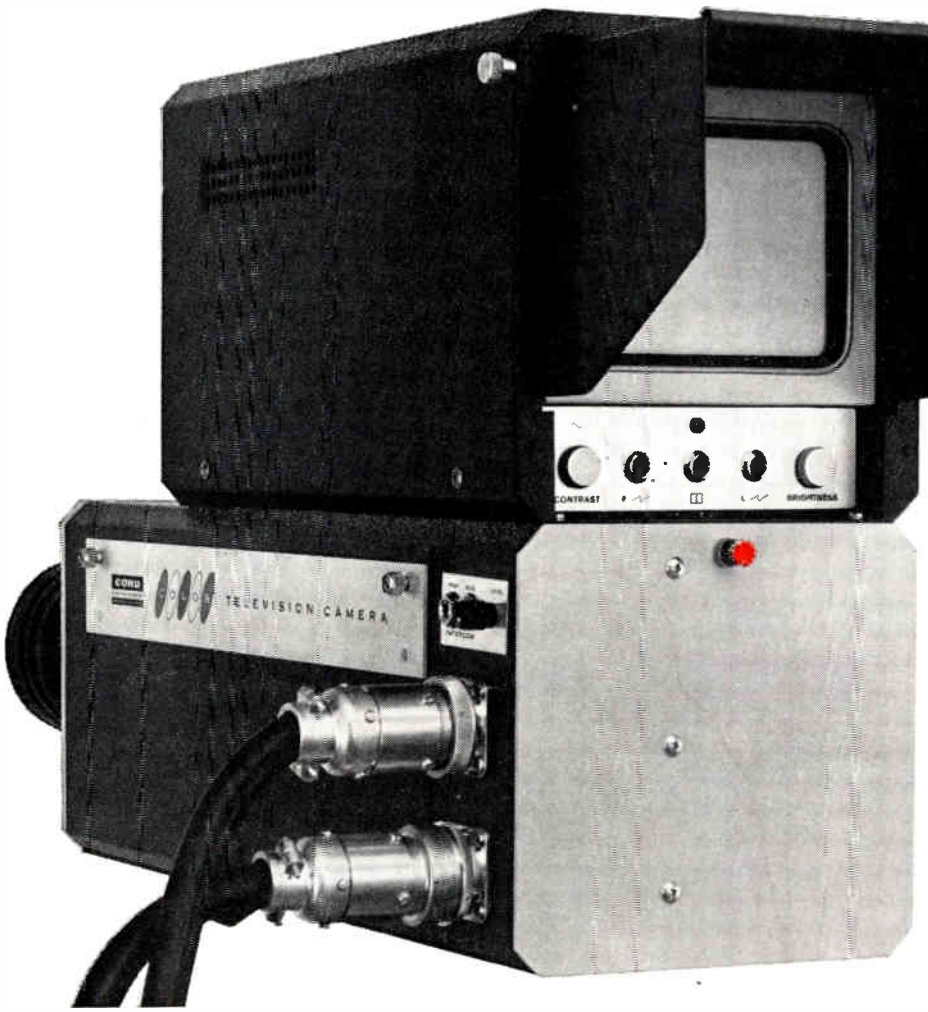

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has created the unavoidable impression that it does *not* intend to permit waivers of the "top 100 market" rule. Perhaps this procedure is justified and perhaps not. In any event, this burden of proof constitutes a formidable, if not totally insurmountable, barrier to the extension of Grade B signals within the top 100 markets.

Countless petitions for stay, petitions for reconsideration, and petitions for waiver of this rule have been denied. (See FCC 66-455, FCC 66-456, Report No. 3821, et al.) This trend is borne out in nearly all of the precedents to date.

There have been limited exceptions to the above. For example, in *Chenor Communications, Inc.* (FCC 66-468), *Coldwater Cablevision Incorporated* (FCC 66-569), and *Martin County Cable Company, Inc.* (FCC 66-570), all released in July 1966, the Commission granted requests for waiver of the top 100 market provisions. While numerous allegedly supporting reasons were given, the Commission's favorable action was obviously stimulated by one *primary* factor—*no one opposed the waivers!*

Another minor area of exception to the "no grant" policy is evidenced in a series of cases that reflects the Commission's disposition to grant waivers of 74.1107 wherever it will permit carriage of a noncommercial educational television station. (For example, see *Buckeye Cablevision, Inc.*, Report No. 6146, September 1966.)

It is conceivable that amendments to the copyright law will result in a relaxation of these rules. Such amendments might remove one of the FCC's primary concerns—the unfair competitive positions from which broadcasters and cablecasters compete. More likely, in time, restrictive CATV rules will be relaxed as a direct result of public demand. However, such a change may be 5 or 10 years in coming.

Section 74.1107(c) - Procedures for Special Relief: In addition to the *prima facie* applicability of the top 100 market rule to all CATV systems falling within prescribed classification, 74.1107(c) affords interested parties an opportunity to file (pursuant ot 74.1109) for the imposition of the top 100 market rules in areas *not* encompassed in the normal definition of the term.

From a practical standpoint, the Commission is not disposed to grant such requests. Wherever a party requests the implementation of CATV rules greater or lesser than those in effect, it imposes the burden of proving that the public interest warrants such extraordinary relief. The burden required is an unknown quantity, and the cases to date reflect only denials of such requests. (See *Old Pueblo Broadcasting Company* and *TV Transmission, Inc.*, both reported in January 1967 Report No. 2522.)

Section 74.1107(d) - Effective Dates and Minor Consideration: This provision provides that: (1) the top 100 market rule became effective on February 15, 1966; (2) those providing "distant" signals, in the top 100 markets on or before that date, need not comply with this rule; (3) such systems, however, must comply with the rule as to service commenced—which would extend service to a "new geographic area" in the same or a new top 100 market—after February 15, 1966.

This Section raises the difficult problem of defining a *new geographic area.* This puzzling problem is best explained in the context of the Commission's January 1967 *Opinion and Order* (Dockets 14895 et al., FCC 67-34) making minor amendments to the CATV rules adopted in the March 1966 *Second Report and Order.* Therein, the Commission states that the entry of the CATV system *into any new, incorporated area* will be considered as entry into a "new geographic area." Thus, in the case of *incorporated* areas, a clear and comprehensible definition is set forth. Unfortunately, *unincorporated areas* will be treated on a case-by-case basis. They may, or may not, be deemed "new geographic areas."

To wit, in the *Mission Cable* case, 4 FCC 2d 236, the CATV system urged that—by the virtue of the fact that it had commenced service in one portion of the unincorporated County prior to February 15, 1966—it was entitled to "grandfather" rights to provide service to the balance of the County after that date. The Commission *rejected* this view and held that the presence of substantial tracts of undeveloped land between subdivisions within the County created separate communities. Accordingly, further expansion was held to be into "new geographic areas," and the top 100 market rule was applicable thereto; approval, via evidentiary hearing, must be held pursuant to 74.1107(a).

Therefore, in cases involving *unincorporated* areas, the decision must be made on a case-by-case basis. *It would appear that most doubtful cases will be deemed to be "new geographic areas."*

Section 74.1109 - Procedures for Relief

Section 74.1109(a) - Procedures in General: While Section 74.1107(c) provides for certain relief under the top 100 market rule, Section 74.1109 is the *primary* provision relating to requests for relief from the CATV rules (affecting *non*microwave systems); 74.1109 provides TV stations, CATV systems, and other interested parties with *broad rights* to petition (by formal pleading or informal letter-request) for modification of the CATV rules. Thereunder, the Commission asserts that it may (1) waive any provision of the instant rules, (2) impose additional or different requirements than promulgated, or (3) issue a ruling on a complaint or disputed question.

Section 74.1109(b), 74.1109(h) - Mechanics of Procedure: These provisions provide, in substantial part, as follows:

(1) The petition shall state the relief requested, detailed facts, and demonstrate a "public interest" need for warranting the grant.

(2) Factual allegations must be supported by the affidavit of a person(s) having actual knowledge of the facts, and exhibits must be verified by the person preparing same. (Note: Some CATV petitioners have failed to comply with this provision, and the Commission has found the pleading fatally defective. See *In Re Durfee's TV Cable Company,* FCC 66-1044, November 1966.)

(3) Interested persons may submit comments (oppositions) to petitions or requests filed under 74.1109(a). Correspondingly, the petitioner may file a reply (to comments submitted in opposition to its initial request) within twenty days after the opposition(s) is filed.

(4) The Commission may (a) grant the request in whole or in part, (b) deny the request, (c) issue

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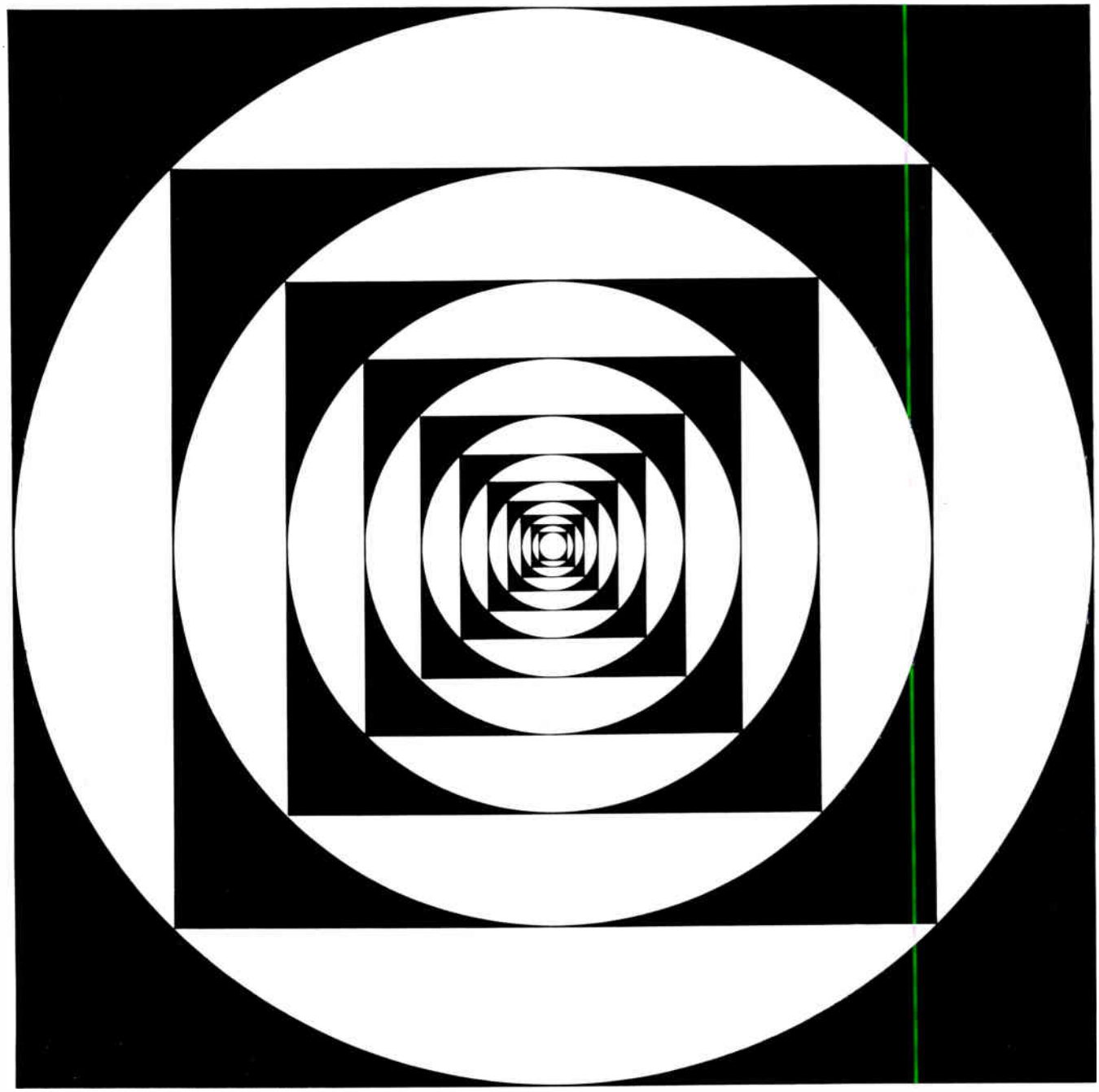

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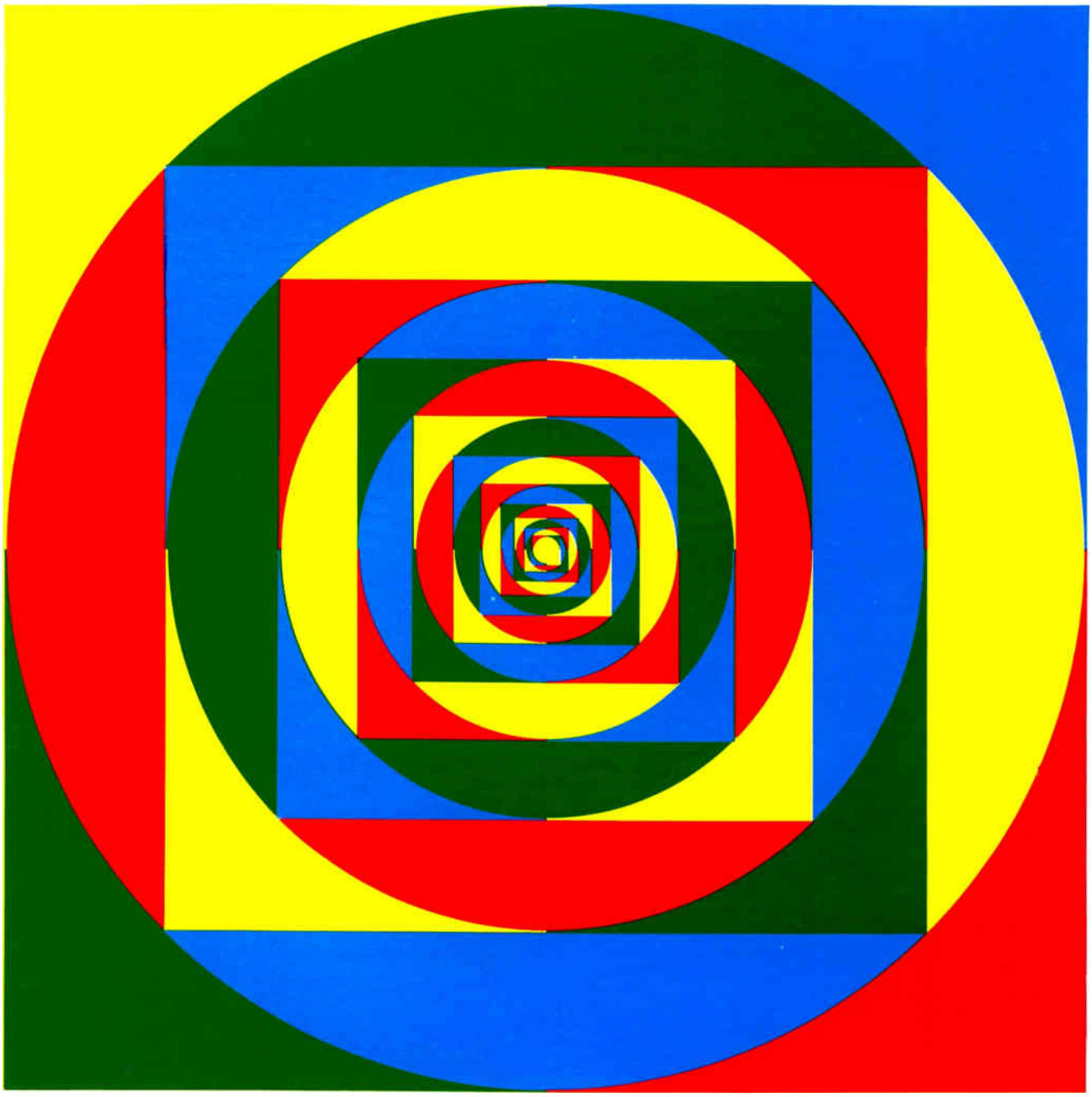

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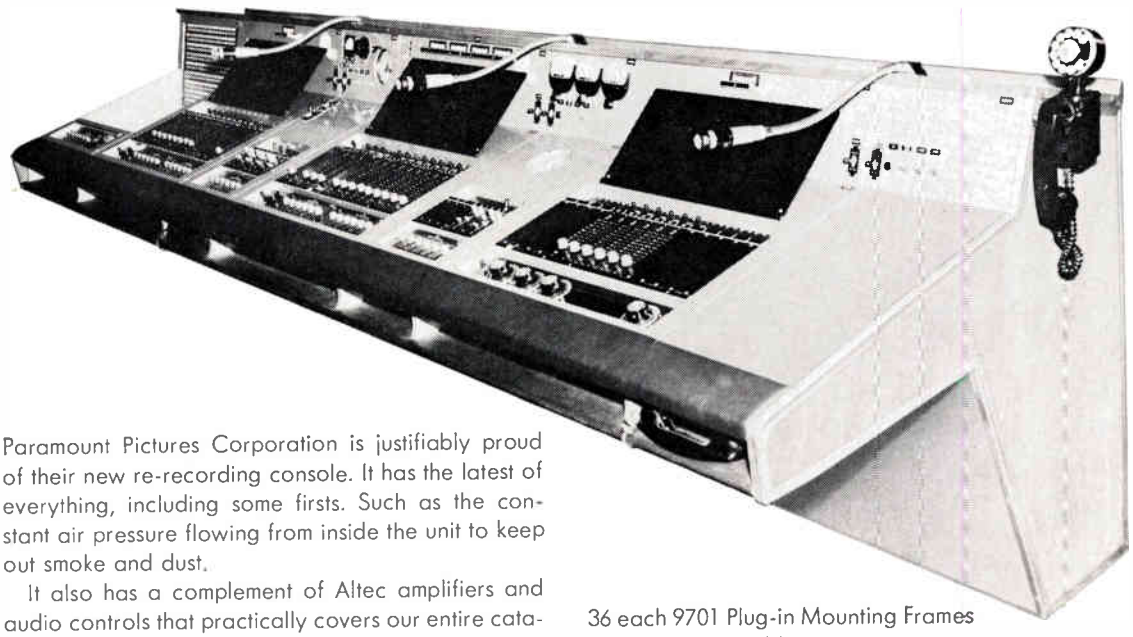

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a ruling on a dispute, (d) specify other procedures, or (e) issue temporary relief pending in-depth consideration.

Effectively, 74.1109 *provides all persons with an opportunity to express their views on the activities or proposals of any CATV System* of interest. The Commission has opened the door to all and has disregarded the normal requirements of "legal standing."

Evidence of "Bureacratic Trends"

The vast majority of legal "experts" in the Communications Industry do not believe that the FCC has jurisdiction over CATV. They assert that the existing statutes and precedents indicate a lack thereof. Commissioners Lee Loevinger and Robert Bartley have consistently observed that the Commission is devoid of legal jurisdiction: their dissents have been numerous, prolific, and carefully documented.

However, the validity of jurisdiction appears to be an academic and irrelevant point. The appellate courts today have an overwhelming proclivity to spare no effort to unearth any legal reasoning that will support the several regulatory agencies. In short, it is highly unlikely that any of the numerous pending cases, challenging the FCC's jurisdiction, will prove beneficial to the CATV industry.

Commissioner Loevinger and others have aptly stated that the Commission's assumption of jurisdiction over CATV has laid the foundation for more extensive and restrictive regulation of the Broadcasting Industry and others within its domain. For example, it is most probable that the FCC will deny, for the first time, a pending microwave common carrier application based upon the *content* of the matter to be provided by the carrier to several CATV systems. (See the pending applications of Dal-Worth Microwave, Inc., File Nos. 7661-2-CI-P-66, proposing to provide certain channels of nonbroadcast programming to several CATV systems in the State of Texas.)

In adopting its CATV rules, be it properly or improperly, the FCC has stated, for all practical purposes, it has or will assume jurisdiction over *anything* that *may* affect or injure broadcasting service to the public. While such conduct may be appropriate and in the public interest, it does not appear to be within the purview of existing statutes. In any event, it is entirely conceivable that the assumption of jurisdiction over CATV will be cited as precedent for future encroachment upon and regulation of less related industries.

Moreover, the Commission's intense interest in program origination by CATVs will result, in all likelihood, in Congressional and/or agency action restricting and/or dictating the substance of such originations. *This*, of course, *will bring the FCC squarely into the area of regulating program content.* Historically, the Commission has judiciously avoided such regulation and has repeatedly stated that its controls and directives do not cover program content. See *United States v. Paramount,* 344 U.S. 131, 166 (1948); *Superior Films v. Department of Education,* 346 U.S. 587 (1954). See *Report & Statement of Policy Re: Commission En Banc Programming Inquiry,* 20 *RR* 1901. Also, see First Amendment to the United States Constitution and Section 326 of the Communications Act of 1934 as amended; the latter states, in pertinent part,

> "Nothing in this chapter shall be understood or construed to give the Commission the power of censorship over radio signals . . . and no regulation or condition shall be promulgated or fixed by the Commission which shall interfere with the right of free speech by means of radio commmunication."

Obviously, the reason why the Act refers to this restriction in terms of *radio* is because there was no CATV at the time. In radio, TV, and other areas of communication, the Commission has avoided regulation of program content—except insofar as lotteries, libel, and criminal acts are concerned. In recent years, the FCC has "crowded" this area by refusing to grant renewals, because (1) their commercial content was too high or (2) their programming proposal did not appear to be offered in response to adequate surveys of the tastes, needs and desires of the audience. In so doing, by indirection, the FCC has begun to regulate program content. *Very* gradually, the "free speech" protection accorded broadcasters is being eroded.

With the advent of FCC control of program origination over CATV—a matter which appears clearly unconstitutional and without precedent or statutory support—it logically follows that the FCC is free to expand its endeavors into the program content offered by broadcasters! After all, if the Commission is entitled promulgate rules concerning program content for one "communications" service (i.e., CATV), the authority for similar promulgations, affecting other services within its administrative domain (i.e., radio, television, microwave, etc.) must surely exist. To be trite, "If it's good for the goose, it's good for the gander."

Undoubtedly, there are many at the Commission who would disagree and "scoff" at the above-suggested extension of regulation into the area of program content. But, then, FCC faces and personalities do change, and there was a time when the Commission's upper eschelon "scoffed" at the suggestion that the FCC would ever assume even limited jurisdiction of CATV—without Congressional mandate.

We do not presume to pass upon the propriety or impropriety of the Commission's regulation of CATV. The fact is, limited regulation of CATV is *now* in effect. More regulation will surely come, and ultimate licensing of CATVs by the Commission (as well as by local government authorities) may be forthcoming and other regulations as suggested above. It appears a matter of logical deduction that the CATV rules have laid the foundation for greater and more extensive regulation of the broadcast industry.

If broadcasters were to view CATV rules in the above light, their disposition to encourage or ignore additional CATV regulation might be altered graphically. Unquestionably, the independent regulatory agencies have been accorded extensive powers and broad discretion in the exercise thereof; but, if democratic government is to survive, this power and discretion must be mollified and mellowed with restraint. ●

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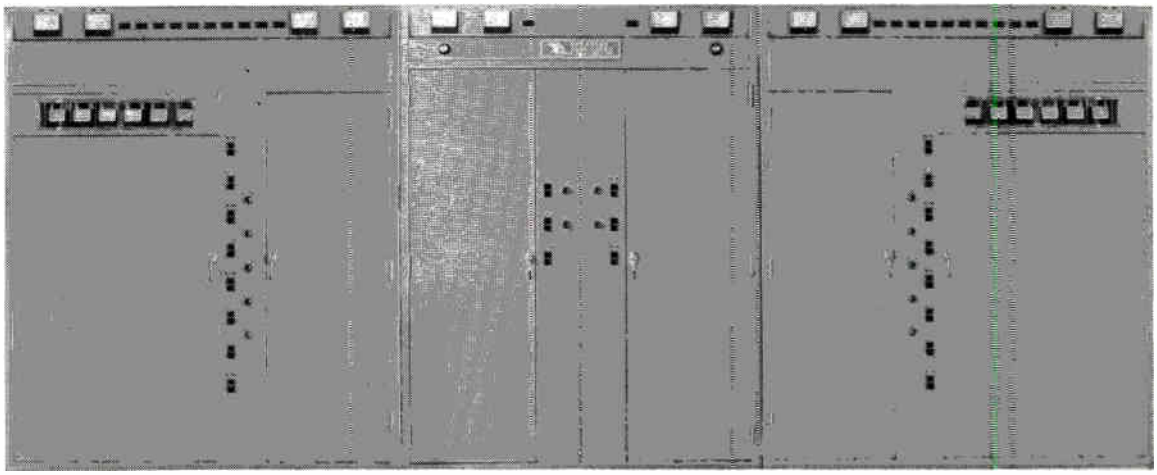
10 KILOWATT AIR COOLED UHF KLYSTRON TRANSMITTER



Townsend Associates announces the TA-10B a new 10 kilowatt air-cooled transmitter system which features truly modern design from the driver unit, employing the industry's first solid state exciter, through the klystron power amplifiers.

The TA-10B transmitter retains the important features which have made the Higher powered Townsend Associates transmitters the best buys in the UHF television field while providing the economy of air cooled operation. The TA-10B employs the unitized beam power supplies, rapid multiplex through either amplifier, a solid state driver with the Ampex modulator, and ease of conversion to higher power at minimum cost.

The air cooled klystron used in this transmitter is of proven design having a long history of successful operation in a number of UHF television stations.

The use of klystron tubes is the most efficient and economical way of producing a UHF television signal at this power level. Use of the klystron eliminates many trouble sources inherent in tetrode systems such as wearing contact fingers, short tube life with the attendant unstable operation, arcing caused by close placing of electrodes and cavity parts, failure of blocking and bypass capacitors, and poor linearity effects which must be overcome to produce a good color signal. In addition, it can be shown that the tube cost per hour of operation in a klystron transmitter at these power levels is considerably less than that of the cascade of tetrodes necessary to achieve this power level.

Townsend Associates employs air cooling in the TA-10B to effect a significant reduction in the initial cost of the transmitter without sacrificing performance. The air cooling system is simple and efficient. Here again, the klystron demonstrates an advantage over the tetrode. While the amount of heat generated is somewhat greater in a klystron than in a tetrode, the klystron is a physically larger tube free of the problem of concentrated heat such as is found in the compact structure of a tetrode. The RF cavities require relatively small amounts of air cooling since most of the heat in a klystron is removed from the collector and body regions which are external to the RF circuitry. This has the additional advantage of eliminating the temperature stability problem from the cavities and producing a transmitter that, once tuned, will operate for months or years without retuning or adjustment.

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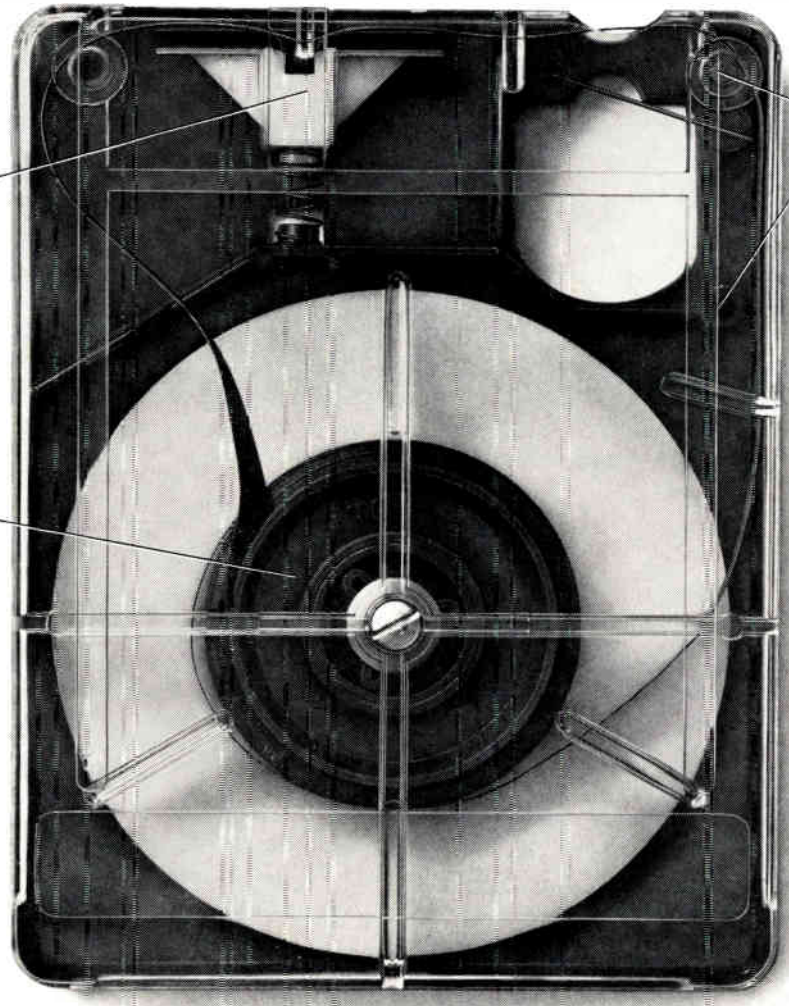

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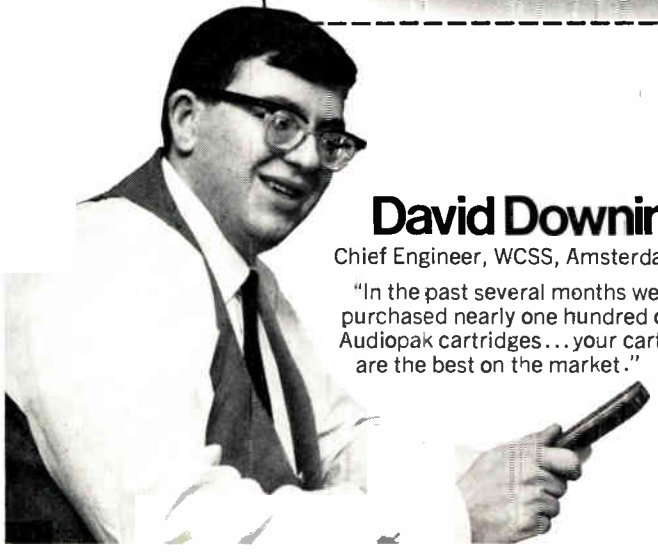
235 E. 42 St.
N.Y. 10017.



David Downing
Chief Engineer, WCSS, Amsterdam, N.Y.

"In the past several months we have purchased nearly one hundred of your Audiopak cartridges... your cartridges are the best on the market."

Circle 21 on Reader Service Card

NAB

CONVENTION RECAP

EXHIBITS SESSIONS AWARDS

Fm: Class and Mass

Fm station operators can now see around the corner. Some have already made it. How? By dropping classical and going middle-of-the-road. That's the conclusion that can be drawn from the recent NAFMB and NAB conferences.

Superior fm signals get mass audiences if the program appeal isn't too narrow. Various rating firms, Hooper, ARB, Media Statistics and Pulse, show fm stations are reaching listeners. Fm has captured 25 percent of the audience in seven major markets reported Roger Hoeck, ARB. Fm's peak share is over 30 percent and is growing. An 11.4 percent increase in share was measured between Oct-Nov of last year and Jan-Feb of 1967. Fm peaks generally at mid-day, evening and weekends. It is soft only during the morning and evening drive times. Some individual fm stations rank 3rd and 4th compared to a-m's, which is considered good in view of the smaller set penetration.

Heavy fm set sales have been helpful in gaining audiences. In 1966, 13,564,000 sets were sold compared to 7,852,000 in 1965. Projection for 1967 is 16,500,000 sets (45 percent of all radio). Jack Gross of Media Statistics reports 69 percent of radio homes have fm sets. Hooper shows upwards of 65 percent.

Heavy "Drive With Fm" campaign is expected to up fm car sales — the only weak spot now in fm penetration. Lynn A. Christian, WPIX-FM, New York reports that 900 fm stations are donating 4 spots a day every day for one full year — over 1.3 million spots equal to $10 million — promoting fm car radios. In 1966, fm-equipped car radio sales were 653,000. Increased use of vertical polarization by broadcasters (38 percent in the top 20 markets) should help fm auto sales.

Another indication of fm acceptance is advertising revenue. While $25 million annual revenue is relatively small, it's enough to attract the attention of a growing number of advertisers. Reps such as Peters, Griffin and Woodward, heretofore only in a-m, have recognized that fm has arrived and is considering taking on fm stations, according to John Butler of PGW.

Generally, concensus of all participants of the three-day NAFMB convention was that fm must be considered *radio* and not a separate medium. Butler said his firm "sells ears" and not higher demographics.

Pop-personality or background music is the order of the day for most stations and such broad based programming is responsible for increased audience. An NAFMB survey of 808 respondents found format broken down as follows: pop-personalities 36 percent; background music, 33 percent; fine arts, 23 percent; talk, 2 percent.

An NAB survey shows middle-of-the-road is the basic program for 61 percent of 461 stations; milder contemporary the format for 16 percent; classical, 7 percent; country and western, 5 percent; top 40, 4 percent; light classical. 3 percent; and Broadway-Hollywood, 3 percent.

The NAB survey reports 23 percent of the stations responding have changed programming in the past year, and there is a clear trend away from classical (down 6 percent) and light classical (down 7 percent).

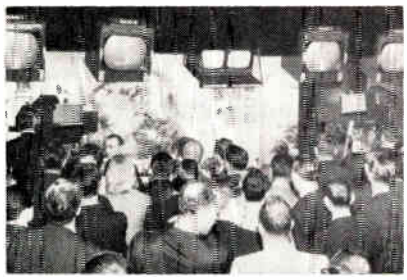
Harold I. Tanner, WLDM, Detroit, and chairman of NAB's FM Radio Committee said, "We have shattered the fm programming stereotype." Sherril Taylor, vp for radio of NAB, declared fm progamming equals a-m in diversity and broad appeal and that fm is out to compete on equal terms in the race for fm audience and advertisers.

At the NAFMB session, manager after manager reported that middle-of-the-road programming with local emphasis on news and public service was a winning formula. Automated systems are fully compatible with most program formats and a live sound can be maintained by proper insertion of music intros, news annoucements and so forth.

Stereo gives fm excellence of sound unequaled by any other medium and stereo broadcasters urged its use. Approximately 515 stations (33 percent) are broadcasting stereo.

Heavy promotion of fm and use of separate sales staffs were also urged by participants in fm sessions.

Another sign that fm is here was the rhetorical question asked by many operators who owned both a-m and fm. If you had to sell one which would it be? The a-m which is very profitable *today*, or the fm which may still be in the red? Not many were ready to sell off their fm station.



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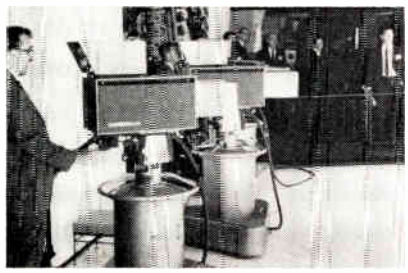

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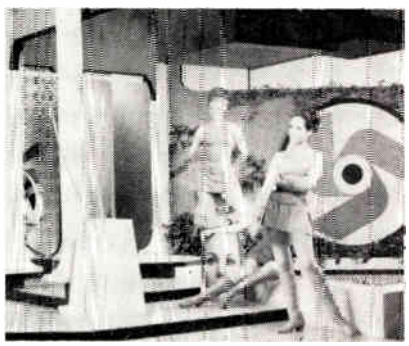

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Loevinger on Game Theory, Programming and Commercials

Commissioner Lee Loevinger combined wit and logic before a committee of APBE (Association for Professional Broadcasting Education) to spoof Fred Friendly and fellow Commissioner Nicholas Johnson for playing. They're All Sinners But Me, Mamma (TASBMM). Loevinger warned that the sequal game is, This Crummy Outfit Must Be Regulated (TCOMBR) and dismissing limited defenses to this game, boosted morale of opposition players to continue the tired, but tried-and-true counter game of Don't Rock the Boat, We're All In This Together.

Loevinger hypothesized that government would do worse at program selection since it had to be responsive to the pressures of the majority of people whereas a private business could survive by pleasing a minority. The commissioner challenged APBE to learn more about the actual role and function that TV performs in contemporary society and suggested that much real education currently comes from commercials.

"Television commercials may have had as much to do with the civil rights revolution . . . as court decisions. Their one inescapable message," Loevinger said, is, "here is a world that is attractive and that you should live in. The improbable heroes and heroines of the programs can be dismissed as fictional and their environments can be regarded as fragments of a dream world. But not so in the commercials."

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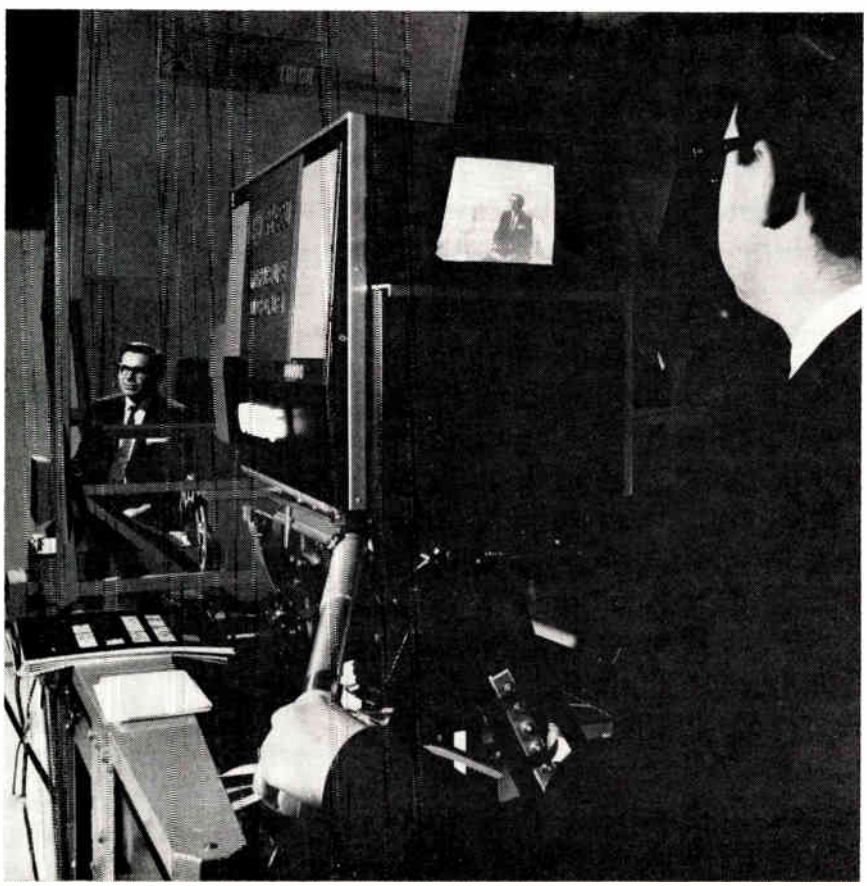

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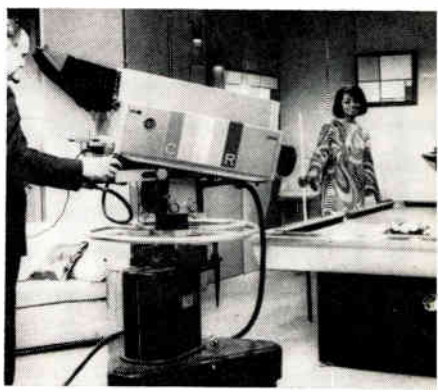

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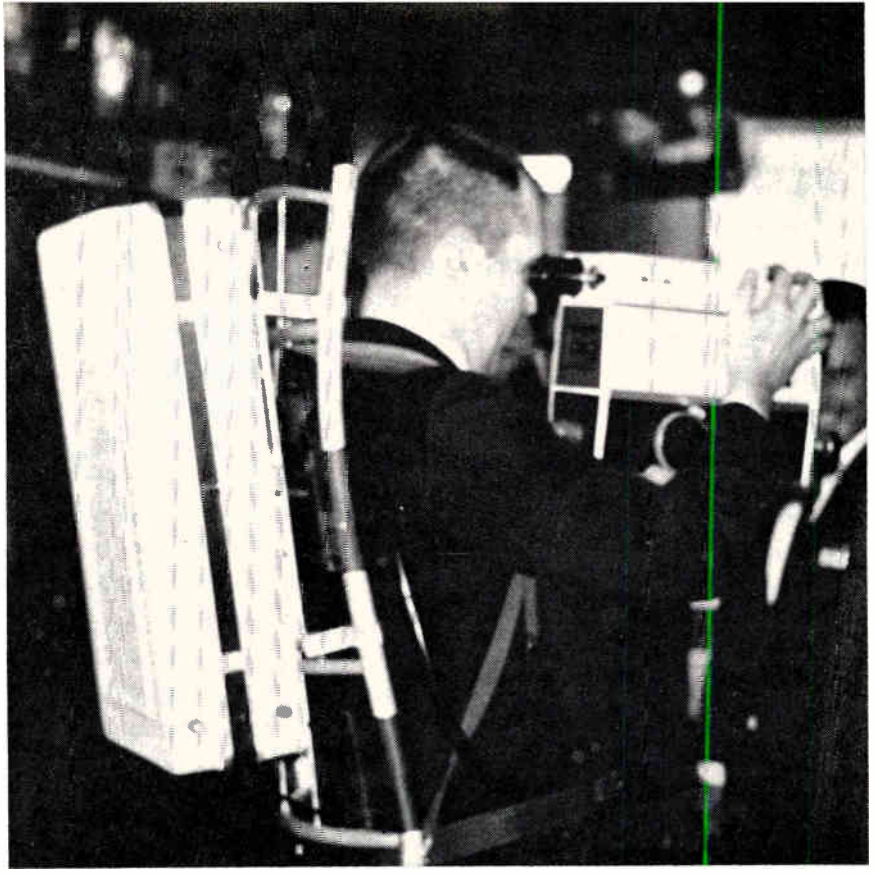
Color TV Dominated Exhibits: Cameras, girls and control rooms drew crowds by Ampex, 1; Sarkes Tarzian, 2; Norelco, 3; General Electric, 4; and RCA, 5. (See story page 37). Ampex sprang a new portable VTR-camera unit, 7; and Front Projection displayed, in conjunction with GE, a new background insertion system, 6.



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Broadcasting Future Full of Problems, Old & New

Major problems facing broadcasting are these, declared Dwight D. Martin, WDSU-AM-FM-TV, New Orleans, Chairman of NAB's Future of Broadcasting Committee:

- The overly familiar problem of CATV
- The older problem of pay TV
- The mounting clamor on the part of land mobile services for more room in the spectrum
- Satellite transmission
- Instructional and public television.

(Martin ruled threats on the concept of advertising and FCC regulation of programming beyond the ken of his committee.)

Cardinal principles which should guide broadcasters in dealing with problems are three in Martin's view:

- Have no fear of competition and do not seek to artificially restrain it. Rather strengthen and improve broadcasting excellence.
- Resist efforts to contain or limit freedom of operation where restrictions are not necessary for the protection of the public.
- Shun the status quo and welcome innovations, technical or otherwise.

CATV is a valuable adjunct to broadcasting, Martin declared and tenets to which broadcasters can subscribe, in Martin's views, are:

1. There should be no hindrance to carriage of local stations nor royalties as long as a CATV operator is in the carriage business only.
2. Carriage of the signal of the nearest station serving a missing network should be permitted. Duplication of programs of local stations should be prevented.
3. If the CATV system introduces distant signals, the stations, local and distant, should be accorded the right to refuse to have their signal carried and royalty should be paid if demanded. Further, in the top 100 markets, the FCC should prohibit carriage of signals beyond the Grade B contours of a station.
4. If, in any event, the CATV seeks to originate programs other than time and weather announcements, the local television station should be accorded the right to refuse to have its signal carried and the CATV system should pay full royalty for material carried.

Martin said he felt these tenets protected the broadcasters from unfair competition and preserved the sanctity of fair competition. He viewed amendments to the copyright act as a good means of working out problems and regulations.

Sure that pay TV would fail if tried, Martin opined that perhaps the FCC should authorize it. This would put the issue to rest forever. The NAB position, however, continues to be one of opposition.

Regarding land mobile pressures, Martin recommended that broadcasters reappraise their use of the spectrum. There should be a willingness to give where broadcasters will not be hurt, he said.

Speaking of satellites, Martin reiterated the NAB position that a special purpose satellite system designed to handle television and radio distribution exclusively is preferred over a multipurpose system. Ownership of the satellite is not of concern but individual stations or groups of stations should own the necessary ground facilities where they so desire, Martin advised. Direct satellite-to-house relay was not feared by Martin because he feels local broadcasters will not be supplanted as long as they satisfy local tastes and needs.

Development of noncommercial television was endorsed by Martin but he sees thorny issues ahead regarding possible duplication, particularly in the

Wasilewski on Issues Facing Broadcasters

• **Public Television System—A New Plan.** The coined title "public television" . . . is one of these whimsical inaccuracies we're going to have to get used to . . . free television is public television . . . and I hope we can be forgiven if we are dismayed at the deft theft of our legitimate birthright."

"We strongly doubt that either the Carnegie Commission or the President's method of appointing men achieves sufficient insulation [against federal government interference over programming] . . . We propose funds be granted to *each state* for . . . facilities, . . . operations and programming. All noncommercial stations . . . [should] be eligible to join in an incorporated nonprofit association with each station acquiring voting privileges in it. The member stations in the association would thereupon elect members to a national board of directors."

• **Satellite Broadcasting:** "The present American broadcasting system, built upon the solid foundation of local station service, should not be undermined."

• **Trial Coverage by News Media:** "Law is not the private preserve of judges and attorneys; the law is the public's business. NAB [is] flatly against contempt power being used against media for anything disseminated outside the courtroom."

• **CATV:** "We believe the [copyright] bill now before the U.S. House of Representatives is basically fair in its intent."

• **Performers and Record Manufacturers Seeking Royalties:** "To contend that performers and record manufacturers are authors and innovators who write or make discoveries [as identified by the Constitution] is manifestly absurd . . . We will fight this scheme with all the vigor at our command."

• **Broadcasting's Current Relationship With Government:** "Anti-advertising feeling still appears to infect high levels of government . . . The economic survival of broadcasting, and, for that matter, the entire free press depends on advertising . . . We must convince Congress that it should not try to put broadcasters on a leash to be yanked at the first sign of independence."

area of news. Martin expected commercial and educational broadcasters working together to avoid such duplications. The committee chairman also called for the finest minds to be put to the task of providing a framework for noncommercial TV free of political or monopolistic control.

William G. Harley, president of the National Association of FM Broadcasters, said that if competition between educational and commercial broadcasters becomes more difficult, it is also true that cooperation will never be more important.

He added that educational and commercial broadcasters must remain alert to prevent regulatory-imposed programming of any kind.

James McCormack, chairman of the Communications Satellite Corp., speaking on the subject of satellites, outlined reasons why Comsat strongly favors a multipurpose system for transmitting domestic communications — including radio and television.

McCormack said the multipurpose system will cost less than a single-purpose system, allows more flexibility and security, and would be more economical for Comsat to operate.

He added, "these initial costs will continue to reduce over the years, as general communications become an ever increasing fraction of total use and bear a proportionately increasing share of total costs."

Within ten years, he estimated that nonbroadcast transmissions will make up more than half of the traffic in a multipurpose system.

However, if Comsat cannot have the large block of broadcast traffic as an "initial backlog of business" for the multipurpose system, McCormack said, "our difficulties are greatly increased in justifying, at any given time, a full scale and economical system for general communications."

At a reasonable estimate, he explained, the capacity of these satellites by 1970, together with their longer lifetimes, "will make it possible to offer a full TV channel in either ocean, around the clock, 365 days a year, for a small fraction of . . . your present domestic transmission charges . . . live, world-wide TV transmission at well under one percent of your total costs."

The Comsat chairman said direct broadcast from satelite to homes is technically feasible. Within a few years, he said, "The design of the satellites and the power aboard them can make it possible to receive the broadcast with a terrestrial home antenna costing very little money — perhaps $50, perhaps even less."

He added, however, that on the practical side "there is considerable force to the argument that no matter how low we may get the cost of an individual home receiving antenna, such a cost, multiplied by a relatively small number of sets in the community, will justify a more efficient antenna for satellite reception, relying on established rebroadcasting means for distributing the programs to the home."

McCormack envisioned a CATV system which would carry into the home other sorts of information, from telephone and telegraph to travel reservations — even the inventory and prices of the local supermarket as a desirable service which militates against direct satellite to home transmission.

Both Harley and McCormack expressed belief in the need for local stations and local service to satisfy sociological needs.

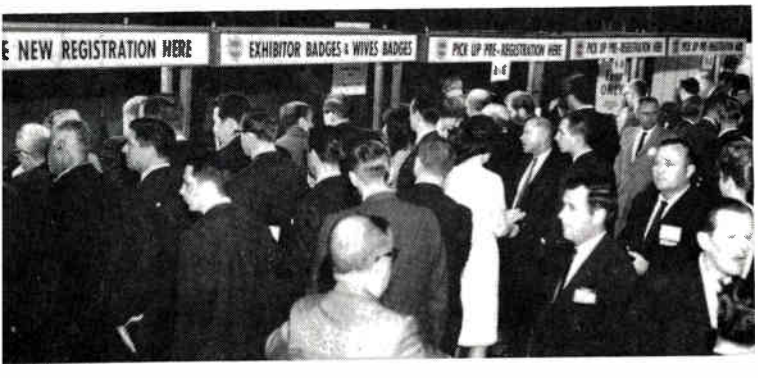
Public Endorses Self Regulation

The public has a clear-cut preference for self regulation by broadcasters over government regulation — even those who now dislike radio and TV, according to recent NAB and Roper studies. About half of the public is aware of the TV code although they are not sure of what code support entails. NAB Code Authority Director, Howard H. Bell, said progress is being made but he urged subscribers to tell the Code story with increasing frequency. To do this the Code Authority is offering a new on-the-air promotion series featuring Henry Fonda and Charlton Heston. The booklet, *The Challenge of Self Regulation,* is available to subscribers for mailing to local leaders. Bell seeks more subscribers. At present 396 TV stations subscribe, representing about 65 percent of the industry. The Code's program of commercial review and evaluation is increasing. The New York Code office reviewed 1640 commercials in 1966 compared to 1139 in 1965. Eighty-five percent of all toy commercials were cleared in 1966.

Time standards are a central issue at the moment, Bell said. The Code is weighing keeping the current standard of 10 min and 20 s/hr versus 12 min, but including all promos and closing credits in the 12 min.

Interruptions are also being studied and Roper research indicates viewers would prefer commercials to be grouped for fewer program breaks rather than evenly spaced. The number of messages on appeals to which the viewer is exposed is also under study — one proposal is not more than 24 messages or appeals in an hour.

Bell said each of these considerations is being weighed independent of the others and any final plan may or may not contain them all. Goal is to simplify current complexities in time standards.



Preclude Government Control

The climate in Washington D.C. seems to be to regulate or control to protect the consumer as witnessed by pressure on auto, tire, drug and the packaging industries. Is broadcasting next? Richard M. Brown, KPOJ, Portland, Oregon, and Chairman, NAB Radio Code Board, feels government regulation of broadcasting can be forestalled if more subscribe to the self-regulating Radio Code. To get more than the current 40 percent of the 5762 licensed radio stations to subscribe, Brown urges existing subscribers to explain the value of self-regulation to other broadcasters. Goal is 60 percent. Currently only 18 percent of broadcasters who are non-NAB members support the code.

FCC Chairman Rosel H. Hyde on PTV

". . . while Federal support for noncommercial broadcasting must provide for effective networking in this area, it must also contain safeguards to assure local autonomy in the choice and selection of programming. This is basic to the American concept of broadcasting . . . The best means of implementing these principles remains a challenging problem . . . which I, of course, leave to your judgment."

Huntley and Brinkley on Receiving the NAB '67 Distinguished Service Award

Huntley . . . "The majority of 20 million Americans receives the major portions of their information by the electronic media . . . The industry works diligently at our local and network daily news broadcasts . . . However, we are not fulfilling a need that has made itself increasingly manifest . . . it is the need for probing more deeply . . . for more analysis, weighing, reflecting."

Huntley said this may mean less spectacular film and more, at the risk of dullness, talk. We must, he said, "evoke what resides in the minds of men — men who have given thought and study to the question . . . we cannot film or tape the insides of the minds of men, but we can prevail upon them to reveal their minds through talk . . . News is no longer the bare bones of what happened, or where or when, and neither is it a palatable and brief quote from the statement or speech of some VIP. It is also what is in the minds of men."

Brinkley . . . "what has been with news also could be done now with programs in other areas . . . if we put them on, make certain they are well done . . . by the highest standards, leave them on, take a few losses . . . and give the public time to discover them and to learn to like them.

"I think in time a surprising number of them will develop into winners, find audiences and pay their way. In other words, exactly what happened with the daily news programs . . . they started slowly with no ratings and no money and now they have both . . .

"A program we think is good should not be canceled until it's had a fair chance at finding its audience, and 13 weeks or 26 weeks are not enough. A good program ought not to be assessed on its first or second Nielsen, but maybe its 15th or 20th."

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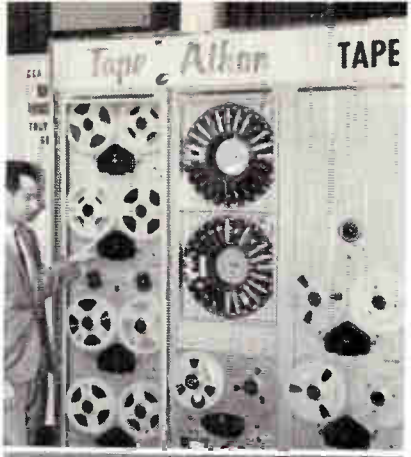

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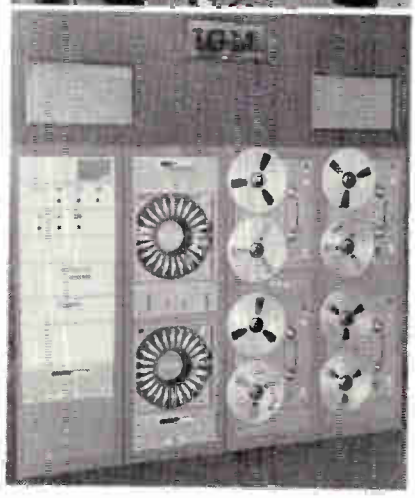

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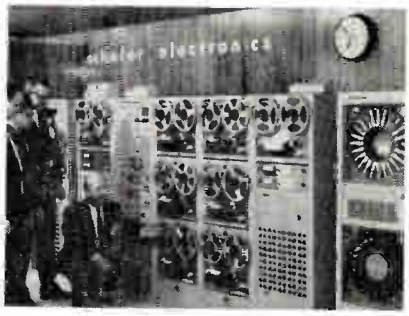

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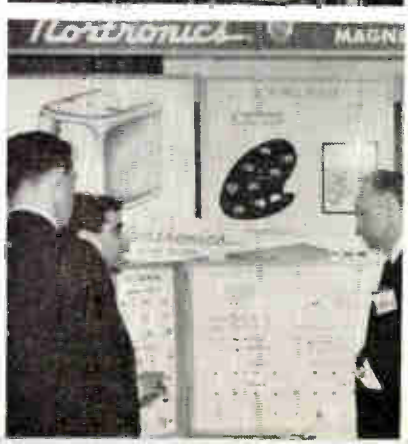

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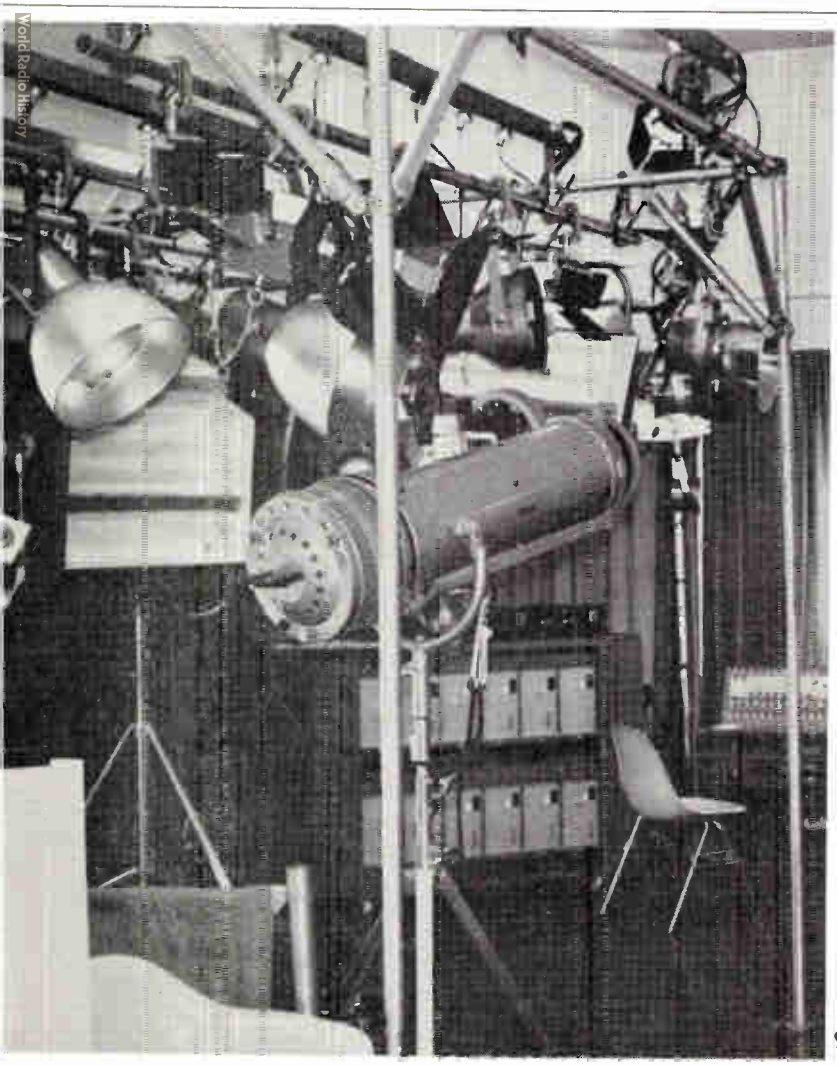

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Recap: Engineering Conference

10

Increase of Fm Transmitters Causes Interference Problems

Interference with television reception and aircraft electronic navigational aids "is increasing by leaps and bounds" as a result of the growing number of commercial fm broadcast transmitters. To cope with the problem, Eldon Kanago, chief engineer at KICD, Spencer, Iowa, recommends: meetings of broadcasters, transmitter manufacturers, FCC and FAA to define the problem; better and faster ways of communicating between the parties when such problems arise; employment of broadcast engineers who have both the knowledge and courage to tackle the problem; proper selection of frequencies so that the interference in a given area between high power stations on the ground and weak power sources at airfields will not have direct harmonic relationship; improved shielding of broadcast equipment including insertion of rf filters in the power line leading into the transmitter and best possible grounding of all components and chassis within the transmitter.

Solid-State Direct Fm Exciters Eliminate Problems

Several manufacturers showed solid-state direct fm exciters in the exhibit hall. Hardin G. Stratman, fm project engineer for the Gates Radio Co., appearing on the technical program described in detail the Gates M-6425 fm exciter. Among the benefits: improved reliability by elimination of tubes and reduced problems since heat is less. Direct fm exciters generate the carrier exactly on the output frequency multiplier stages. As a result, wide bandwidth needed for high fidelity reproduction is easy to attain and a better crosstalk figure between the main channel and sub channels used for SCA and fm stereo is achieved.

Automation exhibits: 1. Gates, 2. Tape-Athon, 3. IGM, 4. Schafer

Components on display: 5. Cleveland Electronics deflection components, 6. RCA Camera tubes, 7. Eimac/Varian power tubes, 8. Nortronics magnetic heads

Lights and more lights: 9. This display, is ColorTran

Other new products: 10. A. B. Dick (Visual Electronics) title inserter; 11. Gates solid-state fm exciter; 12. CBS loudness mster; 13. Norelco remote camera

NAB Interim Procedure for Measuring Loudness

Comparing recorded broadcast commercials to a reference loudness tape before putting them on the air was recommended by John T. Wilner, vice president for radio and TV of the Hearst Corp., and a member of the NAB Engineering Subcommittee. Since there is no accepted method of directly measuring the "loudness" of a broadcast program the prebroadcast audition procedure was suggested as an interim way of observing an FCC policy statement that recorded commercials be auditioned to detect excessive loudness. NAB has proposed a standard loudness reference recording.

The subcommittee felt electronic methods of direct measurement or control of loudness not sufficiently advanced and tested to be recommended to the broadcasting industry.

Loudness Monitor Attempts to Measure Broadcast Sounds

Efforts to measure the illusive factors in loudness, (a commercial that seems to "blare" at you may actually be no higher in volume than the soft music you just enjoyed) were described by Benjamin B. Bauer, vice president for acoustics and magnetics, CBS Laboratories, Stamford, Conn. The company has made a loudness level monitoring in the test stage. Final equipment should keep program material within the limits of proposed NAB standards (see previous item).

Loudness is of two types. One is based on sensory or physiological aspects, resulting from the action of the physical properties of sound upon an individual's hearing mechanism; the other is perceptual or psychological, which includes the emotional content or annoyance of what is heard. It is often difficult for a listener to distinguish between these two types. For example, a broadcast may have a comfortable level for those interested in it, but it may be "too loud" for a person trying to concentrate on reading a book. Or the faint cries of a baby are enough to awaken parents because their ears are "tuned" to that sound, while routine street noises won't disturb them.

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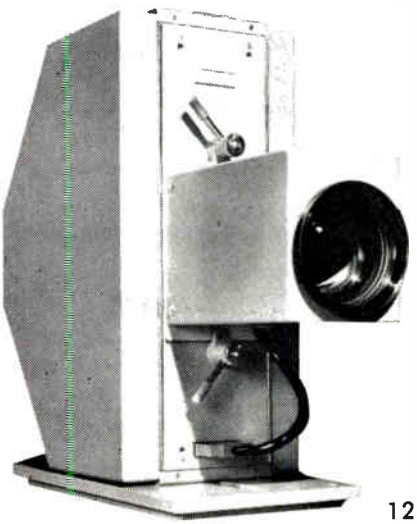

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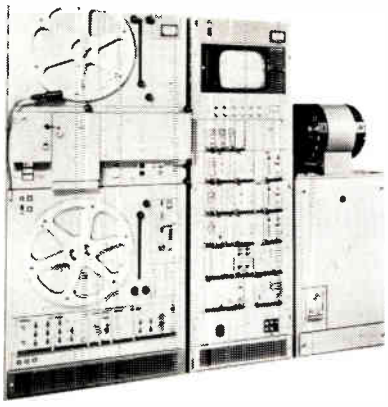
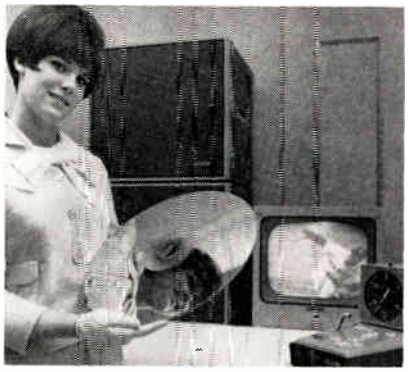
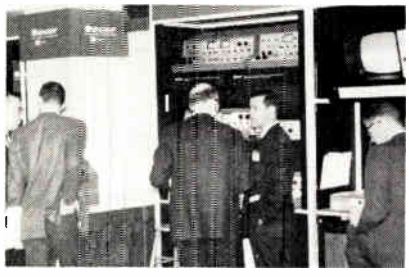
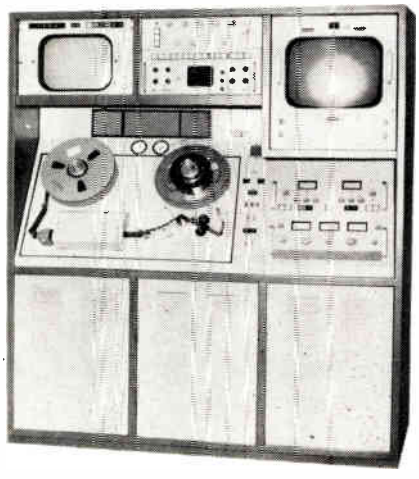








Since the measurement of psychological factors in loudness presents very great difficulties, CBS Labs undertook the measurement of physiological or sensory properties of sound.

The use of conventional vu meters was known to be of little value since tones of different frequency may differ in loudness level by as much as 20 dB for a given vu meter reading; and the vu meter by itself does not respond properly to the sensory loudness of complex sounds or combination of tones. Even a sound level meter, cannot be relied upon when the loudness level of complex and impulsive sounds is to be measured.

To test sensory responses exclusively, CBS Laboratories' team devised means of producing sounds — especially those of speech — free of semantic content, by playing an audio tape recording backward. This method prevented listeners from becoming involved in what they heard, so that they could concentrate on program loudness.

A preliminary task was to obtain a set of equal loudness contours, resulting from measurements of the levels of sound of equal loudness as a function of frequency and intensity. These contours were obtained under conditions applicable to listening in the home. The responses of three separate listening teams of nine or ten individuals each were obtained in months-long tests. The groups listened to "pink" noise, which has equal energy distribution per octave band, presented in 1-dB step adjustments for one second periods, alternating with a comparison tone of ⅓ octave band of pink noise centered at 1000 Hz. Each listener then entered his own judgment of the loudness on a tally sheet. In this manner, their average hearing response was determined.

The result of these tests formed the basis for the development of the sensory loudness level monitor and automatic control, which will be commercially available later this fall.

Video Noisemeter Analyzes Equipment

High quality transmission of TV-pictures requires among other things a sufficient signal/noise ratio. Measurement of the noise voltages which occur in a TV-transmission system is not possible with a simple voltmeter because of the simultaneous presence of the composite video signal.

Operation of a new video noisemeter was described by Rudolph Feldt of Rohde & Schwarz. The principle of the new meter is to block out the sync and blanking pulses. A direct reading S/N meter, calibrated in rms and peak-to-peak pulses, is corrected for the duty cycle of the blocking pulse.

Noise is analyzed by switching in various filters that eliminate noise components. A high pass filter removes hum and microphonics. By varying the cut off frequency of this filter, spurious line frequency and tilt signals that occur in certain cameras can be eliminated. A low pass (4.2 MHz) filter eliminates noise voltage originating outside of the video transmission range. A noise weighing filter corresponding to CCIR recommendation 421 (Christopher-Barstow curve) can be switched in. A fourth color-subcarrier trap eliminates residual color subcarrier (the color burst signal is gated out).

Accuracy is better than 1 dB and individual meters agree within 0.1 to 0.2 dB.

Photos top to bottom
Visual Electronics flying spot film chain
Ampex disk instant replay video recorder
Bauer audio consoles
Ward video programmer
Visual/Allen high-band VTR

FCC and Broadcast Engineers Should Cooperate More

Broadcast engineers charged in an Industry/Government Engineering Session that most FCC rules were obsolete. FCC spokesmen generally agreed but said budget limitations do not permit additions to the staff and wholesale revision is very unlikely. Wallace Johnson, FCC Broadcast Bureau, asked for industry support at the next budget hearing and in return promised action.

Philip Whitney, WINC-WRFL, in pinpointing one absurd FCC rule, cited the necessity to get a remote license because his transmitter was ten feet away from the control panel. In another instance, Whitney said he broke an FCC rule by not having a modulation meter on the remote end of a voice link that was only a few feet long.

Paul Schafer liked some of the rule revisions that have been made such as the automatic programming rule that says if you record the program you don't have to write it down. He said that if all of the rules could be modernized, 100,000 man hours a year could be saved.

Other industry gripes were vagueness of FCC field inspectors in interpreting the rules. Harold Kassens of the FCC Broadcast Facilities Division suggested better communication lines between industry and the FCC and admitted better communications were needed within the FCC itself. He pointed out that FCC field manuals exist and rules subject to evaluation are covered therein. Contact with the FCC field man would help, he said.

The FCC spokesmen pointed that the FCC does not by itself write rules but seeks industry comment.

Rules don't always require measurement of everything even though equipment is available. For example, the rule requiring the use of stereo monitors does not require peak flashers, even though such indication is more accurate than a meter. The industry

should voluntarily use such equipment, Kassen said.

Problems kicked around by the panel that should be resolved included loudness meters, modulation limiters and proof of performance tests that are difficult to make when others are on the air. FCC panel members said sign-on-time rules would be changed but cited the need for international interim agreements with Canada and Mexico as sometime slowing the obvious. International agreements become sticky when radio interference is an issue. FCC instant evaluation during the panel session (in response to questions from the floor): stereo isn't stereo unless two microphones are in use, and tinted slides are color transmissions.

Electronic Newspaper Is Inevitable

An "electronic newspaper" is now technically feasible and will inevitably be reproduced in the home to fulfill the demand for instant information.

Chief deterents, says Dr. James Hillier, vice president of RCA Laboratories, Princeton, N.J., are the problems of economics, tradition and human inertia that must be overcome.

The RCA vice president also sees integrated circuit having a big impact. A miniature television camera no larger than a 35mm still camera is in the future. One thing *not* coming: three-dimensional television pictures by laser is not possible according to Dr. Hillier.

Use Helicopter to Measure Antenna Radiation Patterns

Although airborne measurements have been made on several occasions, their overall accuracy is in doubt. Neil M. Smith of Kear and Kennedy, Washington, D.C., described how helicopters can be used to get a series of measurements which can be averaged to establish more exact pattern information.

In the horizontal measurements, field intensity data is recorded as the helicopter is flown on a circular course around the antenna. The course is maintained by observing ground check points. These are selected to be easily identified from the air and to be spaced as evenly as possible around the circle. (They also identify particular azimuths on the recorded chart.)

Deviations from the proper flight path tend to be averaged out of the final results and more sophisticated navigational systems are not essential in practice. The same circular course is flown a number of times, clockwise and counter-clockwise, then the average of the runs is taken as the final pattern.

For vertical data, the helicopter ascends to an altitude sufficient to observe the shape of the pattern as far from the horizontal as may be desired. Recordings are made as the helicopter descends in as vertical a path as possible. Such runs may be made at as many azimuths as required, but, the individual runs are of significance only as statistical portions of the average.

Tower Maintenance Starts With Day One

The care and maintenance of a broadcast tower starts just as soon as the contractor completes the structure and assures management that everything is in accordance with the drawings and specifications. That is the view of J. Roger Hayden, manager of commercial sales, Dresser Crane Hoist & Tower Division, and he recommended two ways to achieve proper maintenance: do-it-yourself and a professional inspection service.

Do-it-yourself items should be confined to things which can be seen, such as vertical alignment, inspecting guys on the ground, checking the foundations and observing the lights. The rest, he said, should be done by a reputable professional firm.

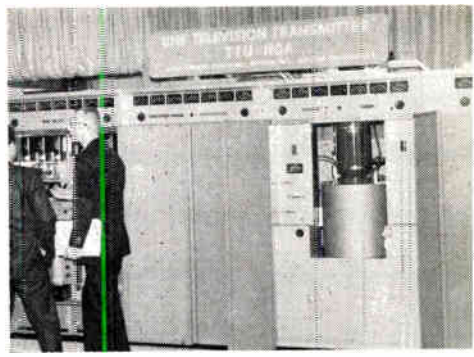
Practical tips offered by Hayden include: check a tower's vertical alignment when there is no wind nor radical temperature changes; to determine repainting needs, take a color photograph at a certain time of the year each year and try to get the lighting conditions as nearly the same for each photograph and then make a running comparison; check guys some time after the first year of service because settling may change exact height of guy connections and guy length.

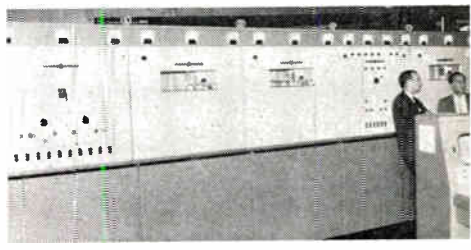
Color News Film No Problem

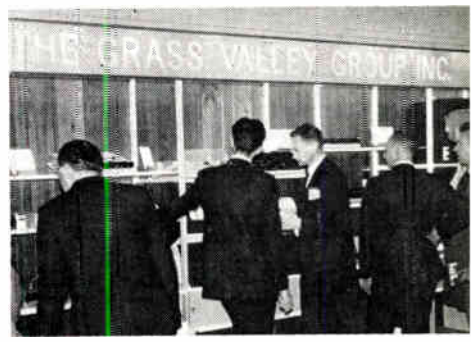
NBC has shifted all news film to color and finds no problem according to Sigmund Bajak. Both film and film processors are available. NBC used Eastman EK7242 or 7258 film with a daylight rating of 80, which is as fast as black and white. Processing time can be cut to 30 min by forced processing. Lighting generally consists of three to five quartz lamps (3200°K). Five lamps increase camera sensitivity but Bajak says news comes first and three quartz lamps plus fluorescents will produce an adequate picture.

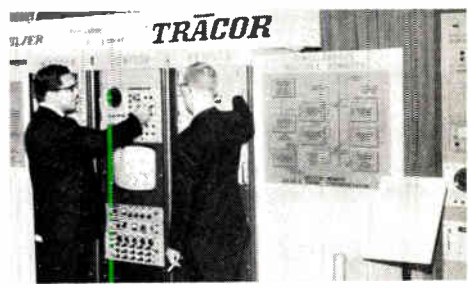
Color Production Requires More Care

More effort is called for in set and costume planning and lighting for color but not necessarily more time. Carlton Winkler of CBS Television reports every element is dependent on and

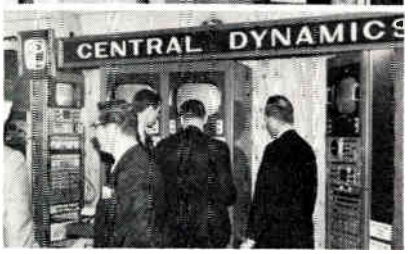








Photos top to bottom
RCA 110-kW uhf transmitter
GE 100-kW uhf transmitter
Grass Valley video line
Dynair video line
Tracor syncing system
Ampex's portable VTR and camera



related to every other element. If one is out of harmony, the whole thing is out. Color cameras can reproduce faithfully — the problem is to get good picture quality in both color and black and white. Brightness contrast and color contrast are two key factors. Brightness contrast determines luminescent value. Since the contrast ratio one has to work is only 20:1, care must be excercised. A gray shirt of 60-percent reflection is seen as white; skin tone of 35- to 40-percent reflection is relatively dark. Thus full spectrums of color are difficult to control properly. Contrasting colors may be pleasing on a color set but if they all reflect the same brightness, everything will be gray on monochrome sets.

Light shades such as yellow or pink reflect much light. Blue does not. Proper skin tone is the goal, but skin tone changes with background brightness. Costumes must complement the actor's skin. Lighting should be handled to avoid dark shadows, but too much light causes blooming. Winkler says Munsel charts should be consulted to determine gray scale value on black and white transmissions.

Getting More Out of Your Color Videotape Recorder

Recorders that are rushed into a tightly scheduled operation often are used without the engineer ever taking time to identify and understand all of their capabilities. Some features which are designed to produce top quality color recording are simply not being used, according to Charles A. Anderson, manager of broadcast engineering, Ampex, Corp.

Anderson advised: Take enough time to get to know intimately this sophisticated apparatus. Pointers for developing better operating practices with equipment include: set up a planned maintenance and adjustment schedule — and stick to it; stay within established standards for recording with television magnetic tape; be sure signals to be recorded are correct; train operators and maintenance men adequately.

Aperture Correction Improves Color Picture Sharpness

Because illumination beams are not infinitesimally small, white to black transitions are not sharp and the vertical edge of color cameras is "soft." Both horizontal and vertical aperture distortion can be corrected.

Photos top to bottom

TeleMation's ultra-stable sync generator
International Nuclear's video gear
Central Dynamics' video line
Memorex showing 78 V videotape
MaCarTa solid-state cartridge player
American Pamcor switching system

Charles E. Spicer, vice president for engineering, at Visual Electronics discussed aperture correction circuits. A principle method is to delay the main signal. The signal voltage is enhanced by *1.* phase inverting the signal, *2.* adding the inverted signal to the delayed signal to get a correction signal and then *3.* adding the correction signal to the main delayed signal to produce an enhanced signal. Such enhanced signals can be added to an encoded color signal.

One and two-line delays are practical as a result of improved glass acoustic delay lines. Such aperature correctors and enhancers are appearing in new color cameras, Spicer said.

Color Cameras More Alike Than B&W

Production of monochrome television cameras had always been in small quantities. They were usually assembled one at a time by craftsmen and then tested and debugged by skilled technicians. Each camera produced had a unique and not always pleasant personality. The heavy demand for more complex color cameras called for more production-oriented manufacturing and quality control procedures beyond weeding out defective products. The approach used by General Electric was described by A.J. Strumar, quality control manager for General Electric's Visual Communication Products Department.

Under a "total quality control program" quality control is maintained in identifying the major characteristics a product must have, planning and making new manufacturing assemblies, purchasing equipment, controlling information feedback, retraining personnel, and incorporating customer suggestions in future models. A major benefit of total quality control is the ability to interchange units within the camera thus preventing a camera from being out of production for repairs.

Tests the General Electric PE250, underwent included subjection to high and low temperatures with the humidity as high as 95 percent, vibration for hours, and drop tests. A packaged camera was shipped 4,000 miles by air, truck and rail to determine its ability to survive shipment from factory to studio.

Use Emergency Power Systems To Serve Public

Broadcast engineers were urged by James J. Strathmann, generator set sales manager, Cummins Engine Co. to consider emergency power systems information for the public during emergencies. Management should consider what effect a utility power outage will have on people in the area.

Strathmann said an owner or manager of a local communications facility should ask "Is there something I should be doing, and if so, what?"

Recap: Exhibits

Color Cameras: Everybody Watched

Five studios were simulating on-the-air color extravaganzas. There were the big three: GE, Norelco and RCA, plus Ampex and Sarkes Tarzian.

All were putting out a good picture. Was any one best? It would be hard to say since each manufacturer was shooting his own set and side by side comparisons could not be made. RCA emphasized brilliant colors in strong lighting. Norelco went more for pastels. GE showed a variety of color with varying light levels and went through normal production steps (adding film, slides, chroma key, etc.) to show typical performance. On the last day a sports network mobile van arrived to pipe in shots from the hotel parking lot. Nobody could say Norelco rigged anything since the pick up of the PC 70s could be seen on any one of over 50 monitors (counting Norelco's control room and Visual Electronics' switching center). Sarkes Tarzian shot for pastels and some viewers thought the floor monitors were soft. Pictures in the control room (smaller monitors) looked good. Ampex in a sense stole the show. Their Marconi MK VIIs were set for close up shots of exotic girls and "living" green sets—a spring garden transported into the Conrad Hilton subterranean showroom. Miratel had a new line of professional color monitors across the way tied into Ampex's camera — for once Conrac didn't have a monopoly.

Ampex also had working for them a new video back-pack tape recorder (VR-3000) and camera combination designed for remote high-speed taping of news events by a single operator. The 20-min., 50-lb unit consistently drew a crowd. The unit made further news when WFLD, Chicago, borrowed it and went on the air. WFLD placed the first order for the system (priced at $65,000).

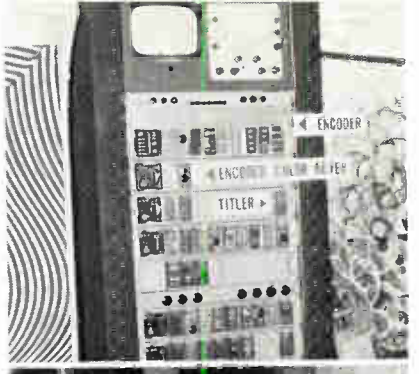
New cameras this year included RCA's field camera, the 140-lb TK44, (less fast detachable view finder and zoom lens) and Norelco showed a compact remote control unit (sans viewfinder) EL8530, which weighs but 60 lbs. The EL8530 camera is also good for telecine pickup. The TK44 uses what RCA calls on Isocon tube which behaves like an IO but which has less noise because of a new internal design. The vidicons will have lead oxide surfaces.

Cohu showed an inexpensive ($26,500) 3-tube vidicon color camera well suited for film pickup and other studio jobs. Toshiba had a 4-tube, 110-lb color unit (a 3-in IO and 3 sensicons) trained on a mini-skirted model. The monitor image was hard to criticize. Packard Bell had a 3-tube color camera over in an adjoining hotel, said to offer broadcast quality for film chains — cost, $18,500.

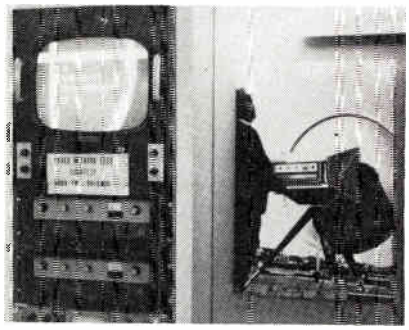
RCA, GE and Sarkes Tarzian, in addition to their live cameras, showed film chain systems. GE was promoting heavily its PE-240 film chain. RCA displayed a new 120-slide TV slide projector, the TP-77. A new slide projector and 16mm film chain based on a flying spot scanner principle was on display at Visual Electronics. The flying spot scanner uses no moving optics, mirrors, or prisms. Photocell multipliers are the pickup. Color registration problems are, therefore, eliminated. Film is fed through the 16mm film system by pneumatics. Units were judged by attendees as being of very high quality. The manufacturer is Fernseh, Germany.

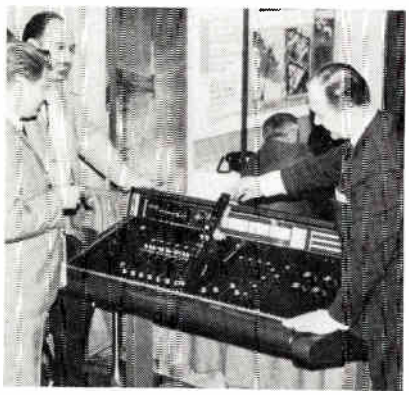
Videotape Recorders, High Band and Other

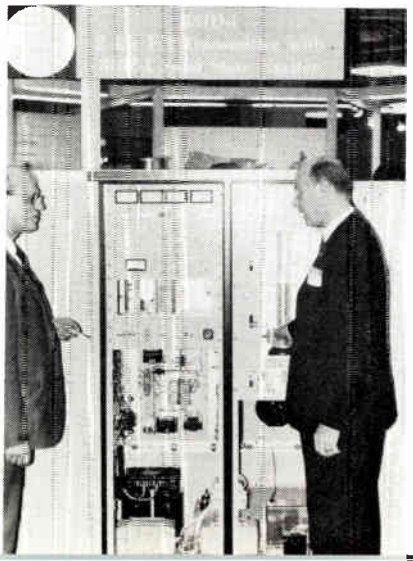
Last year at NAB there were three high band VTRs on display — Ampex, RCA and Visual/Allen. But last year you could get delivery only from Ampex unless you were an NBC network in which case you got several RCA TR70's last December. This year all three were displaying high band-



Photos top to bottom
Riker video equipment
CCA transmitter
Sparta's new tape recorder
BIW's new TV camera connector
Rust remote control equipment
Wilkinson audio console







width types but this year they are for real. RCA is shipping and Visual/Allen has switched to a Fernseh tape transport mechanism and head and is assuring customers who put their orders in last year that they will get machines.

Ampex rated well in achieving attention by virtue of its portable videotape unit (the VR-3000 described earlier) and also its color instant replay system, HS-100, which records on metal disks. ABC has bought three at $110,000 each for use at the Olympics in 1968 and other sporting events. Fast, slow, and frame-by-frame stop action is possible. Ampex also showed a color recorder for closed circuit use priced at $4,495. The new 7500-C device uses 1-in. tape at 9.6 in./s tape speed and 1000 in./s writing speed, standard on the VR6000 and -7000.

Sony got its share of attention by being in various other exhibit areas as well as its own which featured the EV-200 (1-in. tape) ideal for CATV. General Electric was using Sony as an industrial-educational class of VTR as was also Sylvania.

Shibaden and Toshiba had similar VTRs. Many were talking about color conversion kits to give B & W VTRs color capability but most of the schemes on display required a special receiver converter.

Video Processors, Switchers

Live camera No. 1, 2-, or 3-, film camera -, slide camera -, remote camera -, network -, can you handle them all with expertise? On hand to give you a hand with switching and video processing problems were a host of exhibitors. In the system switching area were the following:

- Ward Electronics displayed a new programmed switch that combines full automation for less than $50,000. Handles 12 inputs.
- RCA showed TV switches, the TS-50 and -51, using integrated circuits that handle 16 inputs and 4 outputs and wipes, dissolves, and other effects were possible.
- Visual Electronics LS-8 switching system provides for ten noncomposite and eight separate composite inputs. Fader mixing is possible on the composite inputs. Keyed inserts are possible. The VAT thumbwheel provides for preselection of video, audio and transistion. Duration can also be preset.
- Sarkes Tarzian showed elaborate automatic programmers.
- Telecontrol showed automatic TV controllers that select, control and mix video and audio as determined by a stored, real-time core memory.
- Chrono-log showed an automatic station breaker.
- American Pamcor showed video switching and control systems including computerized automatic programmers.
- International Nuclear Corp. displayed a 22 x 10 video/audio switcher.

In terms of signal processing and switching equipment, Riker Video Industries was the largest such exhibitor and most prominent. Riker stressed everything you need for a system — test equipment, stimulators and switchers. In the switching area it claims nanosecond speeds and high performance in differential phase, gain, and frequency response.

Telemet featured a very complete line of color encoders, gain correctors, sync and generator packages. Dynair boosted a broad line of modulators, distribution amplifiers and monitor switches. The company also offered a cable equalizer. Grass Valley showed a new line of video sync generators, distribution amplifiers and color block generators. Central Dynamics and Vital Industries both stressed color signal processing amplifiers and International Nuclear displayed a number of distribution amplifiers and signal processors. Ball Brothers boasted a considerable line of pulse distribution amplifiers.

Synchronizing news was made by two companies, TeleMation and Tracor.

TeleMation offered a sync generator with time-base stability of better than 5 nanoseconds and a subcarrier jitter of less than 0.5 nanosecond — a several times improvement over existing designs. Secret is the use of a high frequency clock in conjunction with fast-rise integrated circuit logic. No multivibrators are used.

Tracor's approach using a Selzer Lab development, is to control the timing of each video facility to precision. One choice of a standard relies on a 2.5-MHz quartz crystal standard, the other on a rubidium atomic standard. Frequency accuracies of ± 5 parts per 10^{11} are attainable. A brief system description appears on p. 124, *BM/E* April.

Photos top to bottom

Vitro test equipment
Microwave Associates relay equipment
Beckman and Whitley portable camera
Altec Lansing audio console
Collins solid-state fm transmitter

Automated Audio Systems Audio Consoles

BM/E gave considerable preview attention to automated systems in the April issue and will not repeat system description here. Needless to say, systems are growing in capacity and sophistication. The FCC ruling on separating fm broadcasting from a-m has undoubtedly spurred use of automation equipment.

Schafer Electronics, pioneer in automated systems, stood out in the exhibit area because of an expansive booth devoted to nothing but automation. Random selection tape and cartridge systems were on display. Gates exhibit, which included ATC gear,

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Circle 23 on Reader Service Card

showed three new systems. The smallest was the 244 which accommodates 24 events using four audio sources. The 484 handles 48 events, 8 inputs; the 1007, 1000 events, 7 inputs. Gates stressed standard equipment as a trend. Equipment discussed last month included that from Continental, MaCarTa, Perfection Music, Inc., Tape-Athon, and International Goods Music.

Seeburg Music Library was on hand to describe a low cost service.

Broadcast Electronics, MaCarTa, Sparta and Tapecaster showed tape cartridges and players, several models of which are subpackages of automation systems. Also Sparta and Tape-Athon introduced professional-type recorders. Audio Devices was exhibiting cartridges for all of the above.

Audio Consoles

There was plenty to look at and choose from in the area of audio consoles — monaural and stereo. Sparta reported keen interest in their consolettes and shipped floor samples to a customer. Here's a brief run down of consoles shown.

- Altec Lansing: solid-state stereo console 250T3.
- Bauer: variety of consoles.
- Collins: 212T-01, -2 dual channel rack type console providing 28 inputs, 14 faders, etc. The unit uses photoconductive switches and is patterned after the 212 S introduced two years ago.
- Fairchild showed a 42-input TV network mixer.
- Gates introduced the Gatesway II, a solid-state unit as a successor to the tube-type Gatesway. A portable console for use in TV mobile vans, the M-6546 was also shown.
- GE showed a new console tailored to fill the needs of a TV studio. It provided for 14 mixers and 28 inputs.
- McCurdy boosted contemporary-design solid-state units.
- Sparta's familiar line included a new stereo console.
- Wilkinson: solid-state stereo and single channel unit.

Microphones from Shure, Gotham (Neuman) and Norelco were on display.

Magnetic Tapes

On the video side, Memorex drew some close examination as they showed how they measured S/N. Both Memorex and 3M Company showed duplicates of originals to demonstrate the ability to make third and fourth generation tapes. Reeves Soundcraft showed videotape for quadraplex machines as well as helical-scan video recorders and sound recorders.

Transmitters

Transmitters shown were by no means last year's models brought back. Copping the power prize was RCA's 110 kW uhf transmitter. It got extra cooling by using vapor cooled integral cavity klystrons. Three identical tubes were used — one in aural, two in video, diplexed.

GE showed a 100-kW uhf. Townsend showed one half of RCA's transmitter — a 55 kW unit. Incidentally, the price tag on the RCA was a whopping $425,000. All used solid-state except in the output stages. Standard Electric's theme was pick any power combination (vhf or uhf) and add to, or exchange amplifiers, in your present driver/transmitter.

1967 was the year of the solid-state direct-fm stereo exciter. Among those showing the latest solid-state advancement were American Electronic Labs, CCA Electronics Corp., Collins, Gates and Visual. One-, two-, three- and ten-kW transmitters were the most prevalent although Gates offered six models from 250 W to 20 kW. The exciter output generally was 10 W.

AEL, vying to make a place for itself in the transmitter field stressed the clean layout and quality found in its line. AEL offered a 40-kW fm unit.

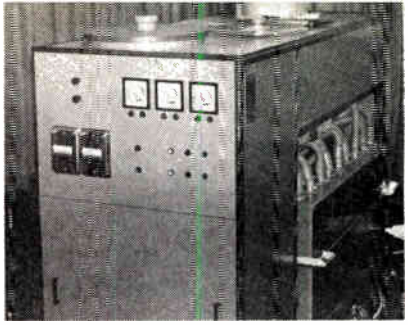
A-m transmitters were also available and one could occasionally spot vacuum tubes. Most of last year's transmitter engineering apparently went into fm design. Collins claimed its a-m transmitter was the most transistorized available.

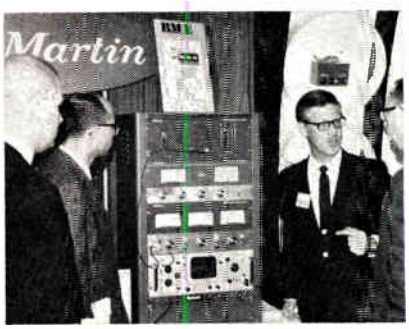
In looking at transmitters, the indispensibleness of Eimac/Varian became apparent. Their tubes were in most final stages.

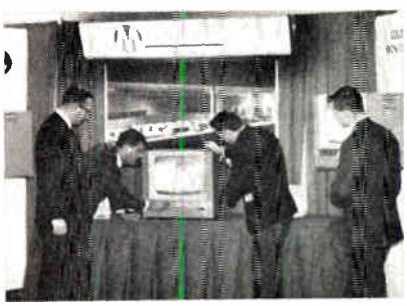
Transmitter logging equipment was on display by Bauer and Rust.

Cousins to the transmitter were all over. Electronic Missile and Communications stressed uhf and vhf translators. Marti and Moseley stressed STL gear (950 MHz) — all solid-state; Lenkurt, Raytheon, RCA and Microwave Associates displayed microwave relays. Microwave Associates showed the color transmission capabilities by relaying in live Chicago, color studio, WBKB.

SCA equipment, practically all solid-state, was displayed everywhere: AEL, CCA, Johnson, Marti, McMartin, Moseley and Wilkinson. McMartin drew special attention because of its all solid-state receiver that eliminated conventional i-f strips. Using solid-state plug-ins incorporating integrated circuits, McMartin said that tuning or misalignment problems were licked. The unit was built around the modular concept and various power output options are possible.

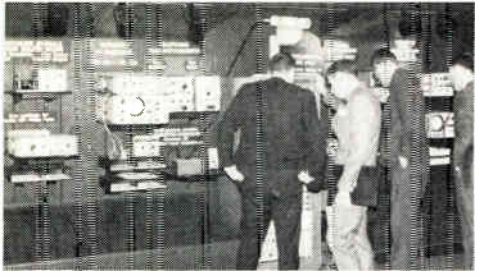


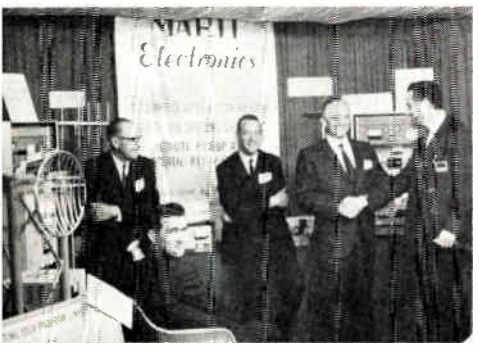


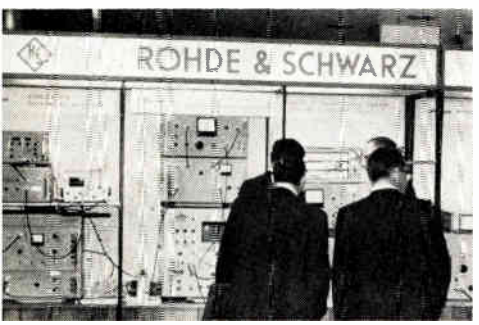


Photos top to bottom

TV Zoomar portable color film processor
Moseley STL equipment
Jampro's zig-zag antenna
McMartin's FCC-approved stereo monitor
Miratel's professional color monitor
GE antenna pattern computer input







Antennas

In antennas, the circular polarized type was promoted heavily because of its value in fm transmission. The circular combines both vertical and horizontal elements into one functional unit. Gates showed a dual cycloid which had a low vswr to 200 kHz and could handle 10 kW of power per bay. Arrays can take up to 40 kW. Collins and CCA introduced a similar circular.

Jampro featured its zigzag and fm antennas (for both horizontal and vertical polarization). McMartin's SCA/fm indoor antenna was sought out by visitors who heard about it during the last year and during current technical sessions on fm.

General Electric engineers talked antenna problems extensively and gave out computer plots of antenna patterns based on inputs provided by inquiring visitors.

Test Equipment

We should logically divide test equipment into audio, video and rf categories. Much was on hand in every category.

In the audio area, CBS's loudness meter was revolutionary (see Engineering Session for a description).

A great deal of attention was paid to FCC approved stereo monitors displayed by Collins and McMartin. On June 1 of this year the FCC will require all fm stereo broadcasters to use such equipment. Only Collins and McMartin have received such approval.

Collins' fm modulation monitor is designated the 900C-2. It measures total modulation of the carrier and individually measures modulation percentage of the main channel, stereo subchannel, pilot carrier and SCA subcarrier. Total peak modulation is displayed on a peak light. Direct measurement of channel separation, cross talk, S/N ratio and stereo subcarrier is displayed on a self-contained voltmeter.

McMartin's monitor (described on p 10, April *BM/E*) shows simultaneously left and right and total modulation. One switch will meter rf level, pilot injection, left and right modulation, L+R, L−R, phase angle, subcarrier suppression and a-m/fm signal to noise ratio.

Other items in this rf field included the harmonic field intensity meter by Nems-Clarke (Vitro Electronics) which could detect third harmonics of radiation. Bridges to simplify antenna measurements were shown by Delta Electronics. In the video area, outstanding waveform monitors were stressed by both H-P and Tektronix. Capabilities of making sine-squared, T-pulse and bar-measurements were shown. Riker Video stressed simulation equipment which would provide a broad range of stable signal sources to evaluate video transmission. Included in such simulation gear are sync generators, encoded color bar generators, chroma keyers, black burst generators and special effects generators. Telemet displayed differential phase and gain receivers. Rohde and Schwarz's booth was busy as visitors looked at group delay testers, swept frequency scopes and asked about the new video noisemeter. (See Technical Sessions.)

An unusual product was Gardner Laboratory's TV Colorguard designed to speed the set up color monitors on display at TV Zoomar. The Colorguard senses red, green and blue colors from the monitor and meter readings are obtained through photo cell pickups. Monitors can be set up in minutes, TV Zoomar people report.

Photos top to bottom
H-P's test equipment line
Ball's waveform monitor
Marti's STL gear
Filmline's film processor
Rohde and Schwarz test equipment
Lenkurt microwave carrier equipment

Film, Film Cameras, Processors, Editors

Film camera news was made by both Arriflex (who showed a sound convertible unit) and Beckman and Whitley (which showed an ultra portable unit). TV Zoomar made news with a new portable 16mm color film processor designed for news rooms (see p 124, *BM/E*, April). Filmline and Houston Fearless stressed color processors. Harwald was back with a full line of film editors.

Eastman Kodak displayed Ektachrome EF film, but basically talked service — how to set you up in the color news coverage business.

Lighting

Century, Colortran, Kliegl and Mole-Richardson were all there. Kliegl got extra mileage by equipping the five live studio sets mentioned earlier. Preset plates were stressed by several manufacturers.

Studio Aids

Although Houston Fearless camera mounts appeared omnipresent (H-F's name cast into every mounting head usually upstages the camera itself), other dollies and mounts drew attention. Power Optics motorized camera head drew favorable attention as did the imported counter-balanced pedestal and camera head shown by TV Zoomar. Davis and Sanford, Telequip Corp. and Quick Set said business was good for their respective heads, tripods, wall and ceiling mounts.

Caption crawlers and title inserters

were popular at Boston Insulated Wire. Q-TV, Telesync and Visual booths. Visual's/Video 990 character generator (developed by A.B. Dick) performs digital to video conversion of 64 different alphanumeric and special characters. Output can be from a keyboard, punched tape, magnetic tape, data phone, TW, or other digital source. Vertical and horizontal crawl and "blinking" features are included.

A radically new method of color background projection that eliminates all of the shortcomings of the common rear projection system, was demonstrated in the GE area. Developed by Front Projection Corp., the key is a patented screen that reflects projected light directly back to the source, with no noticeable falloff. It works under high light levels, and gives saturated color backgrounds under 400 ft candles. Huge backgrounds are practicable from 35mm color slides, and panning, tilting and zooming are permitted. Smaller local stations can offer the flexibility of live commercials with appropriate backgrounds to their advertisers. News and weather broadcasters can get into the action with slides of the subject being featured. All types of variety, music and dramatic presentations can be enlivened by backgrounds to fit the effect.

CATV

CATV row included Ameco, American Electronic Labs, Entron, Jerrold Corp., Kaiser-Cox and Viking. Total turnkey help or engineering assitance was offered by all. Ameco introduced a new solid-state heterodyned head end unit, the Channeler.

Cable

Boston Insulated Wire had camera manufacturers and users gathered into their booth to see BIW's new television connectors which is designed to prevent "scooping" (damage to pins by mismating). The sleeve design prevents the sleeve from hitting a male pin and bending it.

In BIW's new concept, pins and sockets crimp to cable conductors and are released from the front. In a sense BIW has brought military design to the TV industry.

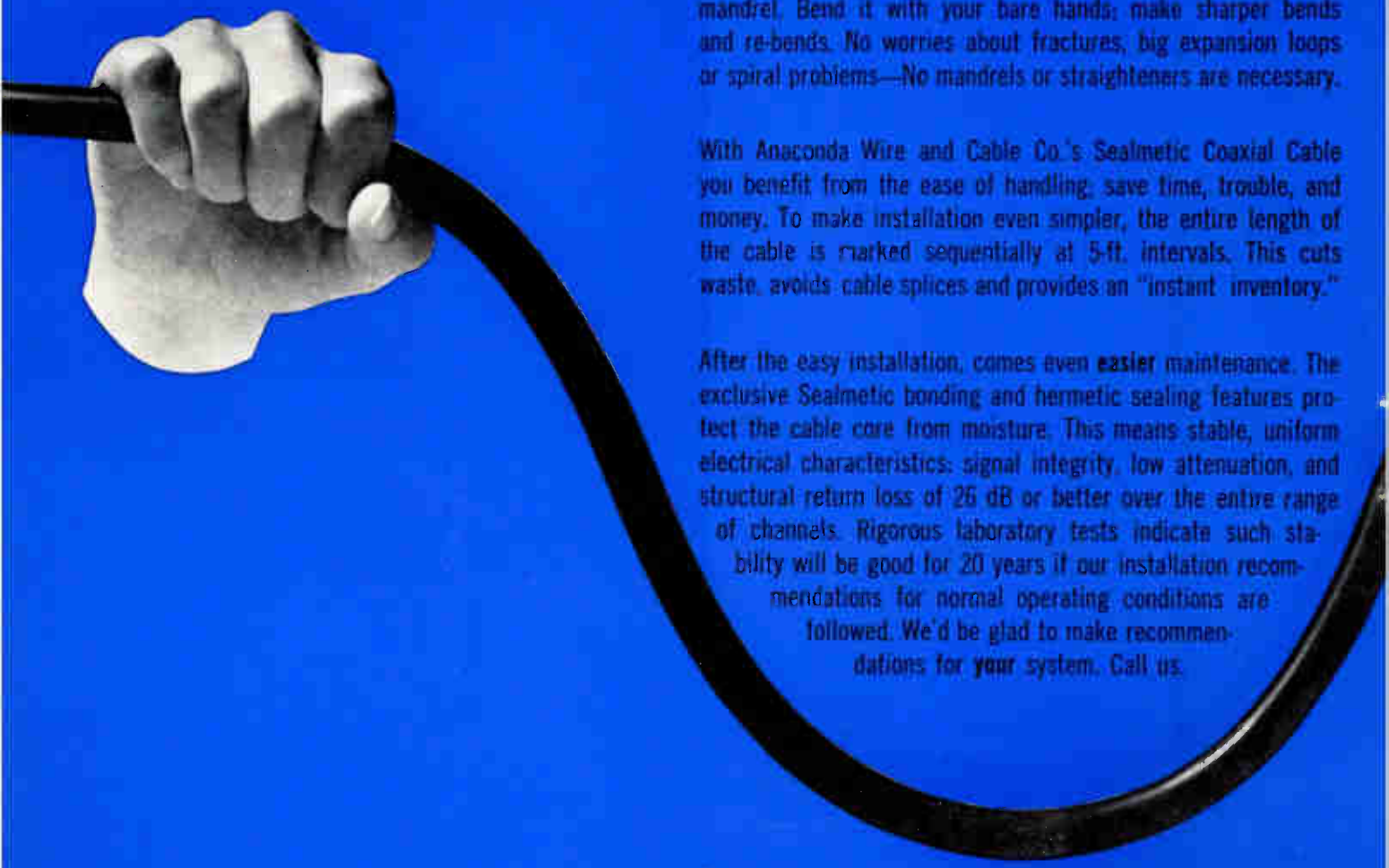
Andrew Corp. got keen interest in its high-power flexible coax type cable HPJ9-50.

For more information on the following products discussed in this report, circle the appropriate Reader Service number. (Refer to April BM/E for Reader Service numbers of similar products previewed that issue.)

Miratel color professional monitor	181
Ampex portable VTR-camera	182
Norelco color remote camera EL8530	183
Toshiba color camera	184
Packard Bell 3-tube color camera	185
RCA slide projector TP-77	186
Visual Electronics flying spot scanner, 16 mm	187
Visual Electronics flying spot scanner, slide	188
Visual/Allen high-band VTR	189
Ampex instant replay recorder	190
Ampex CCTV VTR (7500-C)	191
Sony VTR (EV-200)	192
RCA video switcher TS-50, 51	193
Visual Electronics video switcher, LS-18	194
TeleMation ultra stable sync generator	195
Gates new automation system	196
Schafer Electronics new automation system	197
Sparta tape recorder	198
GE audio-TV console	134
RCA 110-kW uhf transmitter	135
GE 100-kW uhf transmitter	201
Collins solid-state direct fm exciter 310Z-1	202
Gates solid-state aural fm exciter TE-1	203
Visual Electronics solid-state direct fm exciter	204
CBS loudness meter	205
Collins stereo modulation monitor	206
McMartin stereo modulation monitor	207
BIW TV connector	208
Front Projector background inserter	209

BROAD NEW

in flexibility and dependability



CATV Cable — flexible enough to form drip loops without a mandrel. Bend it with your bare hands; make sharper bends and re-bends. No worries about fractures, big expansion loops or spiral problems—No mandrels or straighteners are necessary.

With Anaconda Wire and Cable Co.'s Sealmetic Coaxial Cable you benefit from the ease of handling, save time, trouble, and money. To make installation even simpler, the entire length of the cable is marked sequentially at 5-ft. intervals. This cuts waste, avoids cable splices and provides an "instant inventory."

After the easy installation, comes even **easier** maintenance. The exclusive Sealmetic bonding and hermetic sealing features protect the cable core from moisture. This means stable, uniform electrical characteristics: signal integrity, low attenuation, and structural return loss of 26 dB or better over the entire range of channels. Rigorous laboratory tests indicate such stability will be good for 20 years if our installation recommendations for normal operating conditions are followed. We'd be glad to make recommendations for **your** system. Call us.

PERSPECTIVE

in CATV

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FROM THE
EDITOR

Does the Communication Media Believe in Communications?

Some grevious communication gaps came to the fore during the Industry-Government Panel session held during last month's NAB Engineering Conference. (See brief recap, page 27.)

Among the breakdowns pinpointed by the panelists were these:

- Industry wants FCC rules rewritten—but has not clearly indicated which ones or in what way.
- FCC advises inspectors on how to interpret vague rules through field manuals—but keeps industry in the dark.
- Inspectors do not give forthright answers to chief engineers—"Wait till license renewal time and you'll find out," they say.
- Inspectors are inconsistent—one will issue a citation for such and such an infraction; another will cite you for the remedy.
- The FCC has been unable to communicate to Congress its needs for a larger budget to tackle their problems—industry has not supported the FCC in obtaining increases.

The first task, it would seem, would be to get out in the open problem rules. During the panel discussion, the subject of remote and auxiliary requirements, automation, proof of performance testing and sign on time came up for clarification. Perhaps you can add to this list.

Once the problem areas are brought forth, they must be evaluated and quantified by knowledgeable people. Who should this be? NAB's Engineering Committee? The SBE? Manufacturers' committees? Combinations of the above? Who will donate all of the necessary time?

Should the technical rules be rewritten completely, as suggested by some broadcasters and manufacturers, or should only the most archaic ones be tackled and on some sort of a priority basis? If the FCC encourages a rewrite by industry, again the question, who?

If the FCC needs support before Congress, how can the industry help?

It's always a little more than ironic to find communications breakdowns existing in an industry specializing in communications—and no less so for publishers than broadcasters.

We *(BM/E)*, therefore, are willing to tackle some responsibilities in bridging the gap.

Because of our broad circulation, wider than NAB or SBE membership, for example, we offer to become a collecting agency for concerns facing you. Some items are bound to be controversial and will require discussion. *BM/E* can offer its pages for the discussion and thus become something of a clearinghouse, relieving some of the pressure on the FCC and the NAB Engineering Committee.

So send us your ideas, your concerns—indicate if you prefor to remain anonymous. The broadcast industry can not thrive with obsolete techniques or rules. No one really favors an archaic system, but it isn't clear how to break away. Jack Valenti, president of the Motion Picture Association, recently asked for boldness in overcoming that industry's problems by quoting Ovid:

> "The skies are open,
> Let's try the skies,
> Forgive, Great Jove,
> this daring enterprise."

We'll be watching our mail.

James A. Lippke

A-m/Fm Proof-of-Performance

By Harry A. Etkin

In concise, easy-to-understand terms, here is how to make proof measurements.

EACH BROADCAST LICENSEE must make equipment performance measurements at yearly intervals as required by the FCC. Technical personnel responsible for making such measurements should become familiar with the procedures, standards, and accepted techniques and practices. A-m and fm measurements differ in frequency response, audio frequency, harmonic content, carrier hum, noise and spurious radiations. This article describes detailed and comprehensive standards, procedures and techniques for making a-m proof measurements; fm measurements will be discussed next month.

The paramount reason for making performance measurements is to provide an accurate check of studio audio facilities. By such measurements the performance characteristics of the entire equipment chain, from the microphone input terminals to antenna, can be checked. On this basis it affords a means of locating and applying corrective action to defective equipment. In fact, a regular proof testing schedule is the starting point in a program of preventive maintenance, since it permits a comparison of present performance with performance recorded previously. Each microphone preamplifier, including program amplifiers and turntable preamplifiers, should be tested so that the entire audio chain is maintained at peak performance.

The station engineer usually is authorized to make a complete FCC proof-of-performance test, although some broadcasters employ a consulting engineering firm or use the services of an equipment manufacturing company. The choice depends on management recommendations and cost estimates. Many stations consider it an economical justification to purchase and have available all the test equipment necessary to perform a complete proof. This is desirable because it permits station personnel to investigate problem areas and maintain close observation of equipment performance on a continuing basis. The usual practice when difficulties arise or when less than optimum performance is revealed, is to locate the source of the deficiency and then correct the situation.

Modern broadcast stations should transmit an adequate audio frequency range so that the performance will be equal to or better than FCC limits in all respects. Needless to say, before attempting proof measurements, technical personnel should understand the characteristics and operation of all test instruments. Always be sure to follow the manufacturer's instructions to bring the equipment within the necessary specifications.

Mr. Etkin is a Consulting Engineer based at Levittown, Pa.

Making Proof Measurements

A typical proof-of-performance measuring system is shown in Fig. 1. A block diagram of a typical proof-of-performance setup from microphone input to transmitting antenna is shown in Fig. 2. Input and output circuits include any isolating coils, fixed matching networks and output load resistance, as well as provision for ground or lack of grounds of the input and output terminals of the facility under test.

Frequency Response Measurements

FCC rules require a flat frequency response characteristic (± 2dB) from 100 to 5000 Hz. Measurements should be made at 25, 50, 85 and 100 percent (or the highest attainable) modulation from 30 to 7500 Hz.

Measurements I

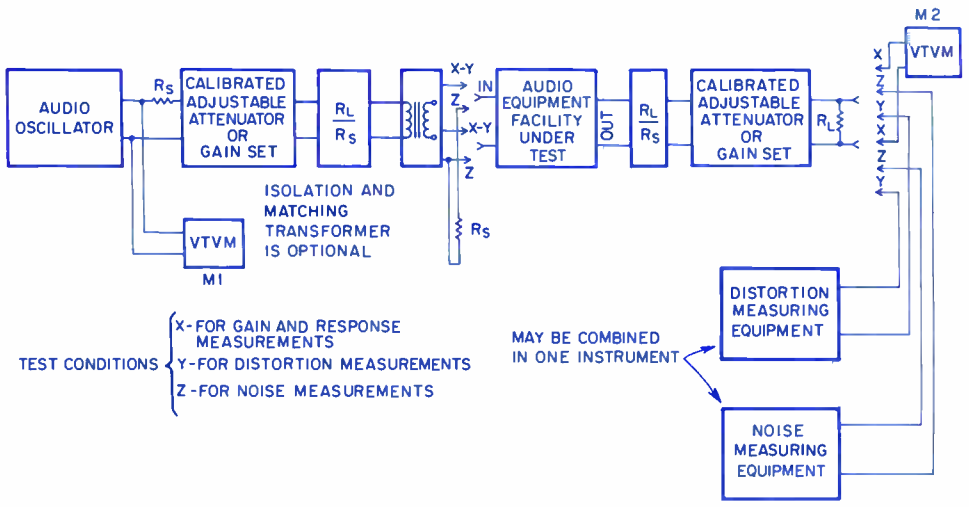


Fig. 1. Typical proof-of-performance test setup. R_S and R_L are external termination resistors equal to the rated source and load impedances.

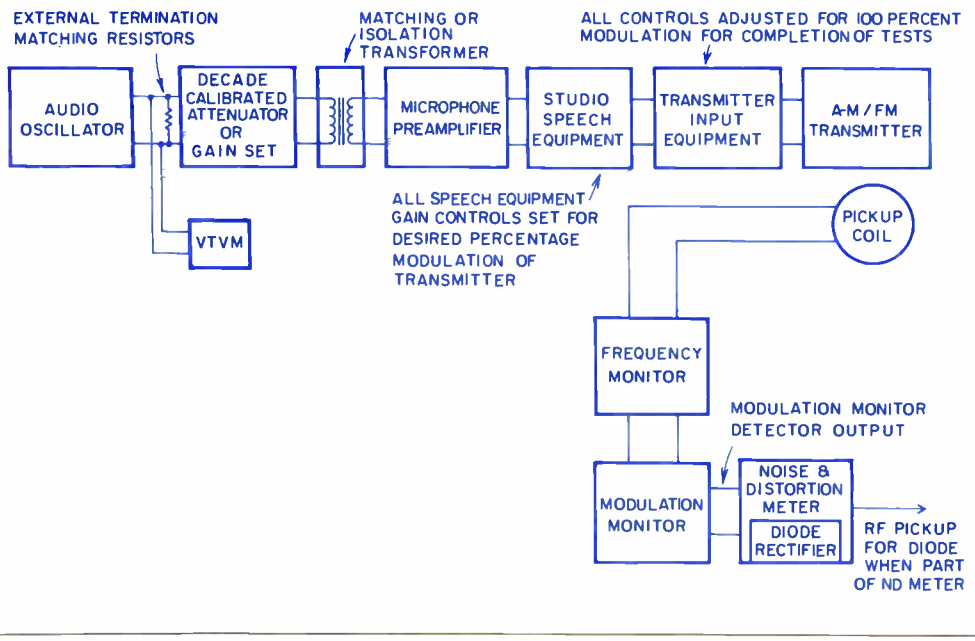


Fig. 2. Block diagram for complete proof-of-performance measurements.

FCC RULES

Paragraph 73.47 states that each standard broadcast station licensee shall make equipment performance measurements at yearly intervals. One such set shall be made during the 4-month period preceding the date on which a license renewal application is filed.

1. Data and curves showing overall audio frequency response from 30 to 7500 Hz for approximately 25, 50, 85 and 100 (if obtainable) percent modulation. A family of curves should be plotted (one for each modulation percentage with dB above and below a reference frequency of 1000 Hz (ordinate) and audio frequency (abscissa).

2. Data and curves showing audio frequency harmonic content for 25, 50, 85 and 100 percent modulation for fundamental frequencies of 50, 100, 400, 1000, 5000 and 7500 Hz (either arithmetical or root sum square values up to the tenth harmonic or 16,000 Hz). Plot family of curves (one for each percentage) with percent distortion as ordinate and audio frequency as abscissa.

3. Data showing percentage carrier shift for 25, 50, 85 and 100 percent modulation with 400-Hz tone.

4. Carrier hum and extraneous noise generated with the equipment and measured as the level below 100 percent modulation throughout the audio spectrum or by bands.

5. Measurements or evidence showing that spurious radiations, including rf harmonics, are suppressed or are not present to a degree capable of causing objectionable interference to other radio services. Field intensity measurements are preferred, but observations made with a communications type receiver may be accepted. However, in cases involving interference or controversy, the Commission may require actual measurements. Measurements shall be made with the equipment adjusted for normal program operation and shall include all circuits between main studio amplifier input and antenna output, including equalizer or correction circuits normally employed, but without compression if such amplifier is employed.

6. The required data and a description of the instruments and procedures used, and signed by the engineer making the measurements, shall be kept on file at the transmitter and retained for a period of two years; on request it shall be made available during that time to any duly authorized FCC representative. Additional information may be found in Paragraphs 73.39 to 73.45 and Paragraphs 73.51 to 73.68.

1. Be sure that any age amplifier is bypassed and that limiter amplifier compression has been disabled.

2. Set the audio oscillator to 1000 Hz.

3. Adjust the oscillator gain control until the VTVM indicates zero dBm. (See Figs. 1 and 2).

4. Set the calibrated attenuator to approximately 50 dB.

5. Adjust the generator gain control to obtain approximately 15 dBm on the VTVM.

6. Connect the audio signal generator to a microphone input circuit.

7. Set the attenuator so that the modulation monitor indicates 25-percent modulation while maintaining a reading of 15 dBm on the VTVM. Keep readjusting the attenuator and gain control until the modulation monitor reads 25-percent and the VTVM reads 15 dBm.

8. Record the attenuator setting on Form No. AFP-1 (Fig. 3). Note that the attenuator response data reading for 25 percent modulation at 1000 Hz is recorded along the entire top row. Copy the same figure in Row 2 under the 1000 Hz heading.

9. Tune the oscillator to 30 Hz.

10. Readjust the attenuator and gain control (if necessary) to again obtain 25-percent modulation. Make sure the VTVM is still reading 15 dBm as in Step 8.

11. Record the new attenuator setting in Row 2 under 30 Hz on Form No. AFP.-1 (Fig. 3).

12. Fill in Row 3 by subtracting the readings in Row 2 from those in Row 1 and enter the difference in Row 3. This entry represents the response variation.

13. The entire procedure, Steps 10 to 13, is repeated for 100, 400, 5000 and 7500 Hz.

14. The entire procedure is also repeated at the higher percentages of modulation 50, 85, and 100 percent; if 100-percent modulation is not attainable, use the highest percentage obtainable.

15. Plot the response readings for each percentage of modulation on the graph sheet in Row 3, Form No. AFP-2 (Fig. 4).

If the response variation between 100 and 5000 Hz is greater than 2 dB, relative to 1000 Hz, the audio system is deficient and in violation of FCC standards. Proper remedial steps should be taken to correct obvious deficiencies in equipment or in measurement procedure.

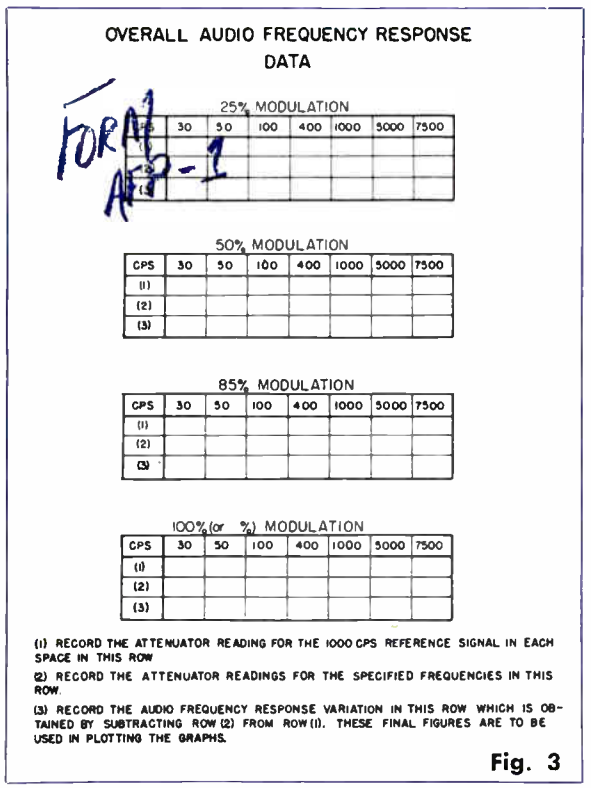
Harmonic Distortion Measurements

The distortion and noise meter must be capable of measuring throughout the harmonic spectrum. Harmonic distortion must not exceed 5 percent up to 84-percent modulation, or 7.5 percent at modulation percentages greater than 84 percent.

1. After program levels are set for normal operation, repeat Steps 1 to 7 under Frequency Response Measurements.

2. Connect the distortion and noise meter to the transmitter output (see Figs. 1 and 2).

Fig. 3. Form for recording frequency response data.
Fig. 4. Graph form for plotting frequency response variation.
Fig. 5. Form for recording harmonic distortion data.
Fig. 6. Form for recording carrier shift, noise and hum readings.
Fig. 7 Form for recording spurious radiation and harmonic data.


OVERALL AUDIO FREQUENCY RESPONSE DATA

25% MODULATION

CPS	30	50	100	400	1000	5000	7500
(1)							
(2)							
(3)							

50% MODULATION

CPS	30	50	100	400	1000	5000	7500
(1)							
(2)							
(3)							

85% MODULATION

CPS	30	50	100	400	1000	5000	7500
(1)							
(2)							
(3)							

100% (or %) MODULATION

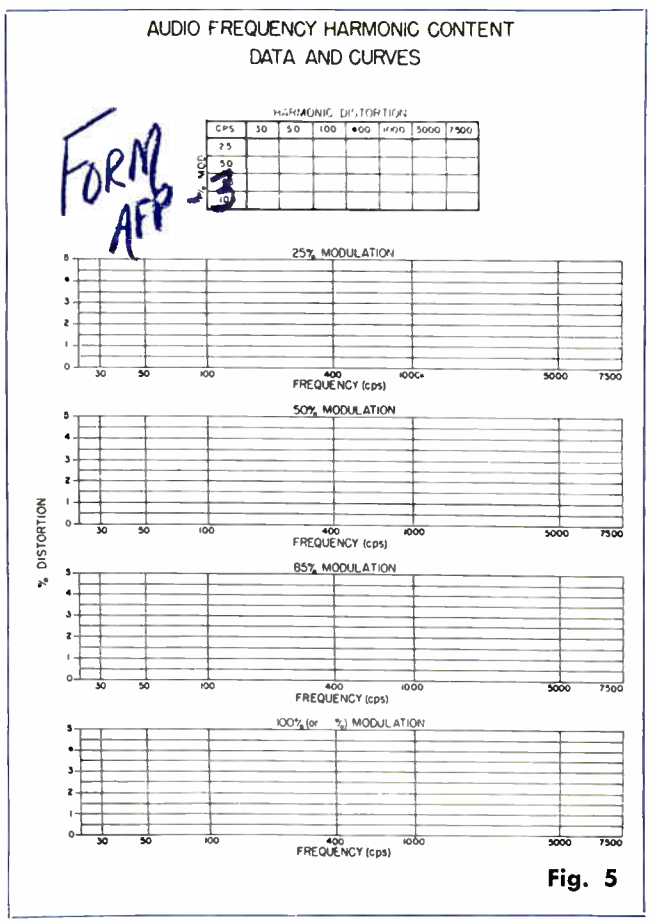
CPS	30	50	100	400	1000	5000	7500
(1)							
(2)							
(3)							

(1) RECORD THE ATTENUATOR READING FOR THE 1000 CPS REFERENCE SIGNAL IN EACH SPACE IN THIS ROW.

(2) RECORD THE ATTENUATOR READINGS FOR THE SPECIFIED FREQUENCIES IN THIS ROW.

(3) RECORD THE AUDIO FREQUENCY RESPONSE VARIATION IN THIS ROW WHICH IS OBTAINED BY SUBTRACTING ROW (2) FROM ROW (1). THESE FINAL FIGURES ARE TO BE USED IN PLOTTING THE GRAPHS.

Fig. 3


AUDIO FREQUENCY HARMONIC CONTENT DATA AND CURVES

HARMONIC DISTORTION

CPS	30	50	100	400	1000	5000	7500
25							
50							
85							
100							

% MODULATION

25% MODULATION

50% MODULATION

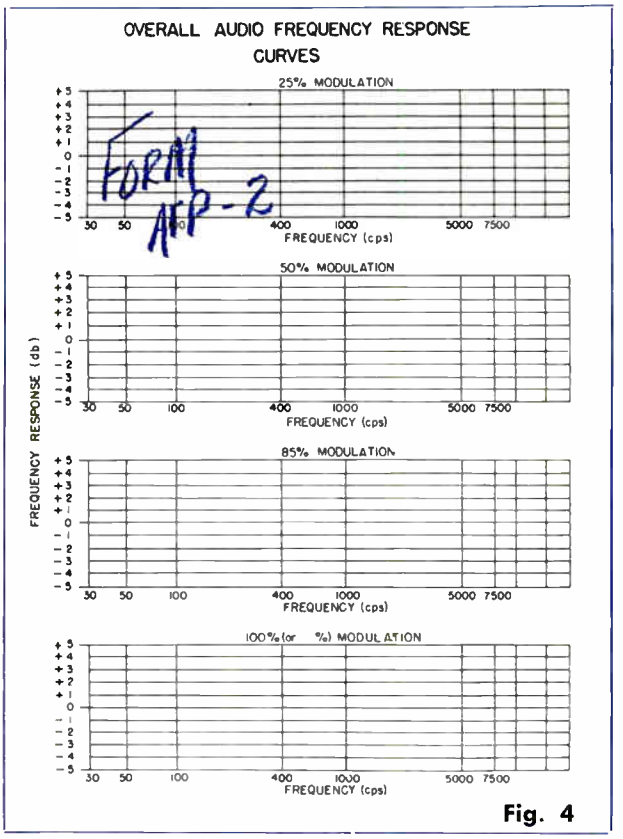
85% MODULATION

100% (or %) MODULATION

% DISTORTION

FREQUENCY (cps)

Fig. 5


OVERALL AUDIO FREQUENCY RESPONSE CURVES

25% MODULATION

50% MODULATION

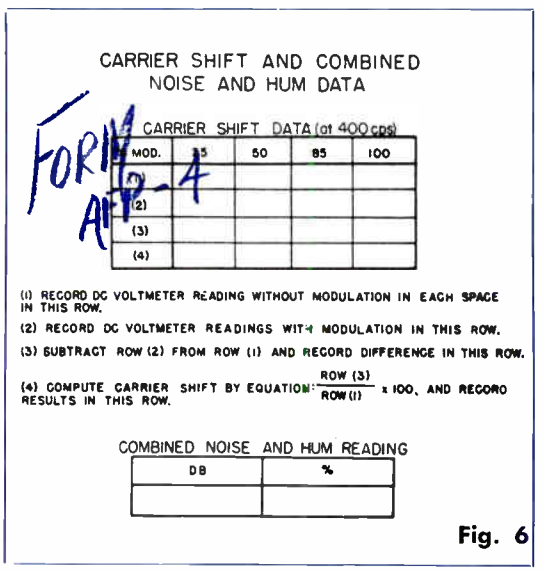
85% MODULATION

100% (or %) MODULATION

FREQUENCY RESPONSE (db)

FREQUENCY (cps)

Fig. 4


CARRIER SHIFT AND COMBINED NOISE AND HUM DATA

CARRIER SHIFT DATA (at 400 cps)

% MOD.	25	50	85	100
(1)				
(2)				
(3)				
(4)				

(1) RECORD DC VOLTMETER READING WITHOUT MODULATION IN EACH SPACE IN THIS ROW.

(2) RECORD DC VOLTMETER READINGS WITH MODULATION IN THIS ROW.

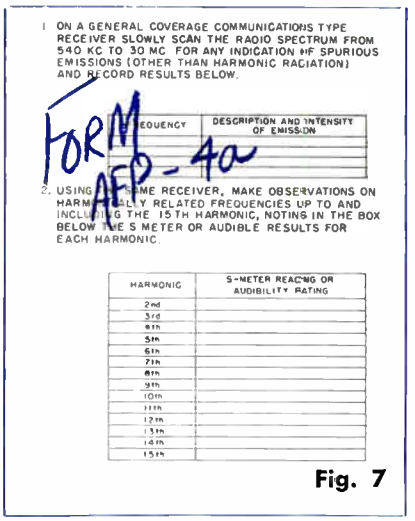
(3) SUBTRACT ROW (2) FROM ROW (1) AND RECORD DIFFERENCE IN THIS ROW.

(4) COMPUTE CARRIER SHIFT BY EQUATION: $\frac{\text{ROW (3)}}{\text{ROW (1)}} \times 100$, AND RECORD RESULTS IN THIS ROW.

COMBINED NOISE AND HUM READING

DB	%

Fig. 6


1. ON A GENERAL COVERAGE COMMUNICATIONS TYPE RECEIVER SLOWLY SCAN THE RADIO SPECTRUM FROM 540 KC TO 30 MC FOR ANY INDICATION OF SPURIOUS EMISSIONS (OTHER THAN HARMONIC RADIATION) AND RECORD RESULTS BELOW.

FREQUENCY	DESCRIPTION AND INTENSITY OF EMISSION

2. USING THE SAME RECEIVER, MAKE OBSERVATIONS ON HARMONICALLY RELATED FREQUENCIES UP TO AND INCLUDING THE 15TH HARMONIC, NOTING IN THE BOX BELOW THE S METER OR AUDIBLE RESULTS FOR EACH HARMONIC.

HARMONIC	S-METER READING OR AUDIBILITY RATING
2nd	
3rd	
4th	
5th	
6th	
7th	
8th	
9th	
10th	
11th	
12th	
13th	
14th	
15th	

Fig. 7

Be sure the meter is in the distortion position. If the meter doesn't have a built-in rf rectifier unit, a separate detector must be used. Usually, the modulation monitor contains an rf rectifier unit which can be used for this measurement.

3. Read the noise-and-distortion meter instruction manual thoroughly to determine the method of measuring harmonic content. Then adjust controls to obtain the harmonic content for the 1000-Hz reference frequency and record in the space on Form No. AFP-3 (Fig. 5).

4. Repeat Steps 7 through 10 under Frequency Response Tests and Step 3 of this section for 30, 50, 100, 400, 5000 and 7500 Hz.

5. Continue to perform Steps 4 through 10 under Frequency Response Tests and Steps 3 and 4 for 50, 85 and 100-percent modulation levels.

6. Record data and plot curves on the graph on Form No. AFP-3 (Fig. 5).

Excessive harmonic distortion greater than 5 percent up to 84-percent modulation or exceeding 7.5 percent for modulation levels from 85 to 95 percent is in violation of FCC standards. Corrective action must be taken and the measurements repeated.

Standards for Proof-Of-Performance Measurements

Overall proof-of-performance measurements cover the entire audio facility from the microphone preamplifier input terminals to the transmitter input terminals, excluding stl equipment which may be either wire line or radio. Pre-emphasis is not included in the audio system.

Input signal: 2.45 mV, rms, in series with 150 ohms.

Output signal: For facilities feeding telephone lines the level is + 18 dBm; for a direct transmitter feed the standard output level is + 12 dBm.

Frequency response: Audio frequency response characteristics are expressed in dB relative to 1000 Hz within the specified frequency range; frequency response is measured between two limits: The upper limits must be uniform from 50 to 15,000 Hz and the lower limit must be uniform from 100 to 7500 Hz within 2 dB at the upper limit.

Harmonic distortion: Harmonic distortion is the rms value of the harmonic signal content within 50 to 30,000 Hz and, at fundamental frequencies, it shall not exceed 1.75 percent rms from 50 to 100 Hz, 1.0 percent rms from 100 to 7500 Hz, and 1.5 percent rms from 7500 to 15,000 Hz. The limits for fundamental frequencies from 7500 to 15,000 Hz can be based on subjective listening.

Signal-to-noise ratio: The ratio, expressed in dB, between the sine-wave signal power required for standard output and the noise power measured with zero applied signal is known as the signal-to-noise ratio. Measurements must be made at the rated load impedance of the equipment under test. The noise level shall be down at least 65 dB at frequencies between 50 to 15,000 Hz. Measurements are to be made at standard input and output signal levels.

Carrier Shift Measurements

Carrier shift is a change in the average value of the modulated rf carrier compared to the average value of the unmodulated carrier. A carrier shift upward is called a positive carrier shift and a shift downward is called a negative carrier shift. Excessive carrier shift results in unwanted harmonics and additional sideband frequencies with resultant interference on adjacent frequencies. The maximum carrier shift at any of the specific modulation percentages must be less than 5 percent in either the positive or negative direction.

1. Set up all the equipment for normal program operation.

2. Bypass the age or limiting amplifier.

3. Connect the audio signal generator or oscillator as illustrated in Figs. 1 and 2.

4. Set the oscillator frequency to 400 Hz.

5. Adjust the oscillator gain control for minimum output.

6. Set the attenuator to 40 or 50 dB.

7. Connect to the input of a microphone preamplifier.

8. Connect a high-impedance dc voltmeter to either the output of the detector or the detector in the noise and distortion meter and adjust the control until maximum dc voltage is obtained.

9. Read and record the dc voltmeter reading (without modulation) in Row 1 or Form No. AFP-4 (Fig. 6).

10. Increase the gain of the audio generator and adjust the attenuator until the modulation monitor reads 25-percent modulation.

11. Record the dc voltage in Row 2 on Form No. AFP-4 (Fig. 6).

12. With the 25-percent modulation, the dc voltmeter reading will drop. This is recorded under the first reading in Row 2.

13. The difference between the two readings is recorded in Row 3.

14. The ratio of the number in Row 3 to the corresponding number in Row 1 multiplied by 100 is recorded in Row 4.

15. Repeat steps 10 through 14 at 50-percent, 85-percent and 100-percent modulation.

If the carrier shift exceeds 5 percent at any level of modulation, it is in violation of the FCC standards. Action should be taken to correct the deficiencies and the measurements repeated.

Carrier Hum and Extraneous Noise Measurements

Hum and noise must be at least 45 dB below the 100-percent modulation signal level between 150 and 5000 Hz, and down 40 dB outside this range.

1. Adjust and set up all the equipment as indicated in Steps 1, 2 and 3 under Carrier Shift Tests.

2. Adjust the audio oscillator to a reference frequency of 1000 Hz.

3. Adjust the gain control to 15 dB.

4. Set the attenuator to approximately 40 dB.

5. Connect to a microphone preamplifier input and adjust the attenuator until the modulation monitor indicates 100-percent modulation.

6. Connect the noise and distortion meter to the transmitter output and adjust the sensitivity controls to obtain a full-scale reading with the output meter set for maximum reading.

7. After the reference level has been set, remove or disconnect the audio oscillator and terminate the preamplifier input with a resistor equal to its input impedance.

8. Leave all the gain settings as originally set; be sure no other faders are open.

9. Place the noise and distortion meter in the NOISE position.

10. Increase the sensitivity until a reading of the noise level on the unmodulated carrier is obtained. Read the record in Form No. AFP-4 (Fig. 6).

11. The combined hum and noise reading is calculated by dividing the reading in Step 11 by the reading obtained in Step 6, and then multiplying by 100.

12. Convert the hum and noise ratio to dB values and record on Form No. AFP-4 (Fig. 6). See Table 2 for conversion data.

If the hum and noise level is less than 45 dB below 100-percent modulation between 150 and 5000 Hz, or less than 40 dB outside this range, it is in violation of the FCC standards. Corrective action should be taken and the measurements should be repeated.

Spurious Radiation and Harmonic Tests

This form of interference must be kept to a minimum and should be suppressed. It must never be of sufficient amplitude to cause undue interference to other radio services. Form No. AFP-4A (Fig. 7), which is self-explanatory, should be used to record the resultant data. All equipment should be adjusted for normal program operation. In cases involving controversy, the Commission may want actual field intensity measurements.

Conclusion

Past experience has shown that a few precautions taken during equipment setup will increase the accuracy of proof measurements. If the setup procedure is followed carelessly, inaccuracies are inevitable. In fact, carelessness at any pont in the measurements may cause normally operating equipment to appear defective.

Proof-of-performance measurements are to be made with the equipment adjusted for normal program operation. All circuits between the main studio microphone input terminals and the antenna output, including telephone lines, preemphasis networks, equalizers and limiter (without compression), must be measured simultaneously. Duplicate measurements are not required where the station operates with a DA-2 or DA-N pattern.

Before attempting to make the measurements, determine the input and output impedances of the audio system. There should be no question as to whether load impedances are balanced or unbalanced. Do not operate into impedance mismatches. To prevent stray fields, currents and ground loops, use short power cords and reverse the plug for the best residual reading. Use short and shielded instrument leads, and bypass, if necessary, with capacitors or rf chokes. Bond all instruments to the station ground bus; leads should be kept as short as possible. Overloaded input circuits will cause excessive distortion, misleading noise measurements, and usually poor frequency response. ●

Test Equipment

Audio Oscillator: Output frequency should range from 10 to 15,000 Hz, and possibly up to 100,000 Hz, at 600- and 5000-ohm impedance outputs. Waveform distortion should be less than 0.2 percent and frequency calibration should not exceed 2 percent. Cost range: $170 to $375.

Level Indicator: May be a VOM, VTVM, or a counter-type device. Cost range: $57 to $330.

Attenuator or Pad: Must have an attenuation range from at least 50 to 80 dB. A gain-and-measuring set, consisting of vu meter and associated attenuation circuits with the proper input and output impedances may be used. Cost range: $75 to $215. Gain sets usually cost more.

Isolation and Matching Transformer: Used to match impedances and isolate test equipment from systems under test. Cost ranges from a few dollars to at least $80.

Distortion and Noise Meter: Must be capable of distortion measurements from 0.3 to 30 percent and distortion levels as low as 0.1 percent. Noise measurement range should read 80 dB below reference calibration or O dBm level should have a frequency range of 20 to 200,000 Hz and 600- and 100,000-ohm inputs. Cost range: $215 to $575.

Diode and Pickup Coil: Usually consists of rf pickup coil, a length of coaxial cable and germanium crystal and rf filtering circuits. Cost: $60.

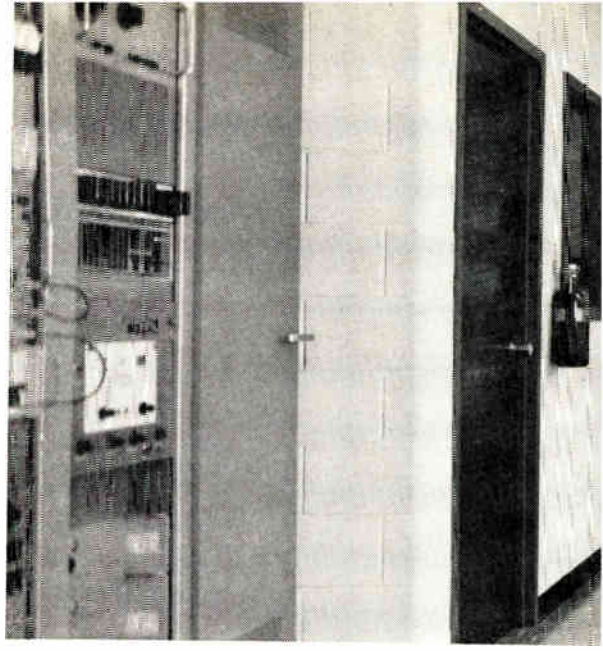
Field Intensity Meter: Used to measure rf field strength. Cost is at least $950.

Communication Receiver: Frequency range should include at least the 15th harmonic of the carrier frequency. Cost ranges from $100 up.

Oscilloscope: Used to analyze audio system output waveform displays. Cost range: $450 to $3000.

Many manufacturers offer a complete package containing all necessary equipment for proof tests. Satisfactory instruments may be obtained from used equipment dealers, but equipment quality should never be sacrificed for economy if suitable and meaningful measurements are to be made.

Profile of a Top-Rated 'U'



By Earl W. Hickerson

In competition with two established 'V's, channel 23 has moved into a first-place tie in the Rockford-Freeport market in less than two years.

WCEE-TV ROCKFORD-FREEPORT, ILL. began regularly scheduled programming September 12, 1965, as a primary CBS affiliate. Planned for efficiency and designed for compactness, WCEE-TV serves Northern Illinois and Southern Wisconsin with an effective radiated power of 674 kW on channel 23.

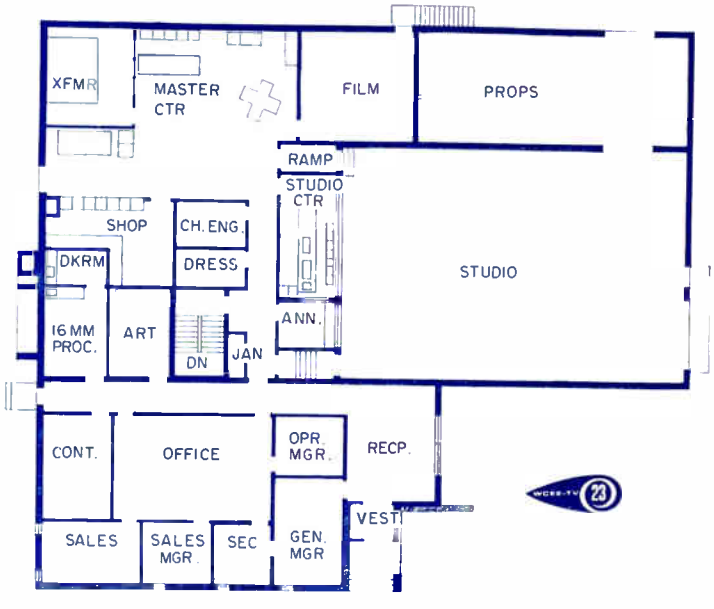
The station is owned by the Rock River Television Corp., which is composed of a number of area businessmen, investors and advertisers. The corporation was organized to bring full network TV service to the nation's 94th market, the second largest city in the State of Illinois, and to provide a means of community service through a powerful and effective medium. In addition, such a facility appeared to be a potenially sound investment for its owners.

Mr. Hickerson is vice president and general manager, WCEE-TV Rockford-Freeport, Ill.

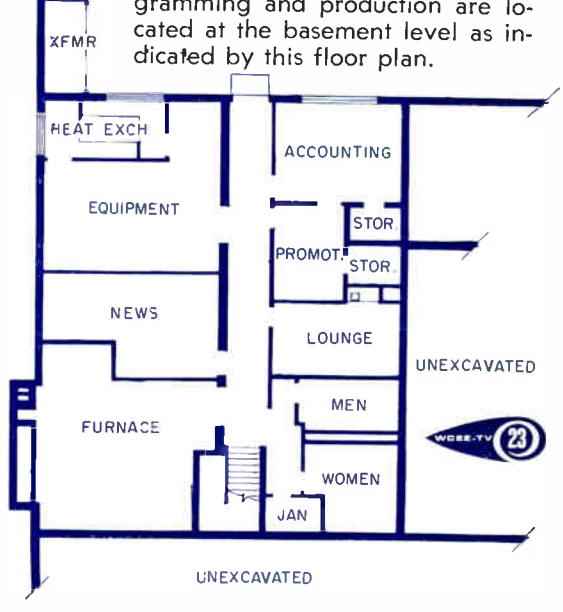
Integrating Planning

The plan was to build a station as modern as possible by taking advantage of the experience of the past 15 yr. As is the case with almost any new TV station, the major problem for WCEE-TV was to develop programming which would woo viewers and advertisers away from the two 13-yr-old stations in the market. Therefore, rather than simply ease into competition with

Evident in this 1st-floor plan is the care exercised in locating interdependent departments and sections.



With the exception of the news department, other individuals not involved with day-to-day programming and production are located at the basement level as indicated by this floor plan.



VTRs and film island are located in close proximity to the master control console. In view of master control and the entire areas is the transmitter, located to the left. The additional space in this area may be used for another film island, VTRs, and color camera power supplies.

these stations, a more positive approach was taken. Instead of a "me too" attitude, our plan to attract both audience and advertisers was to utilize promotional, operational, sales, production, and engineering facilities blended with experience, creativity, know-how and service.

In laying out the building plans, our goal was to achieve a functional operating unit. A single structure, covering 13,000 ft.², houses offices, studio and transmitter. At the basement level is located the accounting, news, public affairs, promotion department, lounge and part of the transmitter heat-exchanger. Sales, program and production planning offices are located as one unit in the entry area so that the creative people (continuity, photo, artist) are as close as possible to each other, thereby enabling closer coordination in commercial and continuity development.

The production manager is located in the same office with the continuity writers, permitting him to work closely on what is written, how it can be produced, and the planning of live and videotape sessions.

"Quality Control" Production

All broadcasters know that planning is important, but in reality, the facility itself, and the desire and ability of the engineering and production departments, determines the on-air look of the station. Therefore, this key area has been tabbed "Quality Control." In the master control area, provisions were made to locate the video switcher, videotape and cartridge-tape machines, and film and slide projectors in one room, adjacent to the transmitter, so that only one engineer and one film man would be needed to operate efficiently from sign-on to sign-off seven days a week.

Announcers are freed from booth shifts, all chain-breaks are prerecorded on cartridge tape and are inserted at proper on-air times by an electronic trip. As a result, slide changes are cleaner and human mistakes in calling for manual changes each time are eliminated.

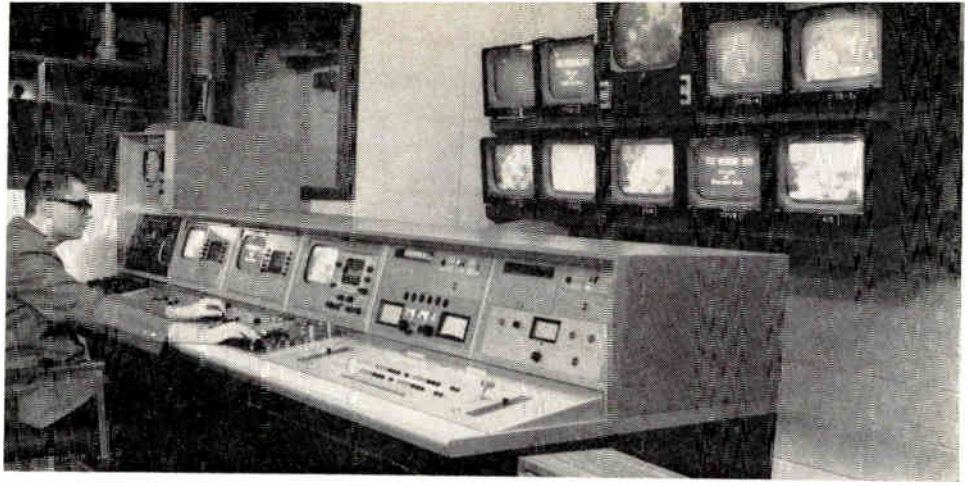
Originally, the RCA TR-4 recorder-playback and TR-3 playback only videotape machines were installed so that two playback machines would be available for cross-rolling. Then, too, we would be able to meet on-air playbacks even if one machine became inoperative. This arrangement offered the flexibility we needed at a smaller initial investment. Eventually, though, the increased demand for local commercial production put such strain on one videotape machine, that the record components for the TR-3 and the color playback modules for the TR-4 were ordered 6 months after we were in operation.

With the magnetic stops and instant-start features installed on the TP-66 film projectors, the film men simply load the projectors; they do not have to start, stop and change projectors as in the past. In his free time, a film man has only to check the equipment; the remainder of his time is devoted to editing, shipping, and other duties.

The RCA TS-40 switcher was split to allow us to use part of it in the master control room. Operating engineers find that the one-step preset and touchbar helps them perform the changes and switches cleaner and more correctly. Remote start, stop and change buttons were installed in both master control and studio control for greater operational flexibility.

Only four feet from the film island is the door to the film editing office where commercial and public service slide and 16mm film is ordered, received, edited, stored and shipped. This department prepares and loads film and slides for use, but the projectors are rolled and the slides are changed by the master control engineer or the studio control director.

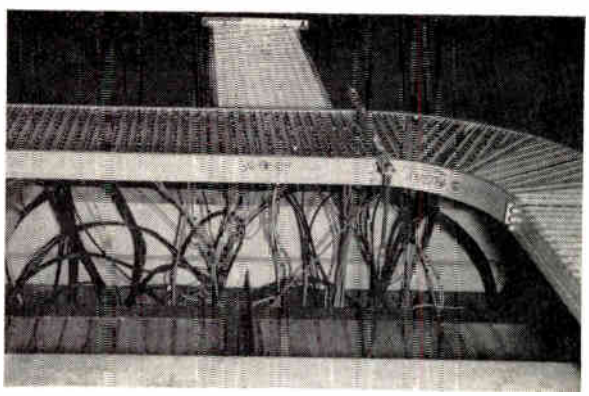
When studio facilities are required, produc-



Closeup view of the master control console. Transmitter meters are visible to the engineer on duty.

Color VTR (above) and film island with split multiplexed output (right) provide flexibility for airing WCEE's in-the-can programs.

Equipment racks (below) form part of the work-show wall.



Inter connecting cable is carried in trays suspended from the first floor, as shown in this basement view, instead of more conventional floor trenches.

tion personnel handle the audio board and switcher in the separate control room overlooking the 40- × 60-ft studio. Adjacent to studio control room is the announce booth. A videotape engineer is on duty during recording sessions for more efficient production and to prevent disruption of master control operations. The cameramen and floor crew also work as production personnel. As a unit they can rehearse or produce live or videotape programs and announcements without disturbing vital day-to-day operations. Camera video controls are mounted in the master control board and the operator on duty checks video; but the newer, more stable equipment does not require constant attention for good results. In order to continue videotape production while a film presentation is on the air or a station break is being made, the TP-15 multiplexer allows us to split the film operation, thereby providing two output sources from one film island.

For more flexible and effective commercial production, local sponsors have access to rear screen projection, Teleprompter equipment, controlled lighting with a modern dimmer panel, a 60-ft cyclorama, drapes, flats, etc. Automobiles may be driven right into the studio.

Initially, the staff consisted of 20 people who operated approximately 42 hr a week, due to the limited availability of network programming for the first 13 weeks. From then on, both the staff and programming continued to increase. We now have just under 50 people and broadcast nearly 120 hr a week, including the full CBS network program schedule.

Planning For Color

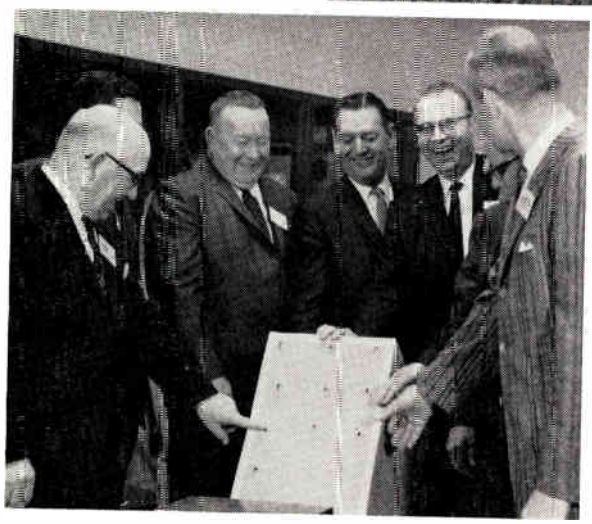
Even during the initial planning stage, color was considered. At air date, we were able to telecast network color programming and local film and slide in color. WCEE-TV took the lead in the use of color in local slide and film production since the competition did not match our capability until 3 to 6 months later. Studio color facilities were discussed in January 1965, when the original equipment order was placed, but it was decided that since the color explosion had not occurred in our area at that point, we would not start with live color cameras or color videotape facilities. The original plan did call for the lighting, drapes, monitors, and other technical equipment necessary for live color, so that all we had to do was add the color cameras.

The key step came on October 23, 1966, when we started televising in local color and recording and playing back color videotapes. By going to local color at this time, we became the first station in this area, outside of Milwaukee and Chicago, to have full color facilities.

The inaugural color program involved mayors and Chamber of Commerce representatives from 10 of the major cities in the channel-23 coverage area, plus several national dignitaries. For this inaugural program, we started a newscast in black and white. Then the newscaster stated that a

In the 40- × 60-ft studio there is sufficient room for a number of sets which may be used for back-to-back programs.

Promotional theme is carried to outdoor advertising, as shown by this billboard.



From black and white to color! Visiting dignitaries push the buttons which switched WCEE-TV to live color.

Saturday afternoon **Panorama** hosts many nonprofit organizations, such as Welcome Wagon.

number of dignitaries were in our control room poised to push the button jointly for the transition from black-and-white to color cameras. The scene switched to the control room where the dignitaries, on a 5-4-3-2-1 countdown, each pushed a button. As they did, viewers with color sets saw their screen suddenly burst forth with color. Also taking part and presenting filmed congratulatory messages were Senator Dirksen, and then Senator Douglas of Illinois and Wisconsin's Governor Knowles. There is between 15 and 20-percent color set penetration in this area. The large color set total has helped us gain additional viewers and, as a sales tool, has helped gross revenue by both time, sales and videotape production charges.

Sales and Promotion

Our sales and production departments work very closely in order to prepare creative production and sales messages for local advertisers. Our salesmen work closely with the staff of four continuity writers in creating new and stronger video and audio sales approaches.

Our photo department has gained wide experience in the use of color, and the experience has proved to be quite valuable in the development of many commercials and programs. We recently filmed, on location, a half-hour color style show in which all departments were involved.

For a late evening movie sponsor, we not only have worked very closely in commercial production and presentation but also used a model from Chicago as host. The young lady comes to Rockford every few weeks to videotape openings and closings and commercial lead-ins. The development of the Willett Girl for Willett Ford has added extra impact to his advertising investment.

Our promotional campaigns are generally built around a single theme which is also pursued in *TV Guide,* local and area newspapers, billboard, and bus advertising, plus, of course, our own on-air promotion. The theme is the same throughout the campaign, but as the campaign is developed, regular features and programs are exploited. For instance, even though the National Football League games were our basic campaign for the fall, other sports features and outstanding regular programs were woven into the promotional campaign. We feel that a special feature campaign draws attention to the station and then other programs are accepted because of association in the promotion.

Community Involvement

Our community interest is reflected not only in a fully equipped news department but also by the fact that we have a full-time public affairs director who works with the Chambers of Commerce, city governments and other groups in

our coverage area in an attempt to find out what the audience wants. It is his duty to develop these suggestions into television features.

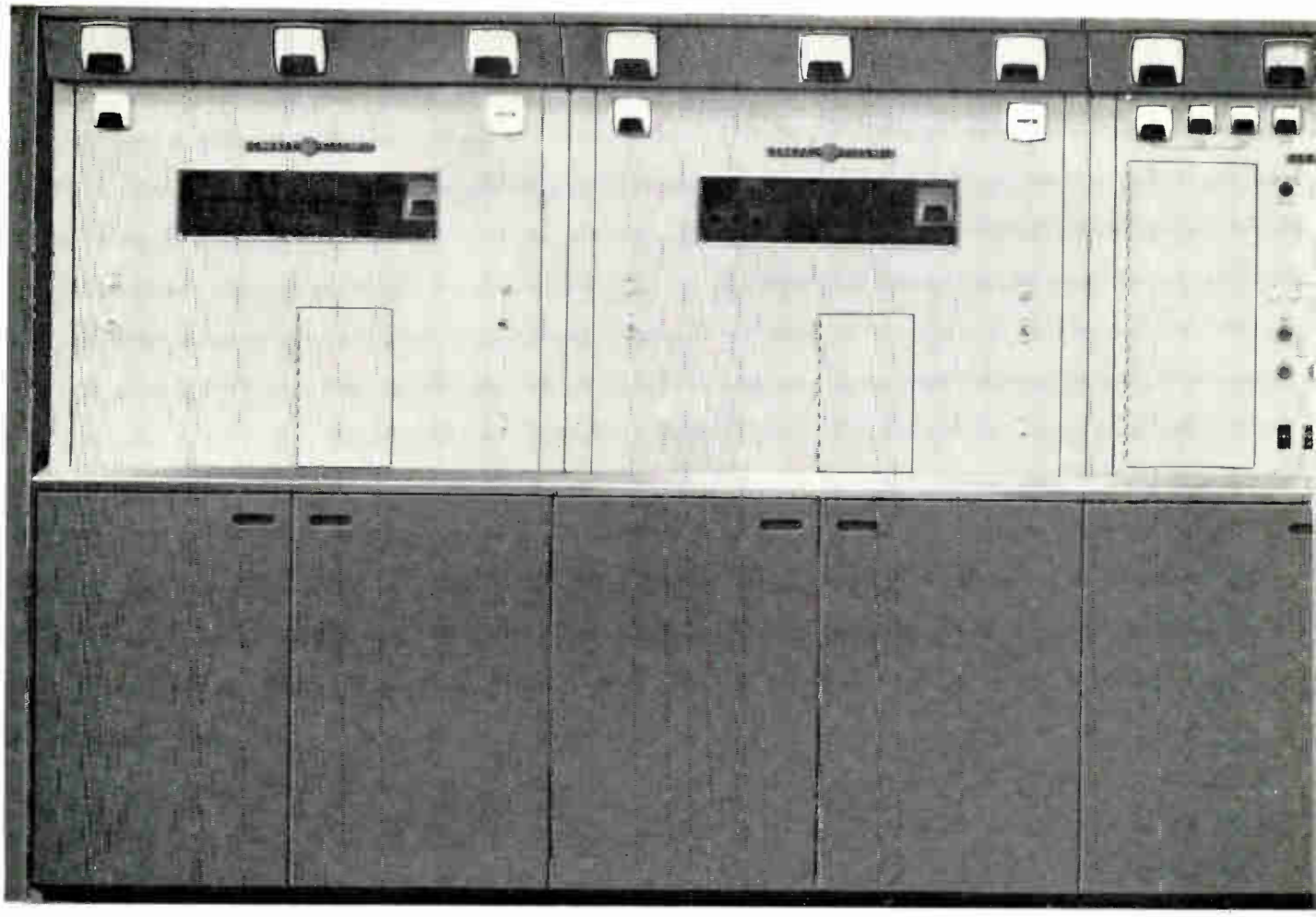
To encourage use of our facility by area groups, clubs and organizations, WCEE-TV and the Junior League of Rockford jointly sponsored a public service seminar in October 1966. Over 175 representatives came to the studio for a morning of instructions and suggestions from the TV-23 staff on how to get more mileage from their projects on both radio and television. At noon, over 200 attended the seminar luncheon to hear FCC Commissioner Robert E. Lee speak on "Current Trends in Telecommunications." All guests were invited to submit suggestions and comments about our station to help us formulate future plans.

In order to intensify our community involvement, we broadcast on *Community Calendar*, which is composed of 60-second public service announcements. Representatives of nonprofit organizations are urged to send in notes concerning meetings, discussions, public functions, etc. These announcements are telecast many times during the week and are scheduled at definite time periods during the day to give the greatest amount of overall exposure. Each Saturday afternoon WCEE-TV presents a half-hour program, called *Panorama* on which guests are invited to appear and discuss details of public service projects such as United Fund drives, style shows, art exhibits, etc.

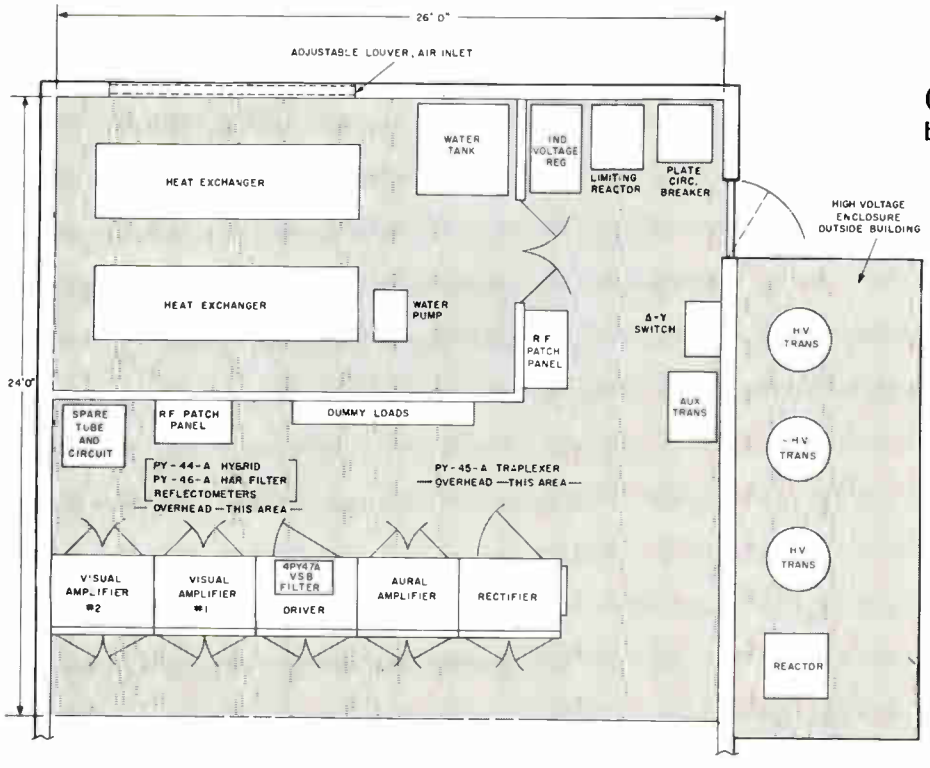
We flew news photographers to the inauguration of the Governor of Wisconsin and the opening sessions of the Illinois Legislature in order that state representatives and state senators could be seen in action by their constituents. WCEE-TV has just recently finished a special half-hour documentary studying an area of our city which has been an urban renewal prospect, and a program which needs city-wide attention.

To give viewers an opportunity to visit our facility and to focus attention on the CBS daytime program schedule which we were launching, an Open House was held in January 1966 for invited guests and the public. A private cocktail party for 300 was held on a Thursday. Two days later, almost 7500 went through the station in a 6-hr period. The amazing thing was that the temperature was 10 below zero all day long, but in spite of the cold visitors stood outside for as long as 30 min waiting to get inside for the tour. We had closed-circuit cameras arranged so each person could see himself on a monitor, balloons for the children, promotional material, and a few inexpensive gimmicks for the adults.

Sales have been increasing rapidly. The audiences growth has been steady. In 13 months, rating services showed that our sign-on to sign-off metro share of the audience went from 10 to 15, 23, 25, and then to 33 percent of the audience. Not bad for a new station, we feel, particularly when its a 'U' in competition with two 'V's. It proves one thing, though—it can be done! ●



Now. A 100 KW UHF-TV Transmitter.

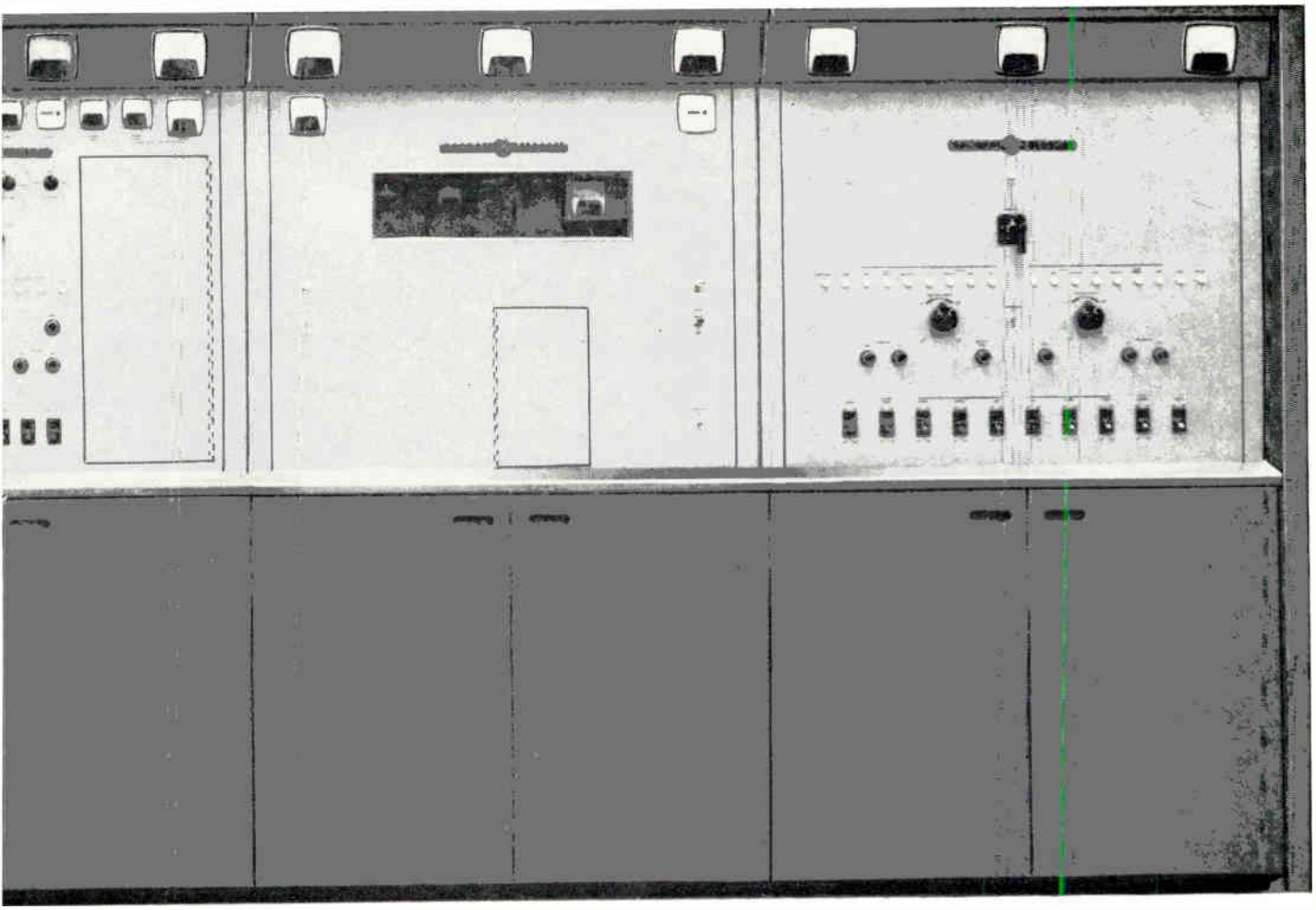


Minimum suggested station floor plan layout, GE Type TT-62-A, 100 KW UHF transmitter.

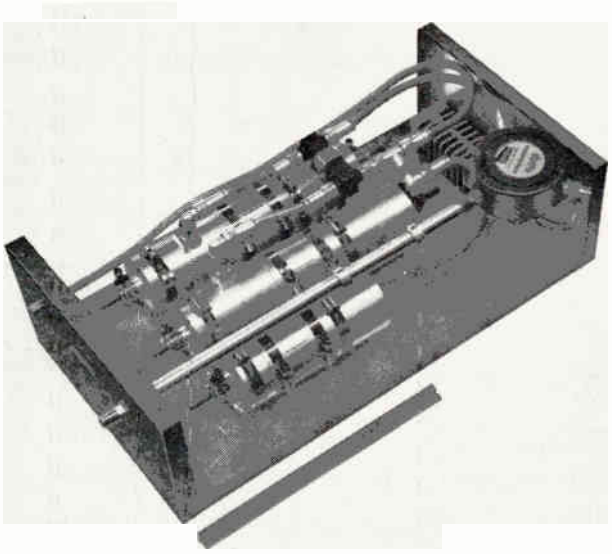
(Inquire how 5 megawatt ERP can be provided with this transmitter.)

These GE transmitters will meet the most sophisticated requirements for UHF television service.

15 KW, Type TT-56-A
30 KW, Type TT-57-A
50 KW, Type TT-59-A
60 KW, Type TT-61-A
100 KW, Type TT-62-A



Honest.



PY-47 Vestigial Sideband Filter inserted between the driver and the visual amplifiers assures maximum filter stability.

Now you can get a 100 KW transmitter that is a 100 KW transmitter. From the ground up. The GE TT-62-A.

It took all the engineering know-how we keep talking about to package it into five standard cubicles. With a modern 100 watt exciter. And four-cavity klystron tube amplifiers. The 50 KW klystron tubes used in the visual amplifiers have been in broadcast service since 1965. Check the minimum floor space requirement—it's another GE first. Now you can get full 100 KW output on any channel from 14 through 83. Day in and day out. With easier tuning, fewer tubes, more efficiency and easier maintenance. And it will cost you less to install and operate.

If you'd like to know more about it, just ask your GE representative. He has all the answers. Honest.

General Electric Company, Visual Communication Products Department, Electronics Park, Syracuse, New York 13201. GE-44

GENERAL ELECTRIC

Circle 27 on Reader Service Card

Log-Keeping Made Painless

In addition to complying with the new FCC logging rules, you can make program, operation, and maintenance log-keeping pay off. Here are some suggestions.

By Joseph D. Coons

SINCE THE BEGINNING of radio, program and operating logs have been a requirement—and a headache—for the broadcaster. Yet, when properly understood and organized, logs can be a valuable asset to a station's operation.

A well-organized program log can be a schedule as well as a log; it can also be an integral part of the billing procedure. It is also the most effective block to embezzlement of station revenues. Likewise, any chief engineer worth his salt long ago learned the value of the operating log as a source of preventive maintenance information, as he gleaned from changing transmitter parameters some indications of impending failures. A new requirement—the maintenance log—serves as a check on the work of the maintenance staff, and the review of such a log by management is a quick indication of the care equipment has been receiving.

Program Logs

Applicable FCC rules (see box) are quite straightforward in what they say, but they omit almost more than they include. Over the years, broadcasters have learned how to design a log form that meets the requirements of the law while at the same time providing the additional information needed to meet individual situations. Basic decisions need to be reached when considering the program log form, however:

1. Will the log be kept by the same man who *originates* programming, or
2. Will the man who keeps the logs be principally a *listener?*

Because of the high cost of personnel, especially those paid wages just to listen, most stations today choose category 1 rather than 2, or more recently, elect to use automatic logging.

If the man who keeps the log is also the program originator, several new premises become important: He must know the schedule, and he must enter required information on the log. It is because of these premises that most logs today include the scheduled times and sequence of events, and utilize as much pretyped information as possible to make the logs easier to complete. The prevalent use of copying machines and other labor-saving systems eliminates the need for a description of them here. (See *BM/E* April 1965, "Office Systems for the Broadcaster.")

A good program log and schedule would contain all of the following information, ruled into appropriate columns:

1. *Scheduled Time* shows the time at which a logged event is *supposed* to occur. It is filled-in in advance by the traffic clerk. Usually only fixed times are shown.
2. *Rendition Time* shows the exact beginning time of each program event, and as the event takes place is filled-in by the operator.
3. *Program Title* column is filled-in by the traffic department with show title or identification.
4. *Sponsor* column contains the name of each advertiser, pretyped. on the log sheet.
5. *Type* shows program type definition as related to the FCC program categories and is pretyped.
6. *Source* identifies where the program originated such as network, live, tape, recorded, etc., and is also pretyped.
7. *Identification* gives actual rendition times for legally-required station identification an-

Mr. Coons is president and general manager of WOHI-AM-FM E. Liverpool, Ohio.

1	2	3	4	5	6	7	8
2:00	2:00:00	Matinee Melodies	Burnside Beans	Entertainment	Recorded	1:59-50	John Smith

1	2	3	4	5&6	7	8
2:00	2:00:00	Mat. Melodies	Burnside Beans	E R	1:59-50	John Smith

AJAX AUTOS (60) 104-9 2:04:10

Fig. 1. Examples of program log entries; short forms (b) and (c) require key explaining abbreviations.

nouncements, and is filled-in by the operator at the time of the announcement. Normally these times are filled in by the operator at the time of the announcement; they may, however, be prelogged, then changed when actual times do not agree with prelogged times.

8. *Operator* column is signed by the operator on duty.

In every case, if a prelogged entry is erroneous, the operator must correct the entry and initial it. In addition, any changes made when the rendition of the schedule takes place must be noted and initialed, with proper times shown. Other items listed on the accompanying checklist (see box) must also be on the log.

The FCC does not require a specific log form, nor are abbreviations forbidden. If abbreviations are used, however, there must be an explanatory key as a part of the log and it must be referred to on every page. As a result of this flexibility, stations can use any convenient arrangement. If we were to use the same 8 columns listed above, a log line might be as shown in Fig. 1 (a), but it could be condensed to read as shown in Fig. 1 (b) as long as the abbreviations were fully explained in the log.

The log can also be a source of information for internal use, again, with the requirement that the key is given. A spot may be logged as shown in Fig. 1 (c). In this case, the station has specified that *any* entry with the time in parenthesis is a spot (commercial announcement), and the (60) means that it is 60 seconds in length. 104-9 is a cartridge number, and is shown on the log for the convenience of the operator.

The program log rules, adopted in 1965 as the result of new application forms, no longer require that the time for each event be logged, as long as the beginning and ending of each 15-min sequence of events is logged. For example, a participating program might have 4 spots between 2:00 and 2:15, and it could be as shown in Fig. 2. Here, the operator has checked each item as it was rendered, and has logged the times for each segment comprising a quarter hour. If the program type or title changes, however, it requires a separate entry; the 15-min segment provision applies only if the component parts of the program checked do not reflect a change in the character of the program. News is not entertainment, for example, and cannot be included as part of an entertainment segment.

The signature column is not required; the rules do specify that the operator must sign when going on and off duty, however. As a result, a station can have signature lines and on- and off-time spaces at the top or bottom of each page. The operator signs on, signs off, and *initials each page in between* if more than two pages are used by him. But he must sign in each case.

Exact to-the-second times are not required. Logging to the nearest 10 seconds has become an accepted standard (i.e., "2:03: 20"), but the nearest minute is all that is required.

"Each identifiable program unit" is the definition for what must be logged. Any change in the type, source, or title of program, each different sponsor, and the time and length of his spots must be shown. In the case of a sponsored program, such as news, the log need show only the total time allotted to the sponsor. For example, if the First Bank has three min of commercial time in the Noon News, it is sufficient to show:

12:00 Noon News
First Bank (180)
12:15 Noon Sports

You need not show how many announcements made up the three min nor when the spots were read.

In the case of a program where commercial copy is not of an identifiable length, such as a paid political talk or a sponsored religious service, you should log the normal amount of time that would be devoted to commercial continuity if it were a regularly sponsored show. In other words, if you include three min of commercial time in a 15-min show, a 15-min paid sermon counts as a 3-min commercial program. (This may, in fact, be an FCC commentary on the efficiency of many radio sermons!) However, a sponsored religious program which does not actually solicit funds may be considered as having no commercial time; "O" may be entered as the duration of commercial continuity.

Promotional announcements need not be logged. A promotional announcement is one for which no compensation is received by the station, it was not a part of the offer to the advertiser, and does not mention the name of the program sponsor, unless the name of the sponsor is a part of the program name. "Hear the Kraft Theatre" is a promo. "Hear the 9:00 P.M. Theatre" is a promo. "Hear the 9:00 P.M. Theatre brought to you by or sponsored by Kraft" is not a promo. Anything not fitting the promo category is a spot by definition.

Public service announcements should be logged when run, but their length need not be shown.

Program-types and sources are clearly defined in the FCC rules and in definitions mailed to stations with renewal forms. The best source for these is the FCC rules themselves. (Incidentally, bear in

mind that the rules require stations to have a full, up-to-date set of rules!)

Operating Logs

Almost the same considerations apply to operating logs as to program logs. Because of time limitations in most stations for logging duties, it is well to have a simple form with built-in checks to be sure the operator performs the required readings accurately and regularly as required by the Commission rules. In most successful stations, this is done by tying the reading time to some regular program event—such as news—so that the operator has the time, at the right time. The careful chief engineer checks them regularly to be sure they are fully completed and accurate. This check should be made daily and should be thorough.

The accompanying box shows the pertinent rules and, in general, it should be easy to tell whether your log includes all the required information. Do not forget, however, that your log should show the on-time and off-time of each engineer's shift, and he should sign at each of these times. The station's frequency, power, call letters, location, time zone observed and a suitable area for remarks should be included.

The FCC requires that remote-control stations show their readings in actual units, not relative metering units, although a station may want to allow room for both relative and actual readings on the log to allow more accurate checking by the chief engineer.

An old rule of thumb is that if a station's operating constants are too similar for too long, the readings were not taken accurately; this is a sure sign to the FCC inspector that all is not being done as well as possible. Of course, too, the station's operating limits should be posted by the chief engineer to show operators within what range meter readings may vary and when the transmitter should be adjusted. Remember, too, that readings are to be taken before adjustments are made, not after — another reason for varying readings as the day passes. As with program logs, form is not specified by the FCC, and a simple columnized page is all that is necessary.

2:00	2:00	Matinee Melodies ER
		Burnside Beans (60)
		Ajax Autos (60)
		Rex Jewelers (60)
		Bear Aspirin (60)
2:15	2:15	Matinee Melodies ER

Fig. 2 15-min program segments do not require beginning time entries for participating spots —only beginning time of each segment.

Automatic Logging

In recent years, the Commission has recognized the advantages offered many stations by automatic logging devices. For operating logs, these usually take the form of strip-chart recorders, with either one recorder attached to each metering point, or a recorder upon which all parameters are combined with coded strip-chart marking to provide identification of each reading. Operating power readings must be alarmed, as must frequency monitor readings. They must be connected in such a way so that if the recorders fail, the transmitters will shut off or the opertor on duty will be immediately warned by an alarm.

Automatic program logging takes one of two forms at present; either all the programming is recorded on a magnetic or disc medium, to serve as confirmation of the programming from which a detailed analysis can be prepared, if necessary; or automatic program unit sequencing causes pulses to be fed to a printing unit, much like an adding machine, which records the number of the unit (or cartridge) in operation and the time it started, to the nearest minute, thus providing a written record of the beginning time of each event. Automatic records still must be certified by the operator on duty with this signature and on- and off-times.

Retention of Logs

The FCC rules specify that logs shall be retained for a period of two years following date of broad-

Program Log Entries
FCC 73.112 (a-m) 73.282 (fm)

Programs

- ☐ Identity of program by name or title.
- ☐ Time each program begins and ends. (In practice, FCC accepts beginning time of next program as ending of preceding program.)
- ☐ Type of program—news, entertainment, etc.
- ☐ Source of program — recorded, live, etc.
- ☐ If political, the name and affiliation of each candidate appearing.

Commercial Matter

- ☐ Identity of the sponsor or person paying for the announcement, or the identity of the person furnishing materials or services (see FCC 73.119).
- ☐ Length of spot or program commercial continuity.
- ☐ Time of each announcement or 15-min period within which it ran.
- ☐ Showing that sponsorship has been announced.

Public Service Announcements

- ☐ Showing that the announcement has been broadcast together with the name of the group for which the announcement was made.

Other Announcements

- ☐ Showing the time each required station id is made.
- ☐ Showing of the name and political affiliation of any candidate appearing on the air.
- ☐ Showing of the time of any pregrant or renewal notice announcement made pursuant to the FCC Rules 1.580 & 1.594.
- ☐ Showing that the mechanical reproduction announcement has been made pursuant to 73.118.

Program Log Check-List

- ☐ Local time zone in which station is located (EST, CST, etc.)
- ☐ Daylight or standard time.
- ☐ Complete key to all abbreviaitons.
- ☐ Station call letters, frequency and location
- ☐ Operator time on, and signature.
- ☐ Operator time off, and signature.
- ☐ Mechanical reproduction announcement times (see 73.118).
- ☐ Clear, descriptive names of each advertiser (Not "Power Co." but "Central State Power.")
- ☐ Party, office sought, and name of each candidate advertised or appearing.
- ☐ Pages numbered in sequence and dated, each page initialed by operator.
- ☐ All corrections initialed in accordance with 73.113 (d) and (e) (see BM/E April, 1966)

Operating Log Entries
FCC 73.113 (a-m) 72.283 (fm)

- ☐ Carrier on and off times.
- ☐ Notation of beginning and ending time of any unscheduled carrier interruption, cause, and signature, where restoration following failure is not relatively instantaneous and automatic.
- ☐ Readings of operating constants of the last rf stage of the transmitter, including plate voltage, plate current and antenna current (or for fm, output power percent).
- ☐ Frequency deviation as indicated on frequency monitor.
- ☐ Where applicable, readings, within two hr of DA pattern changeover, of base currents, phase, etc.
- ☐ Any other readings required by the station license.
- ☐ Time of daily tower light checks or tower light on and off times, as well as a notation of trouble with lighting action taken and signature.

Maintenance Log Entries
FCC 73.114 (a-m) 72.284 (fm)

- ☐ Weekly readings of base current meters and remote-reading base current meters prior to recalibration.
- ☐ Weekly tests of auxiliary transmitter.
- ☐ Tower inspections.
- ☐ Daily inspections as required in 73.93.
- ☐ Frequency check results from independent source.
- ☐ Time, date, and reason for removal from service of any required indicating instrument, and date and time of restoration to service.
- ☐ Description of any experimental or test operation.
- ☐ Signature of engineer for each entry.
- ☐ For inspections as required in 73.93, time spent, including start-time and finish-time, exclusive of travel.

cast. There are exceptions to this rule: Logs must be kept longer when involved in court processes, or when the Commission itself in reviewing them, or when the Commission requires a longer term in a specific case. When the station has operated during a local or national emergency or participated in an Emergency Broadcast System warning with formal permission to destroy actual alerts, the logs must be retained until the Commission gives them.

Maintenance Logs

The maintenance log is now a fixture at every station complying with the rules. It is, perhaps, that most useful of all logs as an engineering tool. It is a permanent source of equipment information, and as such is a diary of the fallibility or infallibility of each piece of equipment. It can be used by management to track down faulty equipment that is worn out, poorly maintained, or obsolete, and can also, as a result, trace excessive costs.

Perhaps the maintenance log is the easiest to keep, for it is really only a journal, loose-leaf if preferred, of the entries as outlined (see box). It should be neat, of course, but it is an ideal place to note miscellaneous information. At our stations, we note such items as running-time meter readings at the tube changes, all maintenance procedures performed, etc. We keep a maintenance log at the studios, too, although this is not required. In it we record work done on studio equipment. It helps particularly when we wish to consult a manufacturer about trouble; the log gives us exact data. Some stations even note supplies consumed and replaced in these logs, so they can keep their inventory up to par.

Summary

FCC logging rules can be onerous, indeed. Yet, with a little care, and a thorough understanding of their intent logs can be a virtue, and a help to the broadcaster. Reasonable training for the operator who keeps the logs can be a boon to getting accurate information, and in assuring the licensee of complete compliance with the rules. ●

Broadcasting By Wire

By Terry Spearen

Local origination is a chief service to woo and hold customers in a suburb which carries but one distant signal.

Since Lakewood is a suburb of Cleveland and within the Grade A contour of the Nation's fifteenth ranked television market, the Second Raport and Order allows only the carriage of Cleveland stations and the Grade B signal of channel 49, Akron. The success or failure of Cleveland Area Television, Inc. system may well depend upon the attraction of locally originated programs. The local origination system competes with the Cleveland stations in the coverage of Lakewood events and is, in effect, a Lakewood television station. Because of the competition aspects of the local programming in Lakewood, the system was designed to provide a maximum of quality and mobility with economic operation.

These circumstances led to the basic requirements in plant and equipment design as tabulated in Table 1. The equipment selected to fulfill these requirements is also included.

The Studio

The studio and control room were constructed in a garage area connected to the rear of the main office by a walkway. The garage area was partitioned approximately in half; providing space for a 30 × 34 ft studio, a 15 × 22 ft control room, an engineering shop-office area and rest room facilities.

The exposed ceiling rafters, approximately 12 ft from the floor, made ideal attachment points for hanging the lighting grid pipes and drapery supports. Insulation board was installed between the exposed rafters for insulation and acoustical purposes.

Drapery was hung to a height of 11 ft along the two garage walls. This covered the unsightly walls and completed the acoustical treatment of the studio. No acoustical treatment was provided for the two partition walls as excessive acoustical deadening can cause the studio to sound unnatural and will not allow satisfactory reproduction of music, etc.

A skim coat of concrete was put on the studio area of the garage floor to level the floor and to provide a smooth dollying surface for the cameras. The floor was painted light gray.

The studio lighting grid is constructed of ¼-in. inside dia iron pipe supported from the exposed rafters by threaded steel rods and Kindorf conduit hangers. Since the primary studio working area is along the two drapery-covered walls, this is the only area for which a lighting grid was provided — although it can be expanded.

Power for the studio lighting system is obtained through a standard twenty-four circuit distribution panel connected, via conduit, to a box with twenty twist-lock receptacles on its front cover. This box is located at rafter height and power is routed to the studio lighting instruments with rubber covered extension cords dressed along the pipe grids. This system provides an economical method of connecting a light. There are also four twist-lock outlets provided at floor level behind the drapery for powering lights used on floor level behind stands.

All studio lights, with the exception of the studio work lights, are of the tungsten-halogen type. They offer high light output in relation to size (for transport to remote locations) and have relatively long life.

Six microphone outlets are distributed along the studio walls behind the drapery. The outlets are mounted in standard duplex convenience outlet boxes attached to a board nailed directly to the brick walls. The board provides a convenient surface for mounting the boxes and serves as an attachment surface for routing the micro-

Terry Spearen is a cablevision engineer for Cox Broadcasting who developed the Cleveland Area Television System. This article is a condensation of a talk given by Mr. Spearen at the 1st NCTA Cablecasting Seminar, March 30-31, 1967 at Lakeland, Ohio.

phone cables to the control room area where they feed into the audio mixer-amplifiers.

Control Room

Control room floors were elevated approximately three ft which made it easy to install control room wiring (and plumbing to the rest rooms). Wiring could have been accomplished through the use of wire trays and ducts hidden the suspended ceiling with equally satisfactory results. In this case the savings in plumbing costs were an added inducement for a false floor and the added floor height is an aid on the loading of the remote truck which will be discussed later in this article.

The control room ceiling is constructed of suspended acoustical tile with lighting provided by dimmer controlled incandescent swivel lamps. Swivel lamps on dimmers allow the control room light level to be adjusted to minimize reflections on the faces of the video monitors. Incandescent lamps were used because fluorescent fixtures, unless specially treated, will induce hum in projector sound pickup cells. Acoustical tiles were installed on the entire back wall of the control room to minimize the noise of the film projector.

The small windows in the hall and control room allow visitors to observe activities.

The control room dimensions of 15 × 22 ft are slightly larger than would be required for the television operation, but in this case the CATV head end equipment is housed in the control room.

Studio Control And Operating Center

All control, switching and monitoring is contained in two five-ft-tall enclosed equipment racks with attached work surfaces.

The left rack contains two eight-in. video monitors; a waveform monitor, which can be switched between the two video monitor inputs allowing waveform measurements on either input signal; film camera remote level controls; a remote control panel for starting and operating the film slide projectors from the operator's position at the console; an EIA synchronizing generator equipped with crosshatch output for linearity adjustments on the video monitors; a video processing amplifier which feeds video to the rf modulator in the head end equipment rack; distribution amplifiers which provide extra video and sync outputs for monitoring, switcher inputs, etc. A five input audio mixer-amplifier, a 2 × 2 VTR video input switch, a 4 × 1 video monitor selector and an 8 × 1 video line switch are mounted on the horizontal work surface on the front panel.

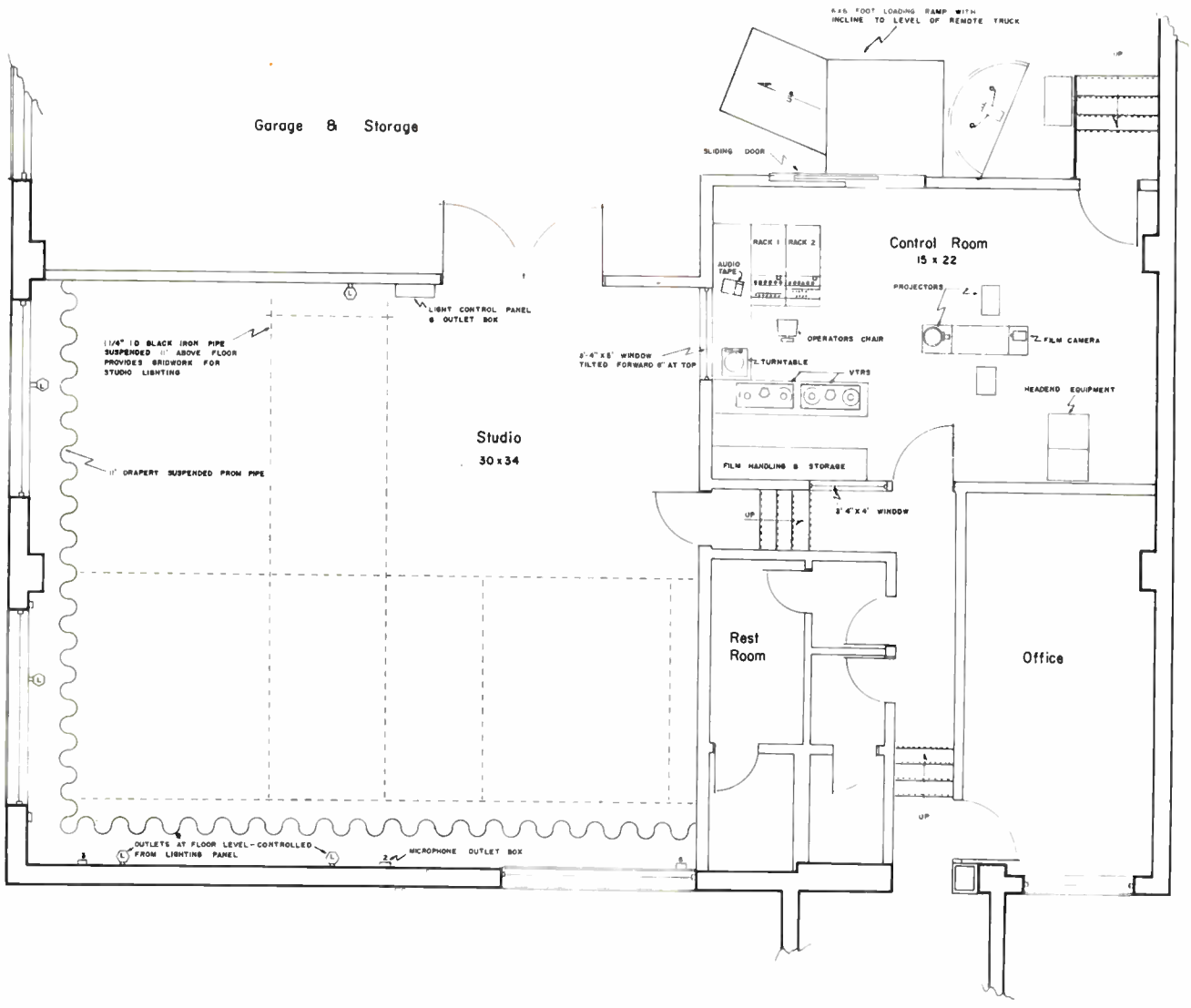
One video monitor in this rack monitors the film chain output and the second monitor is connected to the monitor selector switch. Feeding the second monitor from a delegate switch allows its use for monitoring the output of either VTR, line output, auxilliary signals, etc.

The second rack is equipped with same pictures and waveform monitor as the left and, in addition, has the remote electronic control units for the two studio cameras; and EIA synchronizing generator; audio and video patch panels for quick connect and disconnect with the left rack; and the studio camera processing amplifiers. There is a five input audio mixer-amplifier and a four input video switcher-fader mounted on the horizontal surface.

During normal studio operation, video is switched with the switcher-

Basic Requirements For A High-Quality Local Origination System

Plant and Equipment Requirements	Plant and Equipment Selected
1. Studio. The studio should provide adequate space for performances by glee clubs, high school bands or the simultaneous setup of several small sets for group discussions, interviews, news shows, etc.	See studio and control room layout.
2. Control Room. The control room area should be designed so that the film chain, VTRs video switching and camera level controls can be conveniently operated by one person.	See studio and control room layout.
3. Cameras. There should be two vidicon studio cameras. Each camera should be equipped with an electronic viewfinder, 10 to 1 zoom lens and heavy duty portable tripod and dolly.	RCA PK-330 professional transistorized vidicons (except for vidicon and viewfinder kinescope). Zoom lens is power operated, fine focus adjustments offered.
4. Film Chain. The film chain should be equipped with two 16mm film projectors, a 35mm slide projector and an optical multiplexer to feed the projector images into the film camera.	RCA PK-310 vidicon type which is easily adapted for use with the RCA TP-11 series optical multiplexer. A used TP-11 multiplexer was purchased since the conversion to color by many stations has made this multiplexer readily available at a modest cost. A Spindler & Sauppe slide projector and two Bell & Howell 16mm television film projectors complete the film chain.
5. VTRs. There should be two portable helical-scan VTRs with playback stability equal to the FCC requirements for television broadcast signals. Two recorders are required to allow playback capability on the system while the second unit is in use at a remote location.	Two Ampex Model 660B recorders were selected on the basis of picture quality, adherance to FCC synchronization signal specifications and portability.
6. Remote. The remote truck should be of adequate size to carry all of the required remote equipment and the overall equipment package should be designed so that there will be a minimum of equipment duplication in the control room and remote truck.	Right console in studio equipped with connectors and patch panel for fast disconnect and loading onto truck.
7. FCC. Since it is likely that the FCC will assume authority over the technical operation of CATV local originations, the entire system must meet FCC specifications for television broadcast signals.	Equipment above meets these requirements.



fader and its output is routed through the patch panel to the left rack where it passes through the 8 × 1 video line switch to the video processing amplifier and, finally, to the rf monitor. Audio from five studio microphone outlets is mixed and amplified by the five input mixer-amplifier on the right console. The amplifier output is then routed through the patch panel to the left rack where it is amplified and mixed with other sources (turntables, audio tape, etc.) and fed to the rf modulator. The audio mixer-amplifier on the left rack serves as a mixer-amplifier in the right rack, film audio, VTR audio, turntable, tape and a spare microphone input from the studio.

Synchronizing pulses for all cameras are derived from the synchronizing generator in the left rack while the generator in the right rack serves as a spare.

Remote Operation

The right console is equipped with castors and the patch panel interconnections can be disconnected in about five minutes. Once the right console is disconnected from the system it becomes a completely independent operating unit with monitoring and controls for the two studio cameras, its own synchronizing source, a video switcher-fader, and a five microphone audio mixer-amplifier. It can then be rolled to the loading ramp and onto the remote truck where it is strapped down for transportation.

After dismantling the camera dollys and pedestals, loading the cameras and a videotape recorder on the remote truck, a complete remote system is ready to be moved to the remote location. Once on location, it is a simple matter to set up the cameras, make the proper connections on the patch panel, locate the microphones and start recording the program. Since all the equipment is transistorized, the entire remote operation can be powered from a single 15-A, 110-V ac outlet which can be found almost anywhere.

When the remote rack is on location, film, videotape, audio tape and a studio microphone are still available to maintain programming at the studios.

Conclusion

This system represents what is perhaps the maximum equipment requirement for cablecasting originations. Adequate studio space and equipment allow programming which is limited only by the ability and imagination of the personnel. No additional equipment investment required for the remote operation since the remote equipment is, in fact, the studio equipment. ●

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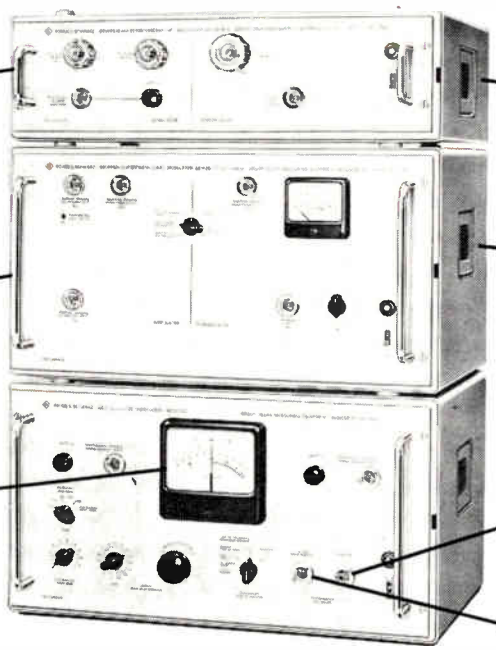

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  - VHF Systems, 25 - 250 MHz
  - UHF Systems, 250 - 1000 MHz (extended with Type MAD Modulator)
- Measurement Range: ±10 to ±1000 nsec, f.s.d. with a resolution of 0.25 nsec.
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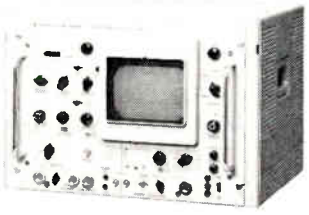
APPLICATIONS

Measure Group Delay Of:

- Active and Passive Devices
- TV Transmitters
- Video Tape Systems, Amplifiers, etc.
- Data Transmission Systems



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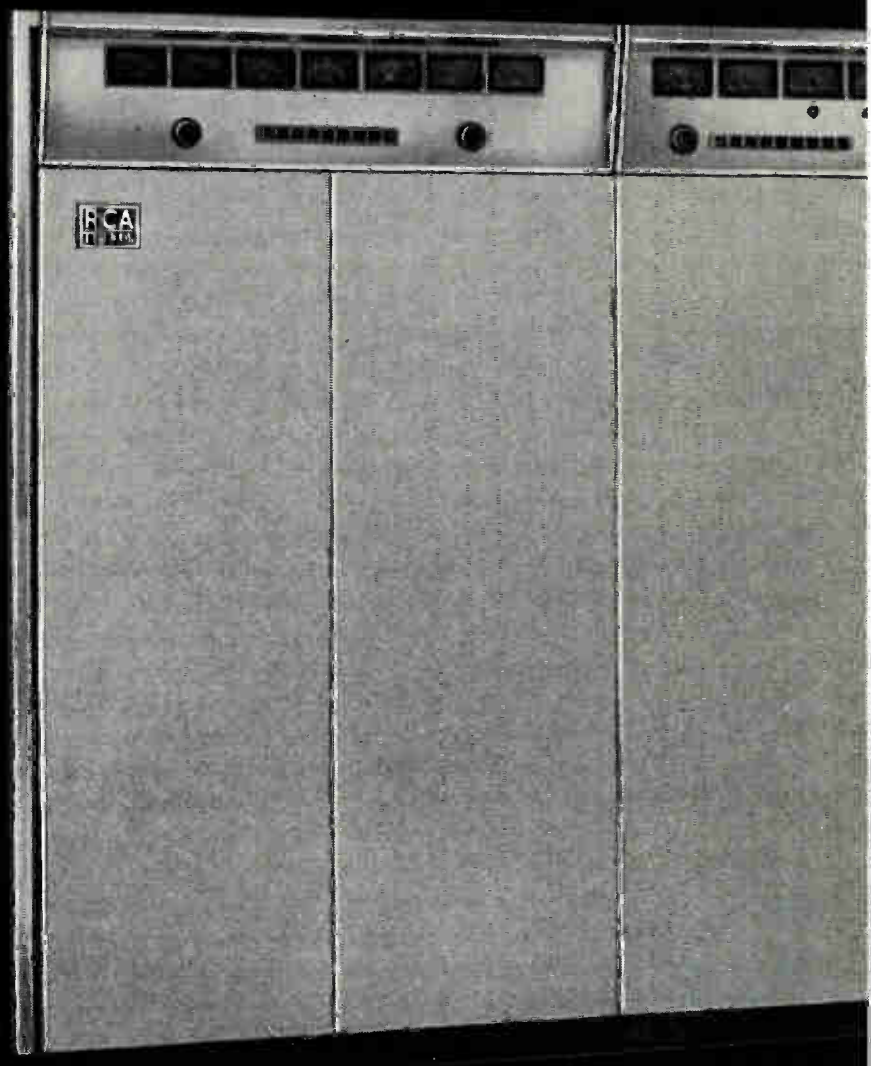

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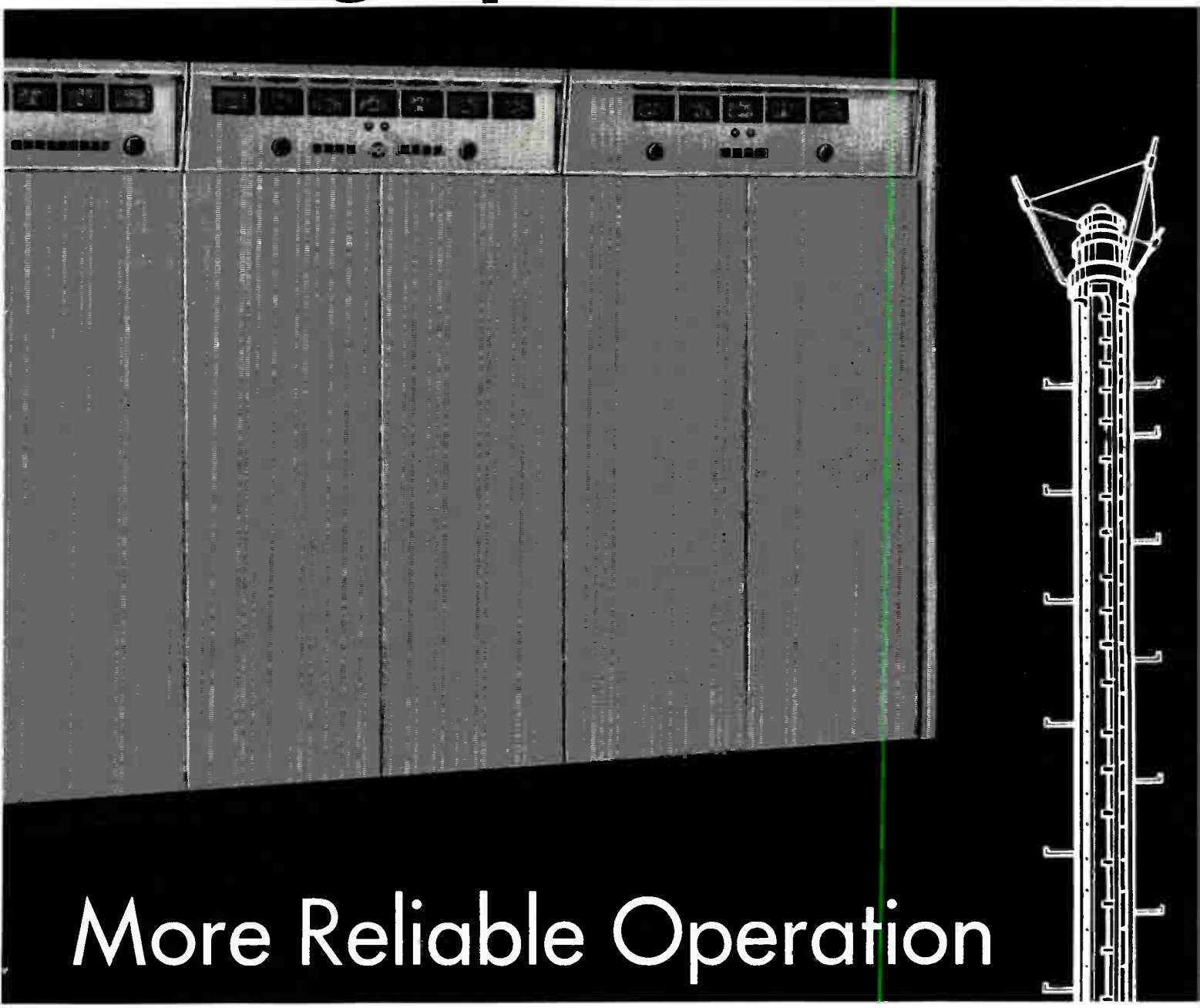

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Circle 29 on Reader Service Card

BROADCAST EQUIPMENT

Portable Color VTR Weighs 35 Lbs

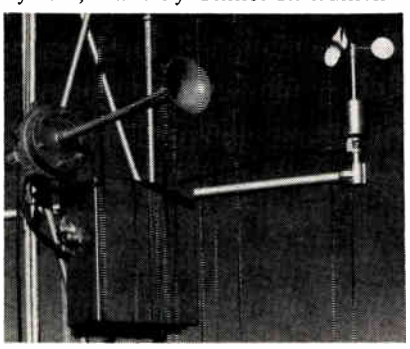
Weighing 35 lbs and measuring 23 × 12¾ × 6 in., the VR-3000 is claimed to be the world's smallest broadcast recorder. The unit, made by Ampex Corporation of Redwood City, Calif., is battery powered and

is available with a companion camera and back rack as shown in photo. Combination of camera and recorder weighs 50 lbs. and is capable of continuous recording for 20 min and an additional 20 min of previewing without recharging. Recorder produces either high band or low band monochrome tapes that may be immediately replayed on the air on any standard transverse (four head) studio recorder. It also is capable of recording high band color from studio color cameras without modification. Complete system, including accessory case with battery charger and spare 2- × 8-in. reels and spare batteries, is priced at $65,000, and is expected to be available early in 1968.

Circle 100 on Reader Service Card

Wind Speed Alarm Protects Towers

Model CI-18 Wind Speed Alarm System, made by Climet Instruments

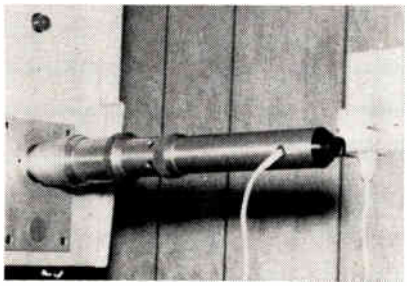


of Sunnyvale, Calif., consists of a wind speed sensor, an electric translator and an electric warning horn. The unit may be set to trigger alarm at any speed from 1.5 to 120 mi/hr ±2 percent for protection of radio towers. Unit operates on 115 V ac.

Circle 101 on Reader Service Card

Vidicon Alignment Gauge

When mounted in place of lens of vidicon camera, model 252 Diascope, made by Zolomatics Corp. of Hollywood, Calif., projects a built-in test pattern illuminated by a 2½-V bulb onto protosensitive vidicon. Pattern projected onto vidicon surface is in proper alignment and appears on

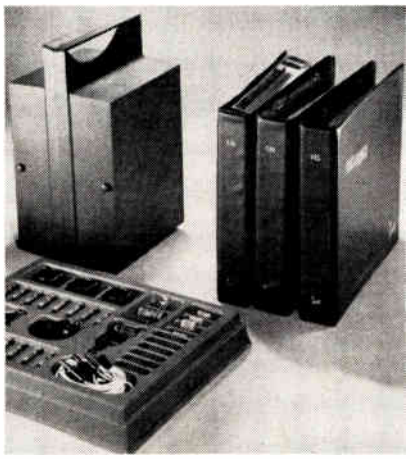


monitor, enabling technician to align vidicon.

Circle 102 on Reader Service Card

Electronics Laboratory Course

Proctronics electricity and electronics course, made available by North American Philips Co. of New York, N.Y., deals with linear networks, ap-

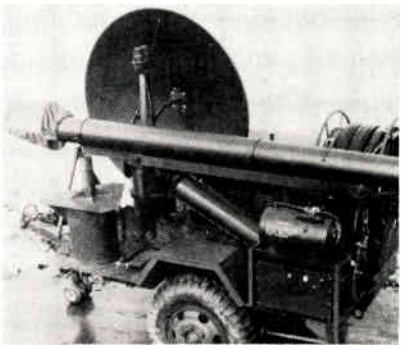


plications of Ohm's and Kirchoff's Laws, Norton and Thevenin theorems, bridges, capacitor, inductor, vectors, and j notation, ac circuits, resonance, filters, electric and magnetic fields, and transformers. The seven-lb lab package folds to form a compact unit measuring 11 × 6¾ × 6 in., and is powered by eight 1.5-V cells. Unit contains an oscillator that produces sine and square wave outputs, and a multirange VOM. The course requires 120 hr to complete, and is geared to a comprehension level extending from the 11th grade through university training. Course is priced at $350.

Circle 103 on Reader Service Card

Mobile Microwave Antenna System

A complete trailer-mounted microwave antenna system that can be placed in operation by four men in eight hr, has been produced by Andrew Corp., Chicago. The two-wheel, 1½-ton trailer unit includes a 100-ft pneumatic telescoping mast, 6-ft microwave antenna, azimuth/elevation antenna positioner with remote control system, 140 ft of Heliax elliptical waveguide, automatic dehydrator and a gasoline-operated



air compressor. The telescoping mast provides for a top load of 600 lb with a wind load of 125 mi/hr. The antenna positioner offers elevation adjustment of ±15° and azimuth adjustment of ±45°. Beam deflection of antenna meets EIA Specification RS 222.

Circle 104 on Reader Service Card

Weather Radar For Broadcasters

Scanning a 100-mi-dia circle, Kaar radar can be used for observing cloud formations and storm conditions by broadcasters and CATV operators for the benefit of viewers and listeners. The unit, made by Kaar Electronics Corp. of Rahway, N.J., employs a 12-in. CRT in the

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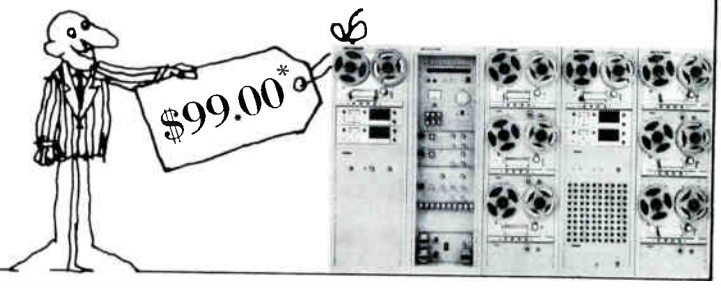

Lease is a word very much in our vocabulary. Our lease plan has been very enthusiastically received by the broadcast industry. *Lease this system for approximately $99 a week or lease other Schafer Systems for less than $65 per week. All Schafer Systems are capable of expansion. As our leasing customer you have the option of purchasing this system at any time during the lease with a portion of the monthly lease payment applying toward the purchase price. No matter whether you buy or lease a Schafer Automation System for your station satisfaction is guaranteed. As a Schafer customer you are eligible to subscribe to the all-new, superior Schafer Taped Music Library for only $99 per month.

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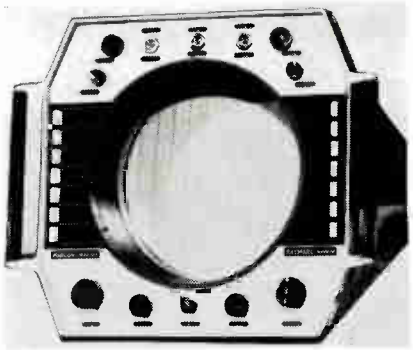
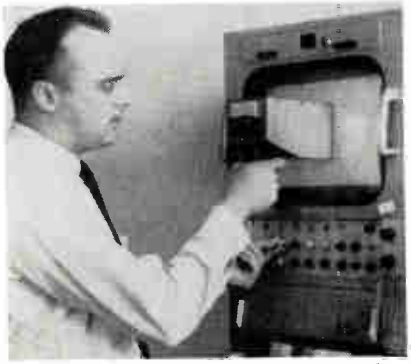


plan position indicator which can be installed up to 200 ft from the transmitter-receiver location. The peak power output of the transmitter, which operates on the 9345- to 9405-MHz band, is 20 kW. Pulse width is 0.6 μs; pulse repetition frequency is 1000 Hz. I-f bandwidth is 5 MHz. When unit is operated on 115 or 230 V ac, power consumption is less than 500 W.

Circle 105 on Reader Service Card

Color Comparator Reduces Setup Time

TV Colorgard, made by Gardner Laboratory of Bethesda, Md., is a hand-held, self-powered color comparator that senses the red, green and blue colors displayed on monitor screens. Color balance is determined



by a preset color temperature that allows broadcast engineers to adjust monitor controls for each color until the Colorgard meter indicates that the correct balance is being displayed on monitors.

Circle 106 on Reader Service Card

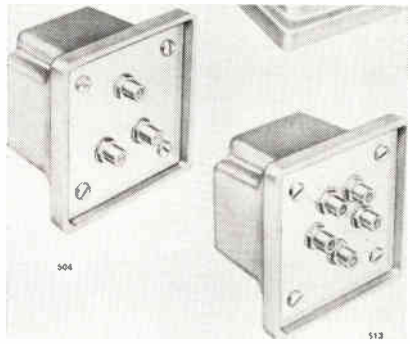
Labor-Saving Logging Method

Plasta Lucent, a shortcut method of reporting and recording program logs, status reports, etc, can be used with any type of copying machine. Plasta Lucent masters provide automatically updated copies of any information needed, and can be used repeatedly. Plasta Lucent is available from Transface Process Co., New York, N.Y.

Circle 108 on Reader Service Card

CATV Line Splitters

Series 504 two-way and 513 four-way splitters, made by Craftsman Electronic Products of Manlius, N.Y., have a frequency range of 10 to 300 MHz; impedance at all ports of 75 ohms, with a minimum return loss of 20 dB; and typical isolation

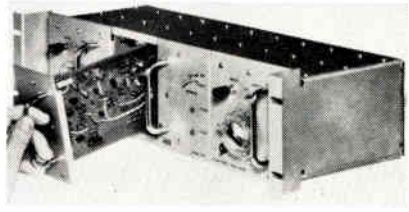


between outputs of 25 dB. Series 504 has an insertion loss of 3.5 dB maximum; insertion loss for four-way splitter, 7.0 dB.

Circle 107 on Reader Service Card

Space Diversity Antenna Switch Selects Stronger Signal

A completely solid-state CATV antenna switch capable of increasing significantly the percentage of good reception and eliminating 90 percent of fades was announced recently by CAS Mfg Co. of Dallas, Tex. The CAS SDS-213 space diversity switch couples two vhf antennas installed to use the space diversity principle and samples the field intensity of a single vhf channel on each of the two antennas, compares and automatically switches to the



antenna with the highest signal level. This action takes place at high speed and is relatively unnoticeable. Two conventional solid-state vhf TV tuners and a video i-f amplifier develop the switching control voltages. Specifications include input impedance to each antenna of 75 ohms with a vswr of 1.3; loss through switch, 5 dB; switch time, 1 μs max; switching delay time, 1 s. Unit weighs 8 lbs and measures 19 $\times$ 5 in. in rack mounting.

Circle 109 on Reader Service Card

Lectern Studio

Completely self-contained and instructor-operated, model Telectern,

hp TDR shows...

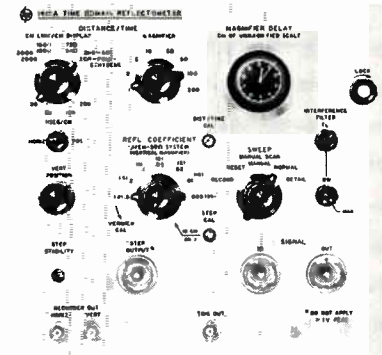
42′ of 75-ohm cable to a defective house tap.

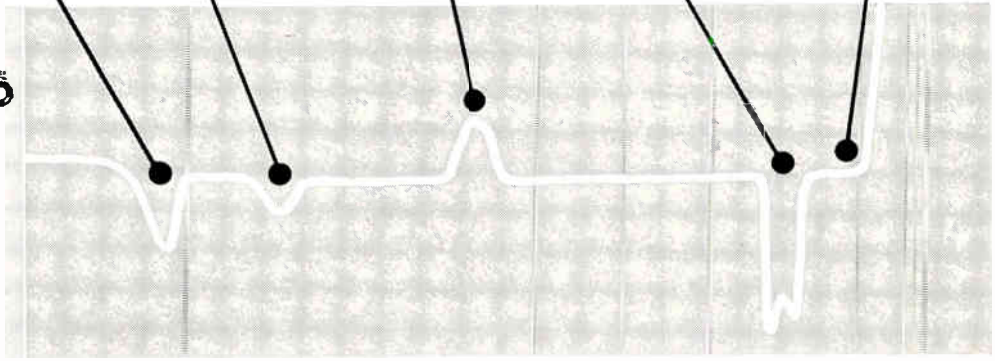
50′ down the line, capacitive defect caused by water in cable.

66′ farther is inductive fault caused by spliced line.

110′ from the splice, the cable has been deformed by sinking concrete wall.

55′ from deformation is open caused by open termination.





CABLE FAULT GUESSWORK ENDS HERE

Improve Picture Quality, Quickly Identify and Locate Cable Faults with hp TDR

Spend your time on the air . . . not up in the air! With hp's 1415A Time Domain Reflectometer you save time and money because you can (1) quickly locate and identify cable faults, (2) detect faults *before* they can cause downtime, (3) get your system back on the air much sooner in the event of a sudden crippling fault, and (4) consistently maintain high picture quality.

When mated with an hp 140A oscilloscope mainframe, the 1415A TDR plug-in gives you a graphic picture of cable quality —and such faults as shorts, opens, loose connectors, defective tapoffs, splices and mismatched terminations with high sensitivity and resolution that detects faults separated by inches. The standard 1415A-140A system locates faults in a 600′ cable to within 5 per cent of the actual distance from the test point. Option 14 can test a 3000′ polyethylene cable (6000′ if both ends are accessible).

The 1415A-140A is a completely self-contained system which consists of a step generator, single-channel vertical amplifier, and a time base. The system sends a step voltage into the cable, then accurately displays reflections on the CRT. A slide rule is provided for conversion to other dielectrics. Prices: TDR plug-in 1415A, $1050; 1415A with Option 14, $1150; 140A mainframe, $595; 141A mainframe with variable persistence and storage, $1395.00.

Extensive "how to" information is available in hp Application Note 67. Complete specifications on the 1415A TDR plug-in and 140A-141A mainframes are contained in Data Sheet 140A. Ask your hp field engineer for a copy, or write to Hewlett-Packard, Palo Alto, California 94304; Telephone (415) 326-7000; Europe: 54 Route des Acacias, Geneva.

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20 MHz Wideband • High-Sensitivity, no drift • 150 ps TDR
12.4 GHz Sampling • Variable Persistence and Storage

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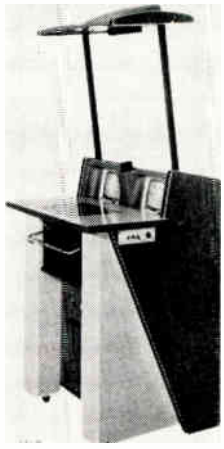
Circle 34 on Reader Service Card



newly restyled by TeleMation, Inc. of Salt Lake City, Utah, utilizes an overhead first-surface mirror to deflect the work-surface image to a TV camera mounted in the console. The arrangement forms a folded optical path allowing the use of a 10:1 zoom lens. Mechanical rather than electrical lens control provides rapid focus of material measuring 2½ to 25 in. in width. The lenticular screen, recessed in the work surface can be rear-lighted for display of transparencies and overlays and serves as a projection screen when the built-in 35mm slide projector is used. A five-input, solid-state switcher is available to operate external video sources.

Circle 111 on Reader Service Card

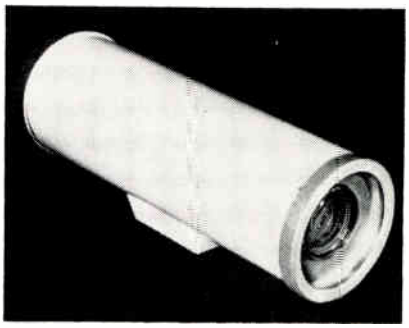
CATV Taps

Models 2 DTM and 4 DTM Multitapoff units, handling up to 10 A ac, have been added to Benco Television Corporation's line of CATV equipment. The directional in-line units are available in two or four tapoff configurations, with a choice of 6 tap attenuations.

Circle 111 on Reader Service Card

Rugged Remote Camera For Continuous Operation

The RGS-20, a solid-state TV camera for continuous operation in untended locations and under extreme environmental conditions recently was introduced by Raytheon Co. of Lexington, Mass. The camera produces a standard 525-line/frame picture



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with a 4:3 aspect ratio and may be operated with up to 3000 ft of cable. Other scan rates are available, and camera is available with vertical sweep rates of 50 or 60 Hz. Required power is 80 W at 120 or 240 V ac. The RGS-20 is priced at $3400.

Circle 112 on Reader Service Card

Sound Modifier

Model GE-20, made by Melcor Electronics Corp. of Farmingdale, N.Y., is an active, lossless multichannel graphic equalizer which modifies the sound characteristics of audio information in discrete frequency bands. Features of the unit include output impedance 1/10 load impedance, equalization variable in steps, input and output are transformer isolated and can be operated balanced or unbalanced and input impedance is nonloading. Hum and noise level is −86 dBm max. Unit has accuracy of ±0.5 percent and max distortion of 1 percent. Power requirements are 115 V ac at 10 mA.

Circle 113 on Reader Service Card

Improved Electro-optical Lens

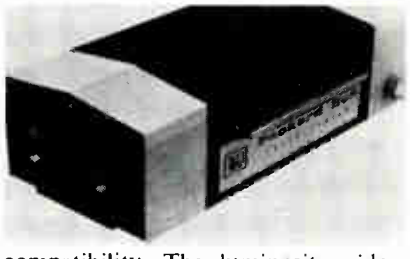
Model S-023 electro-optical lens, made by Dynalens of Blue Bell, Pa., is designed to nullify image distortion caused by vibration of long-

lens cameras and ocular sights. The lens can be mounted on any type of platform or vehicle and is readily adaptable to surveillance or camera systems.

Circle 114 on Reader Service Card

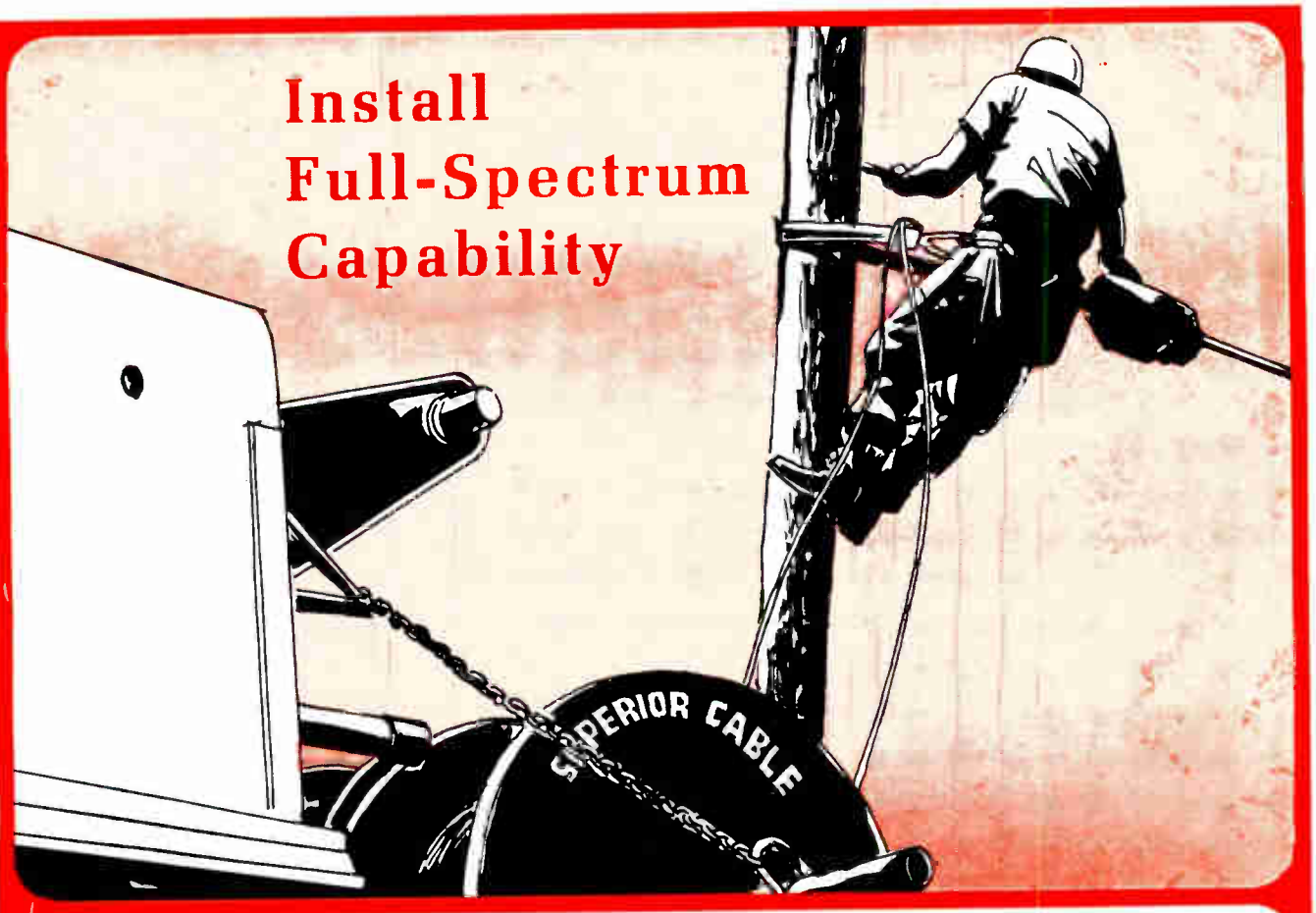
Film Chain Color Camera

Using three vidicon channels, Model 100 has four-channel standards of resolution, contrast and monochrome



compatibility. The luminosity video signal is processed, including aper-

Install Full-Spectrum Capability



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SUPERIOR CABLE

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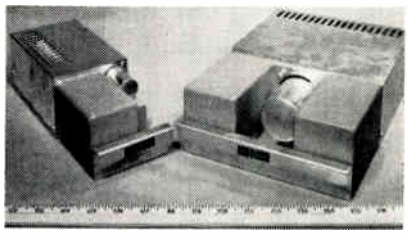
Circle 38 on Reader Service Card

ture correction, to provide an unmatrixed monochrome signal. A dichroic mirror system used to divide the picture into red, blue and wide-band luminosity response channels. Model 100 camera may be connected to camera control unit by up to 1000 ft of cable, with provision for full operational control and intercommunication from control unit. Camera is priced under $18,000.

Circle 115 on Reader Service Card

Solid-State Cueing Amplifiers

Type 9471A and 9476A 20- and 8-W cueing amplifiers have frequency responses of ±0.5 dB and total harmonic distortion of 0.5 percent from 20 to 20,000 Hz. Units have been designed to operate con-

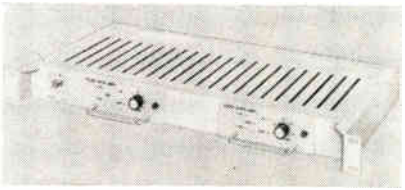


tinuously without derating at temperatures up to 131°C. Solid-state circuit employs silicon diodes and transistors.

Circle 116 on Reader Service Card

Video Pulse Distribution Amplifiers

Model Mark IX-A series solid-state distribution amplifiers feature 20-MHz broadband amplification and low differential gain and phase distortion. Each video pulse distribu-



tion amplifier has optional provisions for adding either sync or blanking to video output. Prices start at $255.

Circle 117 on Reader Service Card

Stop Action Color Recording Disc System

Model HS-100 color recording system by Ampex of Redwood City, Calif. records and plays back 30 s of action in high-band color. For replay of significant action, any part of the 30-s recording may be cued for on-the-air use in four s. The HS-100 may also be used effectively for rapid low-cost production of color commercials and special effects material. The system, which records on

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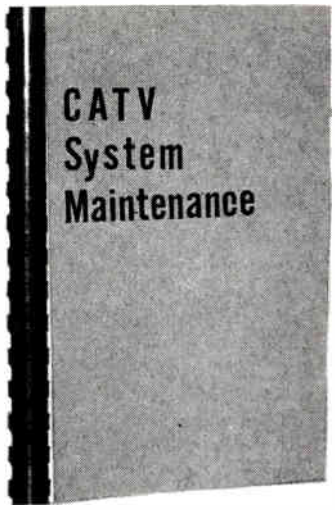
This Brand-New and entirely original book—complete and up-to-date—is the first and only book devoted to the maintenance of CATV systems. Long needed by the industry, this is a book no Cable TV system or technician should be without.



PARTIAL LIST OF CONTENTS

CATV TV CONCEPTS
- In Retrospect

THE ROLE OF THE CATV TECHNICIAN
- Duties During Construction
- Duties After Construction

ANTENNA SYSTEM REQUIREMENTS
- Adjacent & Co-Channel Interference
- Obtaining Off-Air Signals
- Antenna Downlead
- Preamplifiers

HEAD-END REQUIREMENTS
- Bandpass Filters & Traps
- Channel Conversion & AGC Equipment
- RF Radiation
- Channel Coupling
- Pilot Carrier Level Control
- Signal Monitoring
- Line Voltage Regulation
- Temperature Regulation
- The Head-End Building

HEAD-END MAINTENANCE
- Individual Signal Traits
- Head-End Troubleshooting
- Conditions Affecting Color Signals
- Tube Replacement
- Connector & Patch Cord Defects
- Cable Routing

POLE-LINE CONSTRUCTION TECHNIQUES
- Joint-Use Poles
- Construction Considerations
- Running the Messenger Stand

CABLE PLANT CONSTRUCTION TECHNIQUES
- CATV Cable
- Cascadeability
- Distribution Systems
- Cable Powering
- Passive Equipment
- RF Plant Construction
- Mounting Amplifiers
- RF Alignment

CATV PLANT MAINTENANCE
- Tube Plants
- Solid State Plants
- Locating & Repairing Faults

TROUBLESHOOTING AND MEASURING EQUIPMENT
- The Field Strength Meter
- The TV Set As a Monitor

THE SERVICE DROP
- Drop Levels
- Routing The Drop
- The Cable Tap
- Attaching to the Subscriber's Home
- Drop Termination
- Amplified Splits
- Commercial Drops
- Servicing Drops

AUXILIARY SERVICES
- Weather Channel
- News Channel
- FM & Background Music
- Local Origination
- Use of Video Tape
- Auxiliary Audio Services

THE TECHNICIAN & CUSTOMER RELATIONS
- CATV Is a Service
- Customer Relations

APPENDICES
- Pole Equipment Installation Drawings
- Cable Attenuation Table
- Drop Level Table
- Channel Dipole Lengths
- DBMV-Microvolt Equivalents
- Cable Powering Calculations

CATV System Maintenance is a **practical** guide on all phases of maintaining a CATV system—from the antenna through construction techniques, to complete troubleshooting. Written expressly for the **practicing** technician or engineer, this invaluable volume will be worth its small cost many times over to anyone involved in CATV—be he owner, manager, engineer or technican. The book begins with a brief review of CATV system concepts and what is expected of technical personnel . . . with adequate technical data on system design to enable them to handle run-of-the-mill engineering work such as is required in planning and installing additions and extensions to the system.

The major emphasis is on **maintenance**—providing a wealth of information on how to locate and correct equipment failures, including tips on how to eliminate various types of interference and radiation problems at the head end. Step-by-step maintenance charts are included to aid the technician in quickly isolating and correcting the more common head-end problems. Sections on plant construction and maintenance provide valuable "how-to" information on pole-line mechanics and distribution techniques. Contains the straightforward answers to the maintenance problems encountered daily in CATV.

In-depth coverage is also given such important topics as head-end and distribution design variations, signal levels and AGC, interference and radiation, distribution techniques, cascadeability, amplifier alignment, test equipment, installing and maintaining service drops, weather and news reporting equipment, FM and background music equipment, video tape production—in fact, just about everything Cable TV technical personnel must deal with in their day-to-day activities, including the all-important aspects of dealing with the public.

Yes, **CATV System Maintenance** contains tested and proven data, based on actual experience in maintaining CATV plants — information essential for both practical day-to-day operations as well as for reference. Every system will need several copies of this fact-packed volume. Due off the presses on May 15th, CATV Systems Maintenance is published to sell at $12.95. **Through June 30th, however, the Special Prepublication price of only $9.95 prevails. Order at our risk for FREE 10-Day Examination. SEND NO MONEY! Simply fill in and mail the handy NO-RISK coupon below for this helpful volume!**

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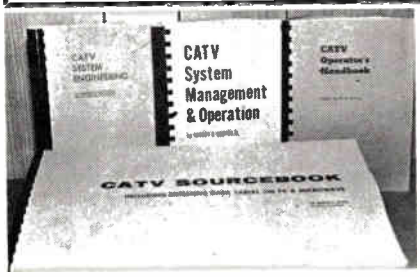

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Circle 40 on Reader Service Card

metal discs instead of magnetic tape, is capable of instantaneous replay of televised action at normal, fast and slow speeds down to frame-by-frame stop action. Its capabilities also include reverse action playback or analysis of highlights.

Circle 118 on Reader Service Card

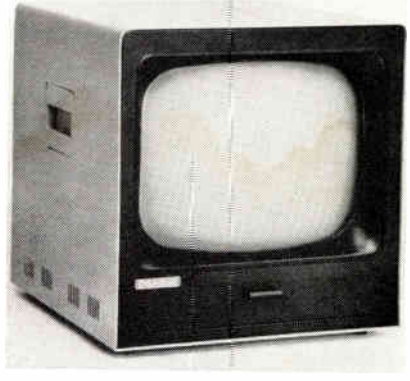
Four-tube Color Camera

Using a 3-in. pickup tube called an Isocon, the 140-lb TK-44 by RCA of New York, N.Y. has the ability to handle high contrasts in lighting encountered in outdoor TV work. Used in the fourth (luminance) channel of the camera's four-tube pickup system, the Isocon provides a substantial reduction in picture noise while retaining sensitivity and resolution. The camera is equipped with a detachable viewfinder and zoom lens that are easily removed. The camera is due for delivery in mid-1968.

Circle 119 on Reader Service Card

Stable TV Monitors

Models RVB17/C and RVB23/C solid-state 17- and 23-in. TV monitors by Conrac Div. of Giannini Controls Corp., Covina, Calif., offer improved reliability and low power drain. The units feature full regulation, permitting picture size and



brightness to remain constant with ac line variations from 105 to 130 V at any rate. Monitors use differential input for minimizing hum and other extraneous pickup on long video cables. Video response is flat to 10 MHz.

Circle 120 on Reader Service Card

EIMAC 15 kW tetrode offers high power gain for advanced transmitters

Most new high-power 20 kW FM transmitters use the EIMAC 4CX15,000A tetrode for service as a Class-C amplifier. The tube features a new internal mechanical structure which minimizes rf losses, and is capable of operation at full power ratings to 110 MHz. EIMAC also recommends the 4CX15,000A for 220 MHz operation at lower power levels for VHF-TV transmitters. ■ EIMAC's long experience in tube technology and ceramic-to-metal sealing leadership have combined to produce a tetrode of optimum design and structural integrity. That's why the 4CX15,000A is used in more new transmitters than any other ceramic tetrode with similar characteristics. For more information write Product Manager, Power Grid Tubes, or contact your nearest EIMAC distributor.

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Class-C Telegraphy or FM Telephony (Key-down conditions)

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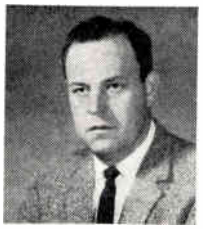
NAMES IN THE NEWS



R. Donald Peterson

Helmut Dieter

General Electric announces the appointment of **R. Donald Peterson** manager-broadcast product planning in GE's Visual Communications Products Department.

President Bruce Merrill of Ameco announces the naming of **Helmut Dieter** and **Ray M. Wood** as vice presidents.

John S. Mullen of WWLP, Springfield, Mass., has been appointed program director.

WKBS, Philadelphia, announces the appointment of **Glenn Romsos** as chief engineer of WKBS-TV.

Miguel A. Reyes has joined the Latin American sales force of Visual Electronics. Charles E. Spicer, vice president, Engineering, made the announcement.

Dwight Rohn, president of Rohn Mfg. Co. has appointed **Donald Rohn** and **Richard A. Kleine** to the positions of executive vice president and vice president.

Dale O. Murphy has been named sales engineer, videotape, for Memorex Corp.

James L. Reinsch, Jr.

Sam Street

James L. Reinsch, Jr. has been designed general manager of Columbus Communications Corp.

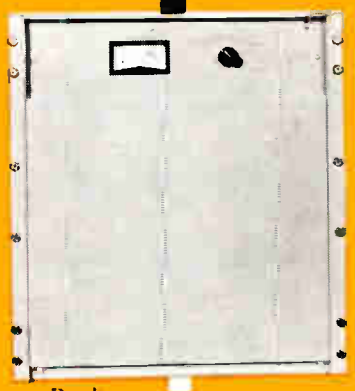
President Frederick W. Ford of NCTC announces the appointments of **Wally Briscoe** as managing director, **Sam Street** as director of convention and field services and **David Roudybush** as bookkeeper.

The promotion of **William L. Robinson** to director of engineering at

212T-1

212T-2

In 8 out of 10 cases one of these STANDARD consoles will meet CUSTOM console requirements



Rack Assembly

Before ordering a custom installation for your control room, check your requirements against these features of Collins' standard 212T-1 and 212T-2 Audio Control Consoles:

REMOTE CAPABILITY. Rack-mounted assembly containing amplifier cards can be located in an equipment room and linked by cable to the audio control panel in the studio. Sensitive audio wiring is concentrated in a card cage away from interference. Noiseless switching and audio level control are accomplished by photoconductive cells which employ a light beam to isolate control voltages from the audio circuits.

COMPONENT ACCESSIBILITY. Plug-in etched circuit card construction ends time-wasting troubleshooting. Attenuator, input switches, amplifiers, and amplifier output switches are replaced by simply taking one card out of the rack-mounted assembly and plugging in another card.

The 212T Audio Control Consoles consist basically of three units:

CONTROL PANELS. The control panel constitutes the difference between the two systems.

The 212T-1 control panel provides 28 inputs to 14 faders, 2 program output channels, and 2 10-watt monitor speaker outputs. The overall dimensions are 15¾" high by 24" wide.

The 212T-2 control panel has 32 inputs to 16 faders. The panel is divided into two sections: The fader operating controls are mounted on a panel 10½" high by 19" wide; the VU meters and monitoring controls are mounted on a panel 5¼" high by 19" wide.

RACK-MOUNTED ASSEMBLY. The assembly contains 16 preamplifier cards. Quantity and types of cards depend upon individual requirements. The assembly includes three program amplifier cards—one for cue and two for program channels. Two amplifiers are for speaker monitors; two switching cards select monitor inputs. The rack-mounted assemblies for the 212T-1 and 212T-2 are identical.

POWER SUPPLIES. Two power supplies are housed with the rack-mounted assembly. One power supply provides variable illumination for meters and push-button controls. Another provides powering for cards, attenuators, amplifiers, switches, and photoconductive cells

Most studio audio requirements can be met by adapting the standard 212T-1 or 212T-2 Console through strapping options and minor wiring changes. Expansion and adaptation can be accomplished easily with additional space which the units provide for two extra preamplifier cards, two additional program amplifiers, and two unwired spare card receptacles.

For a copy of a new descriptive brochure on the 212T series, contact Broadcast Marketing, Collins Radio Company, Dallas, Texas 75207. Ph. (214) AD 5-9511.

COMMUNICATION / COMPUTATION / CONTROL

Visit Collins' NAB Convention Booth (209). New products will include speech consoles, AM & FM transmitters, and measuring and monitoring equipment.

COLLINS

COLLINS RADIO COMPANY / DALLAS, TEXAS • CEDAR RAPIDS, IOWA • NEWPORT BEACH, CALIFORNIA • TORONTO, ONTARIO

Bangkok • Beirut • Frankfurt • Hong Kong • Kuala Lumpur • Los Angeles • London • Melbourne • Mexico City • New York • Paris • Rome • Washington • Wellington

Circle 44 on Reader Service Card

Capitol Records was recently announced by George Jones, vice president.

Peter R. de Bruyn has joined the staff of the National Bureau of Standards as industrial liaison officer in the Office of Industrial Service.

Robert C. Bacon

Glenn Littlejohn

Robert C. Bacon has been named executive vice president and assistant manager of Electronic Sales Corp. and TeleMation, Inc., according to Lyle O. Keys, president.

Hugh H. Buchanan, Jr. and **Glenn Littlejohn** have been designated midwestern and northwestern sales managers, respectively, according to John G. Russell, vice president/sales.

Anaconda Wire and Cable announces three top appointments. **A. H. Leader** as administrative vice president, **W. R. Olson** as corporate planning and employee relations and **W. J. Plate** as vice president/Wire and Cable Div.

Abraham E. Patlove

Rosel H. Hyde

Abraham E. Patlove has been appointed system development director of Continental CATV Corp., a subsidiary of Viking Industries.

Rosel H. Hyde, chairman of the FCC, has been named to receive the 1967 Ballington and Maud Booth Award, given annually by the Volunteers of America for outstanding service to the nation, it was announced by General John F. McMahon.

The appointment of **Warren S. Park, Jr.,** as director of programming and operations for the new Maryland and Educational-Cultural Television Commission was recently announced by the network's executive director, Dr. Frederick Breitenfeld, Jr.

Your Sylvania distributor can give you a technical library. For fast answers to difficult electronic problems.

Nobody beats Sylvania when it comes to up-to-date technical information—for *your* applications. And your Sylvania distributor has it all for you.

You can get data sheets and catalogs on industrial receiving tubes, transmitting tubes, industrial control tubes, counter tubes, cathode ray tubes, flash tubes, gauge tubes, photosensitive devices, microwave devices and all semiconductors.

Your Sylvania man also has inventory programming forms—and many types of application information. Plus other kinds of free technical materials.

And he's a tube expert. He can analyze your tube and semiconductor replacement needs. He can prevent emergencies, take an inventory and save you time and money.

Call him for these services—and for the best technical literature in the tube industry. And depend on him for fast delivery—in any quantity.

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

SYLVANIA

SUBSIDIARY OF
GENERAL TELEPHONE & ELECTRONICS GT&E

G. Kurt Butenhoff

Samuel R. Tedford

Ward Electronic Industries regretfully announced the death of its president, **G. Kurt Butenhoff,** who was killed in an automobile accident on March 19th. Butenhoff, age 36, is survived by his wife, Kelly, four children, his parents and a sister. A native of Hamburg Germany, Butenhoff graduated as an electrical engineer from the University of Aachen and was a member of the National Engineers Association.

Samuel R. Tedford has been appointed manager of advertising and public relations of the Voice Communications (Vocom) Division of Roanwell Corp., R. W. Howell, president, recently announced.

Ansel Kleiman

Donald D. Rogers

Telex announces the election of **Ansel Kleiman** as executive vice president and the appointment of **Donald D. Rogers** as marketing director of national sales manager of the Professional Products Group.

Sony Corp. announces the appointment of **Elyn S. Rankell** as publicity director for Superscope, Inc. and **Clarence Lang** as district sales manager in the New York metropolitan area for the Industrial Div.

Dr. James H. McNamara has been named director of research for Rome Cable Div., Aluminum Co. of America.

George M. Anthony, president of Tape-Athon Corp., has appointed **Wally Rubin** as national sales manager.

J.L. Robb, president of Superior Cable Corp., Hickory, N.C., has appointed **Donald C. Stewart,** as director of corporate development.

Mobile color TV van for American Broadcasting Company

Let F&M help you convert your facilities to color

"How much will it cost? How long will it take?" Get answers to these questions and any others that may be bothering you from F & M Systems. We can point out ways to cut costs and speed the conversion to complete color facilities.

We can help you cut costs by using your present plant and equipment wherever possible. Because of our experience, we can reduce engineering costs which are an important part of the cost of any conversion.

We can save your time because we have experienced crews to put on your job. The work moves forward rapidly and with professional competence.

But maybe you're not converting to color now. Maybe you're planning a UHF station . . . or maybe an educational TV system . . . or a mobile unit . . . or maybe you just want to modernize some obsolete facilities.

We can help you, too. Call us today!

F&M SYSTEMS CO.

A DIVISION OF FISCHBACH AND MOORE, INCORPORATED

P. O. BOX 20778 AREA CODE 214, CH 1-2121 DALLAS, TEXAS 75220

BROADCASTERS SPEAK

Sirs:
The magazine of Broadcast Management Engineering has given us great help in our operation and we wish to thank you for sending us the copies we receive free of charge.

We are having these magazines book bound and lack the April issue of last year 1966. We will appreciate it very much if you could send us a copy to complete our file for the year 1966.

Jorge D. Bayona
General Director
DZGB

Nice to know we're well received in the Philippines, J.D.B. Your April 1966 BM/E*'s on the way.*

Sirs:
I am writing today . . . to tell you how much we enjoy receiving your magazine, Broadcast Management/Engineering. Its articles have been invaluable in helping us to design our new studios and offices, to streamline our operations for greater efficiency, and to keep us up to date as to what is going on around us in the broadcasting industry. Of course it goes without saying that your high quality advertising has really been an aid to us over the past year. . . .

David F. Herrick
Chief Programming Director

Sirs:
After five years, I am relatively new to this business of radio broadcasting and now find myself accepting the responsibility of being the station's only full-time salesman.

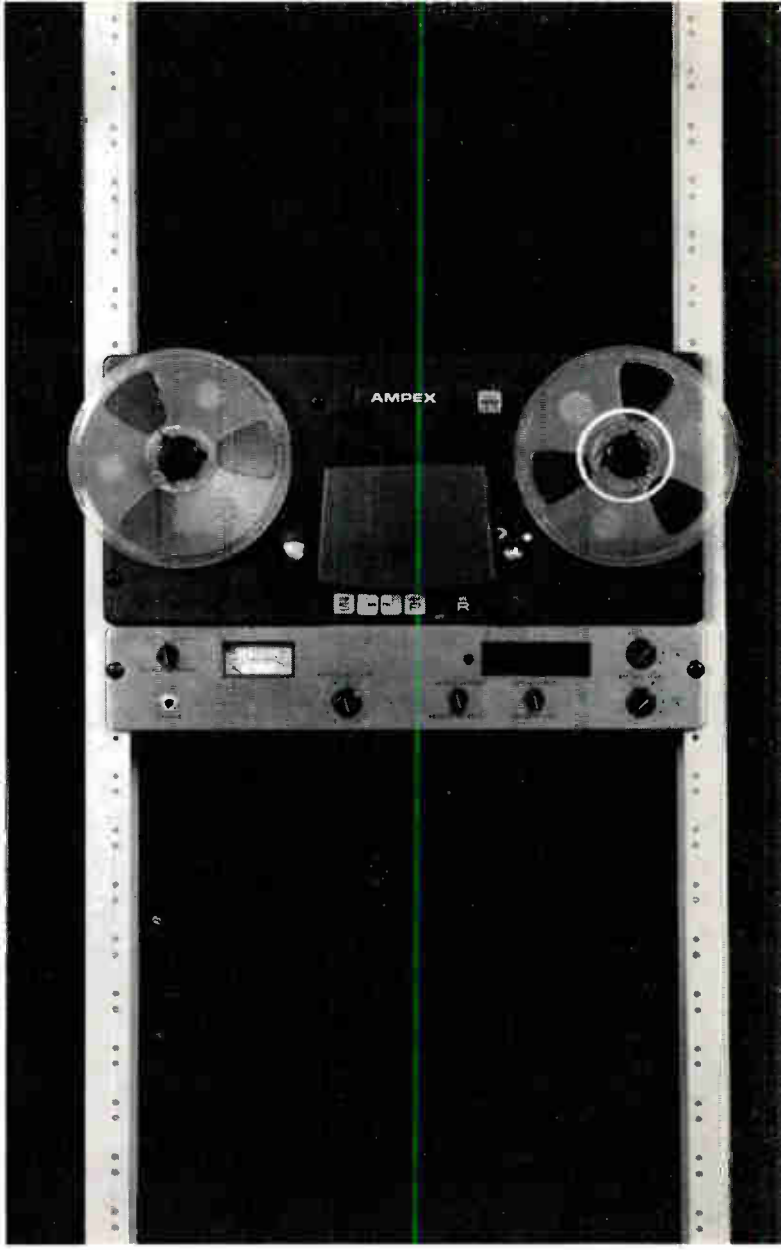
With this responsibility in mind, I write to you in hopes that through your vast knowledge and contacts with the industry you may help me find a "tool of the trade," so to speak.

I'm seeking a catalog (or its source) containing available radio programs, their length, cost, source, etc. There is such an animal! Can you help? If not, please refer this letter to someone who might.

Thank you for your help, and may *BM/E* enjoy many more years of success.

Hayden Grant
WLNH

According to the publisher, H. G., there are three books in this area: "Series, Serials and Packages—A TV Film Source Book," "TV Feature Film Book" and "TV Free Source Book." You can obtain them from Broadcast Information Bureau, 535 Fifth Ave., New York, N.Y. 10017.



Every ounce a studio.

Every inch an Ampex.

ONLY THE AG-500 WILL PACK TRUE STUDIO QUALITY INTO 0.8 CU. FT.

In your rack that means an Ampex studio recorder only 12¼" high, 6" deep. As a portable it means the finest you can carry—any way you measure it.

First, the new AG-500 packs a true studio transport with all-electric push-button solenoid operation, full remote control capability, and a solid die-cast top plate precision-milled to keep tracks accurately aligned. It will maintain its performance well above broadcast studio specifications, even after years of heavy use.

Then, the cool-running solid state electronics are arranged professionally—for instant adjustment and service; easy channel add-on and head changes: One-channel, full or half track. Two-channel, two or four track. Input controls can mix two incoming signals per channel. You can choose speeds 3¾ and 7½; or 7½ and 15 ips. Go portable with a rugged Samsonite* case. And enjoy silken-smooth tape handling that is pure Ampex.

Ask your Ampex distributor, or send the coupon, for an AG-500 demonstration—measured to your needs.

Circle 53 on Reader Service Card

Our AG-500 demonstration offer:
Send your name. Ampex will demonstrate the new AG-500 and show how it is used as a studio or field recorder. Write: AMPEX, Room 714a, Redwood City, California 94063.

☐ Demonstrate ☐ Send Literature Only

NAME _____

ORGANIZATION _____

ADDRESS _____

CITY/STATE/ZIP _____

AMPEX

☐ Check here for career opportunities

LITERATURE of INTEREST

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

Videotape recorders, cameras and accessories are presented in 10-page Bulletin V085 from Ampex. **150**

Microwave equipment including receivers, transmitters, mixer-preamplifiers, linear, log i-f, rf and microwave amplifiers are detailed in 16-page Catalog 67a from RHG Electronics Lab. **151**

Voltage regulators and the effects of off-voltage are included in 11-page brochure from Sola Electric Div. Tabulated specifications and illustrations of 50, 60 and 400-Hz regulators occupy 6 pages of brochure. **152**

Instruments including signal generators, fm deviation meters, bridges and Q meters, voltmeters, receivers and intermodulation and baseband test gear are described and illustrated in Short From Catalog 67 from Marconi Instruments. **153**

Pushbutton switch catalog from Centralab has 22 pages of information on electrical and mechanical specifications of modular switches. Ask for Catalog PBS-1. **154**

Kit and wired equipment made by EICO is presented in 36-page catalog. Equipment line includes test equipment, communications equipment and hi-fi stereo components. **155**

Rf terminations ranging from convection-cooled to calorimetric waterloads are described in "Coaxial and Waveguide RF Terminations" from Raytheon. **156**

Synchronizing generator by Telemation is presented in brochure From TPB-40. Generator is all-digital type, and derives all waveform transition from clock pulses. **157**

Semiconductor diodes—their electrical specifications, case configurations and dimensions—are presented in 13-page catalog from Sylvania. **158**

Helpful hints for maintaining conditions of transmission systems after insertion type wattmeter is removed from line are presented in short form vol 4 no 1 from Bird. **159**

Two-way radio brochure from Amphenol presents illustrations and specifications of mobile/base/portable transceivers and accessories. **160**

Coax, twinax, triax matrix and multipole, mutithrow switches for programming, video, rf, data transmission and other applications are described in Catalog M-4 from Trompeter Electronics. Catalog includes test procedure for finding isolation parameters. **161**

Five cardinal errors committed by management in a study of 649 companies are the topic of "How to 'Go Union' in 5 Easy Steps." The study is available to company executives free of charge from Matthew Goodfellow, Executive Director, University Research Center, 121 West Adams St., Chicago, Ill. 60603. **162**

Studio console and remote units are described and illustrated in broadsides from Sparta Corp. **163**

Studio and CCTV cameras, color encoder, and film camera channel are the subjects of technical brochures GEC-1770, GEZ-4113, GEA-8053 and GEC-1773 from General Electric. **175**

Tape recorder/reproducers for rack or portable mount described in literature from Magnecord. Includes mono and stereo units. **176**

CATV Signals, quarterly publication from Jerrold Electronics, has well-rounded coverage of technical and social items of interest to CATV operators. **179**

Microwave, uhf, vhf, telemetry antennas; flexible coaxial cables and elliptical waveguides; switching and pressurization equipment and system accessories such as radomes, positioners and telescoping masts made by Andrew Corp are treated in 128-page Catalog 25. **164**

Engine preheaters are described in broadside from Kim Holstart Mfg. Co. **165**

Setup with two CCTV systems and studio with rotating stage for economic use of TV facilities by schools is outlined in application bulletin (8-79) from Cohu Electronics Inc. **166**

Ceramic capacitors in microminiature by King Electronics are tabulated and illustrated with outline drawings in 2-page short form catalog. **167**

Rf instrumentation equipment including attenuators, dummy load/wattmeters and coaxial switches are presented with specifications in brochure from Waters Mfg. Co. **168**

"Core Memory Systems" is a 2-page brochure from Burroughs Corp. describing high-speed memory systems and associated equipment. **169**

Books on all phases of radio-TV-CATV, many unavailable from other sources, fully described and illustrated in 18-page literature package from TAB Books. **170**

Solid-state S-band parametric amplifier is the topic of Bulletin 100 from American Electronic Laboratories, Inc. **171**

Model Power Watch—a system for monitoring and charging wet-cell batteries—is described in broadside from All American Engineering Co. **172**

Microphones and audio accessories, made by Beyer are detailed in 3-page brochure from Elpha Marketing Industries, Inc. **173**

Receiving Tube Manual (RC-25) contains 608 pages of tube and voltage-regulator specifications, applications data, replacement information, etc. Manual is available from RCA for $1.25. **174**

Fm audio peak controller described in literature from CBS Labs. Outlines features of Volumax. **177**

Audio console with photoconductive control described in literature from Collins Radio. **178**

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

SITUATIONS WANTED: 15¢ per word; $2.00 minimum
HELP WANTED: 20¢ per word; $2.00 minimum.
ALL OTHER ADVERTISING: 25¢ per word; $3.00 minimum.
BLIND BOX NUMBERS: No extra charge. Send replies to address below.

DISPLAY CLASSIFIED ADVERTISING: $21.50 per inch 1x; $20.00 per inch 6x; $18.50 per inch 12x. Professional Cards $15.00 12x.
CASH DISCOUNT: 2% cash discount if remittance accompanies order.
CLOSING DATE: 5th of the second month preceding issue date.

BM/E, 18 Frederick Road, Thurmont, Maryland 21788. Phone 301/271-7151

BUSINESS OPPORTUNITIES

FOR IMMEDIATE SALE
WGYW, Knoxville, Tenn. 1430, 1kw daytimer. Only Negro programed station in market. Ideal for owner-operator. Must be sold to highest bidder within 30 to 45 days. A chance to buy through court receivership at real bargain. First reasonable bid will be submitted to court. Contact
H. T. Kern, Receiver, Hamilton Bank Building, Knoxville, Tenn. Phone 615-525-0238.

POSITIONS WANTED

Man-wife team reached peak in present market. Presently manager, age 36. Proven success. Both have over 15 years' experience in all phases including: National-local sales. network contacts, news—programing—copy—payroll—accounts receivable—billing—on air. radio and TV. Excellent financial and personal references. Prefer Wisconsin-Minnesota-Iowa-North Dakota-South Dakota-Michigan markets. Cash available for investments if possible. Box 567-1, c/o BM/E, Thurmont, Md.

Attention—WABC, WLS, CKLW stations in markets of 1,000,000. I'm the DJ that turns people on. I produce the big personality sound with results in better ratings and more money. Don't believe? Try me and see. Qualifications: College, fantastic voice, tremendous personality, and ability second to none. If it's done in radio, I can do it. By the way, I have a 1st. Phone. Call 205 387-7588 or write 567-2, c/o BM/E, Thurmont, Md.

ATTENTION: WEST COAST — young top 40 DJ — 3rd Phone — experienced — Broadcast School Grad — Draft exempt — will relocate. Looking for station desiring hard working, career-minded announcer. Tight board and strong commercial delivery, lively sound. Will consider all locations, prefer West Coast. Charlie Raye, 5510 S. Cleveland, Hinsdale, Illinois. 312 323-5270.

Have extensive Television-Radio experience; Specialty sports. Prefer to locate in Denver, Portland or West coast area. Hockey, football, baseball, play-by-play. Will supply all references, video tape, background plus personal interview if necessary. Box 567-3, c/o BM/E, Thurmont, Md.

DJ announcer, Chicago vicinity. Will consider relocating. Beginner, single, draft exempt. Third endorsed. Broadcast graduate. Top forty or MOR or FM. E. Misiora, 2332 W. Cullerton St., Chicago, Illinois 60608. 312 226-7376 after 6 P.M.

Chief Engineer presently employed — 17 years experience, construction and operation. Experience includes transmitter color proof, studio color film, video tape, microwave, CATV. Desires permanent relocation with stable organization in Florida or southeast. Box 567-4, c/o BM/E, Thurmont, Md.

TELEVISION — ANNOUNCER, ENGINEER, SWITCHER. Young. 1 yr. in small market VHF's. Booth and some on-camera announcing; 1st ticket. Desire position which includes on-camera announcing. Will consider ETV or CATV. Box 567-5, c/o BM/E, Thurmont, Md.

POSITIONS WANTED (continued)

Attention major broadcasters. This is one way to get past the receptionist. Seeking position as cameraman. 15 months' experience. No engineering. Consider vacation relief. Presently living in N. Y. Box 567-6, c/o BM/E, Thurmont, Md.

TV EXECUTIVE with 14 years' experience in all phases of TV administration and film production seeks position as program manager or operations manager. Excellent professional references. 616 532-9329 or write Box 567-7, c/o BM/E, Thurmont, Md.

Versatile beginner, 3rd endorsed. Conn. broadcasting school. Prefer groovy station. Ready now. Take any format except C&W. Call or write now. Joe Sherman, 242 Orange St., Waterbury, Conn. 203 753-6666. Negro.

Top rated "telephone talk show" personality available. Audience builder. Degree in social science—Journalism—Mature broadcaster radio and TV. Interested in the **west coast only.** Write Box 567-8, c/o BM/E, Thurmont, Md.

Country DJ and announcer country music only. 3rd endorsed. Family man. Also plays several string instruments. Joe Reeves, 923 Lindell Avenue, Hannibal, Mo. AC 1-3908 or AC 1-0752.

College graduate (BA in speech) with strong interest in news. Experience light. Family man, 26. Presently employed in education field. No form letter replies answered. Available June 15. Box 567-9, c/o BM/E, Thurmont, Md.

The "MOJO-MAN" is looking. No formula button pusher deals. A real showman for real money. All others don't bug me. 172 Morningside Ct., Weirton, W. Va. 1—304 723-2410.

CONTROVERSIAL TALK SHOW — College graduate also has law degree, former history teacher. Five years' commercial radio as announcer-news-man. Phone 301 686-1863.

Young, aggressive beginner—combo. Negro R&B dj-announcer, newscasters. Tight board, third license. Married, will relocate. (212) 789-6152 or Box 567-10, c/o BM/E, Thurmont, Md.

First phone beginner, divorced, early forties, white. 18 months' formal technical training radio, TV, etc. Florida preferred. No announcing. Box 567-11, c/o BM/E, Thurmont, Md.

Sportscaster. Experienced, professional play-by-play all sports. Employed sports director. College graduate. Family. Box 567-14, c/o BM/E, Thurmont, Md.

Announcer-DJ, MOR or Top 40, Coll., drama & speech, 1st phone, tight board, draft exempt. Minnesota or surrounding states preferred. 507 532-5472 or Box 567-35, c/o BM/E, Thurmont, Md.

Female, announcer, DJ, newscaster desires position in Puerto Rico, West Indies or Mexico. 3rd endorsement. Box 567-12, c/o BM/E, Thurmont, Md.

DJ Broadcast School graduate. 3rd ticket. Jay Jackson, HY 3-2676, 6620 South Drexel, Chicago, Illinois 60637. Negro with R&B experience.

Chief engineer pleasant air personality seeks FM night show D.C. area. Basie, James, Caiola $12,000. Box 567-13, c/o BM/E, Thurmont, Md.

PD/Announcer wants larger market. 12 years all phases. Permanent. Box 567-15, c/o BM/E, Thurmont, Md.

Good music DJ 16 years—3rd ticket—34 years old—desires to relocate. West coast preferred. Box 567-16, c/o BM/E, Thurmont, Md.

Talented, personality jock looking for opportunity in major market. Box 567-17, c/o BM/E, Thurmont, Md.

DJ, announcer, newscaster, experienced unmarried, willing to relocate. Box 567-18, c/o BM/E, Thurmont, Md.

1st Class Engineer with 20 years of experience wants position as working engineer or chief. Desire permanence. Can do all phases of radio. Dan Coltrane, WITL, Lansing, Mich.

Experienced newsman-announcer desires position—Northeast—1st class voice—3rd class license—Box 567-19, c/o BM/E, Thurmont, Md.

DJ-announcer—Negro, 3rd phone, production minded, available now. Box 567-20, c/o BM/E, Thurmont, Md.

HELP WANTED

TOWNSEND ASSOCIATES

TV TRANSMITTER FIELD ENGINEERS

DESIGN ENGINEERS

OUR BUSINESS IS EXPANDING RAPIDLY AND WE NEED QUALIFIED PERSONNEL TO PARTICIPATE IN OUR GROWTH. WE OFFER UNUSUAL OPPORTUNITIES FOR ENTERPRISING ENGINEERS.

Write or Call
Mr. Robert Bromley
P.O. Box 215
Feeding Hills, Mass. 01030

Area Code 413-733-2284

CATV FIELD ENGINEERS

A well-known manufacturer and designer of CATV equipments, builder of turn-key systems and systems owner has several career openings for qualified field engineers and technicians. Please forward a resume of your background and experience, including salary requirements. All contacts will be confidential. Our employees have been informed of this advertisement. **Box 567-22, c/o BM/E, Thurmont, Md.**

First Class Engineer

for TV-Radio operation in medium size North Central Market. One year experience preferred, but will train new man with maintenance ability. Latest RCA equipment. Good salary and fringe benefits. Please send photograph and resume to:
Box 567-23, c/o BM/E, Thurmont, Md.

Broadcast Equipment Marketing & Field Sales

A leading producer of broadcast communication equipment operating on a continuing planned growth program requires the addition of several new personnel in marketing.

Product Management

High level marketing position requiring marketing and sales experience in broadcast equipment. Involves product planning, technical proposals and other marketing management functions. Requires college degree and at least ten years' experience. Top salary plus incentive bonus.

Export Sales

Sales manager position for export of broadcast equipment. Must be college graduate with proven sales ability, technical background and 2-5 years export experience. Fluency in Spanish or French desirable. Salary and bonus commensurate with experience.

Field Sales

Travel and sell electronic communications equipment primarily to AM, FM, and TV stations in exclusive territory. Must be a sales minded self-starter. BSEE or equivalent plus a minimum three years in field of radio broadcasting. Excellent salary plus commission.

To receive complete information concerning the position, company and community send resume to Box 567-21, c/o BM/E, Thurmont, Md.

SYSTEMS ENGINEERS
VIDEO
SWITCHING SYSTEMS

Our rapidly expanding volume of business has created openings for systems engineers familiar with vertical interval switching equipment. Responsibilities include provision of wiring information on rack and control panel equipment for custom switchers. Some station experience and familiarity with audio preferred. Please send resume of experience or call Mr. R. J. Rainey, 201-382-3700.

Ward Electronic Industries

142 Central Ave. Clark, N.J. 07066

CONSULTING ENGINEERING firm needs qualified engineers for permanent addition to staff. AM, FM, TV and microwave projects. FCC, broadcasting, or systems design experience, or engineering degree required. Have positions at several levels from trade school graduate to experienced, registered professional engineer. San Francisco area. Send complete resume to Box 567-25, c/o BM/E, Thurmont, Md.

Hartselle, Alabama WHRT CBS station serving the growing Tennessee Valley area offers a person who is willing to work hard at selling an opportunity for part ownership in a new chain of stations. If you are willing to make 12 calls per day, if you can produce sales, call Gene Newman, 773-2558.

ENGINEERS—TV—Sunny California. Discover job security, and a new way of life in California. Have top openings for qualified Maintenance Engineers, especially Video Tape and Live Color Video. Send resume or letter to The AMPS Agency—3974 Wilshire Boulevard, Los Angeles, California 90005.

By Broadcasters — For Broadcasters

TELEVISION ENGINEERS

We are interested in contacting 10 Station Engineers capable of design or field engineering. Excellent opportunities in TV Development Engineering and Systems Engineering with Sarkes Tarzian, Inc., Broadcast Equipment Division.

TV station engineering experience required, BSEE or equivalent desirable. Send resume of experience, or call, Mr. Biagio Presti, Broadcast Equipment Division, Sarkes Tarzian, Inc., Bloomington, Indiana, Area Code 812, 332-7251.

Symbol of Excellence in Electronics

Established group-owned TV station in the Southeast has opening for video operator with first class license and potential for growing into administrative duties assisting the Chief Engineer. This is a position with an aggressive fast-growing company and has excellent possibilities. Send resume to Box 567-24, c/o BM/E, Thurmont, Md.

Full time Midwest FM and SCA operation, all new equipment, needs full time Chief for regular maintenance. No board, unless you really want it. Age, etc., not important. We want a good man, for a long happy relationship with us. Start yesterday. Reply to Box 567-26, c/o BM/E, Thurmont, Md.

Experienced television studio technician—must be thoroughly familiar with all phases of television studio operating. First-class license required. Contact: Fred Edwards, Director of Engineering Services, WQED-TV, 4337 Fifth Avenue, Pittsburgh, Pa. 15213. 412/683-1300.

Need general maintenance technician with first phone and some experience in broadcasting. Salary commensurate with radio and television maintenance experience. Send resume and phone number to George Wussow, KHSL-TV, P. O. Box 489, Chico, California 95926.

Salesman — 1st phone-announcer. Daytimer. Western Penna. Salary, commission, expenses. Group ownership. Box 567-33, c/o BM/E, Thurmont, Md.

WSVA-TV Harrisonburg, Virginia has immediate opening for transmitter engineer. Willing to train beginner. Primarily operational, but maintenance increases as ability increases. Send resume to Thomas B. Jones, Chief Engineer, WSVA AM-FM-TV, Harrisonburg, Virginia 22801.

Need 1st ticket for chief. Finish degree or get additional hours at Kansas State University while working. Current chief has done this. Is leaving June 1st for home station. You'll like Manhattan, garden spot of Kansas. Lots of fishing and hunting. Lowell Jack, KMAN. PR 8-4451.

Experienced technician for Chicago's "Fine Arts Station." Maintenance, board work and recording Stereo experience desirable. No announcing, good working conditions. Send resume to Chief Engineer, WFMT, 221 N. LaSalle Street, Chicago, Illinois 60601.

First Class Engineer for TV-Radio installation in medium size North Central market. One year experience preferred. Latest RCA equipment. Good salary and fringe benefits. Please send recent photograph and resume to Box 567-27, c/o BM/E, Thurmont, Md.

First Class Engineers, maintenance background, NO board work. Immediate openings. Excellent growth opportunity with independent group. Rush reply by letter to C. Dingmer, WCTC, 385 George St., New Brunswick, N. J.

NEWSMAN. Sober and industrious to handle one-man department. Authoritative voice and style. 5KW eastern station. Name your salary. Send details and tape. Box 567-29, c/o BM/E, Thurmont, Md.

MANAGER for new FM radio station in rapidly growing Eastern Washington city. Sales ability important. Good salary with profit sharing and/or opportunity to participate in ownership. Box 567-28, c/o BM/E, Thurmont, Md.

First phone transmitter shift. 5 KW regional. Production work, five day week, good salary, fringe benefits, recreational area. Send resume to Box 567-30, c/o BM/E, Thurmont, Md.

Experienced TV technician—Video tape and cameras. Excellent opportunity with major systems installer. Allstate Communications, Union, New Jersey, 201/687-8810.

1st class engineer—Music-news station. AM-FM. Southeastern Massachusetts. No board work. Excellent salary. Send details, experience. Box 567-31, c/o BM/E, Thurmont, Md.

"Engineer with some announcing. Small market, good job, no pressure, must do maintenance. 1st class. KTRF, Thief River Falls, Minn."

Opening soon for engineer with 1st class license in mid-Michigan, full power VHF station. Write Box 567-32, c/o BM/E, Thurmont, Md.

Wanted—1st Class Engineer-Announcer, Radio Station WNKY, Box 248, Neon, Ky.

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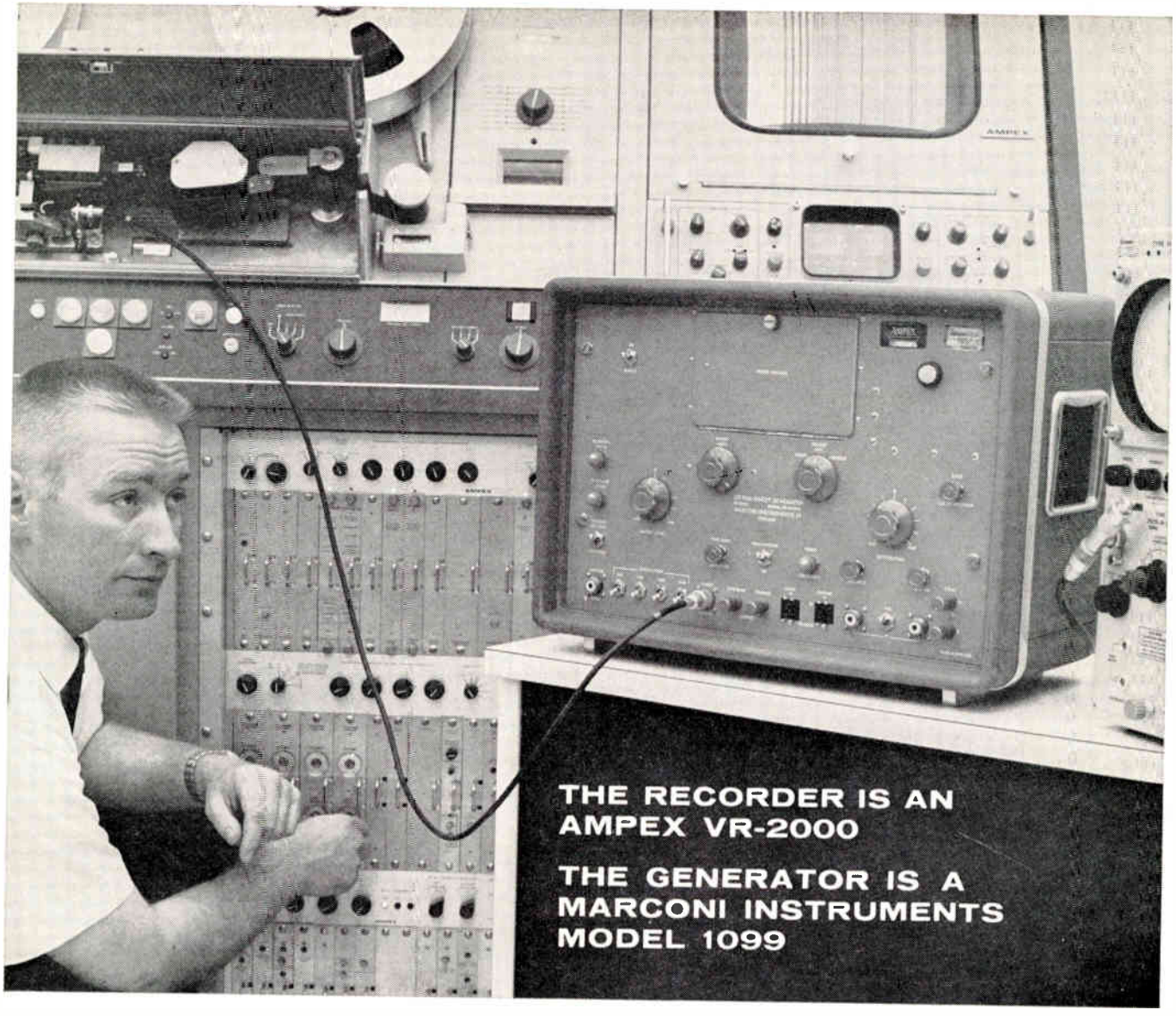

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ENGINEERING
CASEBOOK

Antenna Impedance and Vswr Measurements With Interfering Signals

By William D. Kelly and Lucien Feldt

THE TASK OF MEASURING antenna impedance and vswr in the presence of strong rf fields frequently is encountered in large cities where antennas often must operate in close proximity to each other. The presence of strong rf fields induces voltages in an antenna, resulting in erroneous readings, if not complete masking of test signals.

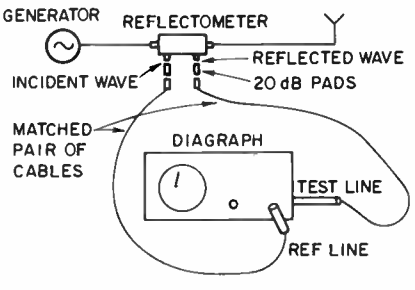
A situation of this kind was encountered in the measurement of impedance and vswr of the WNEW-TV channel 5 antenna atop the Empire State Building. WNEW's antenna is a 5-bay, RCA Supergain (TFS-55), split so that 3 bays are used as the main antenna and the remaining 2 bays are used as auxiliaries. A measurement of 0.5 W was taken at the end of the 414-ft, 3⅛-in. coaxial feed line (feeding 3 antenna bays) with the transmitter off the air. Normally, a reading of this type would be cause for some head scratching. But the situation at this site is a special case. The Empire State Building tower contains nine other TV transmitting antennas, 10 fm antennas and other broadcasting services such as paging services, the New York Telephone Company and others.

Mr. Kelly is vice president and chief engineer of WNEW-TV.
Mr. Feldt is an electrical engineer with Rohde & Schwarz.

Various systems such as the pulse reflection method and impedance bridges were attempted and discarded since they were found to be incapable of eliminating the effect of the interfering signals. Subsequently, Rohde and Schwarz was contacted to determine whether an instrument called a Diagraph (type ZDU) could be used to solve the problem.

The Diagraph is a semiautomatic impedance plotter which presents the test results directly on a Smith chart. It is also a selective measuring receiver with an i-f bandwidth of 70 kHz — a feature which was an advantage in the solution of the problem.

The first attempted measurement with the Diagraph showed that it was subject to the same difficulties as all other instruments. When connected in series with a reflectometer, however, the problem was solved. The series configuration worked so well that it even permitted similar measurements (with the exception of a few spot frequencies) of the adjacent auxiliary antenna with the main antenna on the air.



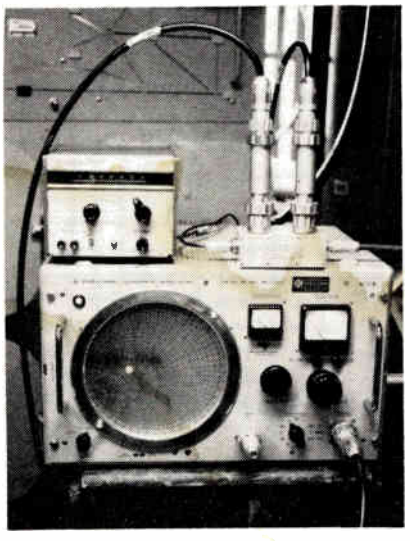


Figure and photo show test setup used to measure impedance and vswr at WNEW-TV. Photo shows spot of light projected on Smith chart showing measurements.

The figure and the photo show a typical setup of the Diagraph. The instrument accepts an external rf source which is reflected from the ends of built-in test and reference lines of equal electrical length. Power reflection from the test line is compared with that of the reference line. The reference line is always terminated in a short circuit, and therefore reflects 100 percent of the rf energy fed to it. After heterodyning, narrowband amplification, limiting and detection, the ratio of the test line reflection to the reference is indicated by a light spot galvanometer which is projected optically onto a translucent Smith chart. The Smith chart then may be rotated to indicate the phase of the reflection of the system under test. Both the amplitude and phase may be read directly without further computation. The removable Smith chart, available in normal and in 3X expanded scale, may be marked and stored for future reference, or may be reproduced and the marking erased and the chart reused.

In order to obtain a valid measurement with the Diagraph, interfering signals must be attenuated to a maximum spot deflection of 2mm. It was found at WNEW-TV that the rf interference was such that 70 dB of attenuation was required to reduce the interfering signals below 2mm.

The test and response lines of the Diagraph are connected to a reflectometer (type ZDP) by means of a pair of matched cables, 2 meters in length. The reflectometer is a dual or two-port directional coupler. The reference coax line is connected to the incident wave port; the test coax line, to the reflected wave port. The rf source is connected to the input of the reflectometer and the system under test (antenna) to its output. The directional couplers of the

Diagraph are thus connected in series with those of the reflectometer. Due to the use of the reflectometer, the residual vswr increases to a value between 1.02 and 1.03. The normal frequency range of the type ZDP reflectometer is between 300 and 4200 MHz. At 76 MHz it has a coupling attenuation of 52 dB. To obtain the required 70-dB minimum attenuation, a 20-dB (DPF) pad is inserted between the Diagraph coaxial lines and each of the ports of the reflectometer.

The sensitivity of the ZDU Diagraph is 7 mV for full-scale deflection (100mm) of its light spot galvanometer. The rf source thus has to provide sufficient power to overcome the combined reflectometer and the series pad attenuation. For full-scale deflection of the Diagraph, the incident voltage in the ZDP reflectometer is 7 mV X $10^{70/20}$ or 22 V, hence the rf source must deliver a minimum of 10 W. This calculation is based on the assumption of an interfering signal reflection of 2 percent maximum, or 1.03 vswr. Thus using the data compiled at WNEW (see data table), the total measuring error of the system is

$*r = 0.015 + 0.02 = 0.035.$

This corresponds to a vswr of 1.07. In order to reduce the measuring error to a vswr of 1.05, the output power of the rf source must be increased to 40 W and an additional 6 dB of attenuation must be inserted at each port of the ZDP reflectometer. ●

Data Table

*r = reflection coefficient
r of 0.015 = 1.03 vswr or residual of the system
r of 0.02 refers to 2mm light spot deflection due to interference
(ZDU Diagraph full-scale deflection is 100mm.)

Editor's Note: The Diagraph was developed in 1952 by the late Dr. Eichacker, director of the Rohde and Schwarz Microwave laboratory in Munich, Germany. Much credit is due Dr. Eichacker who suggested the technique which resulted from the satisfactory solution of the problem of impedance and vswr measurements of TV and fm antennas in the presence of strong interference signals.

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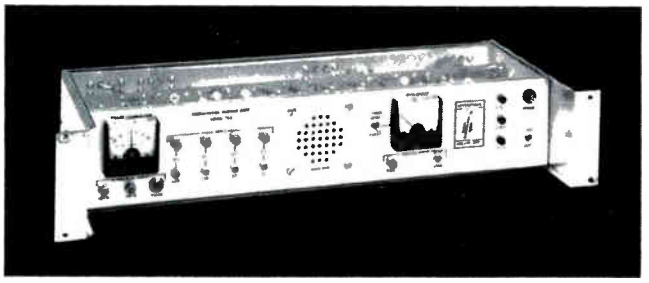

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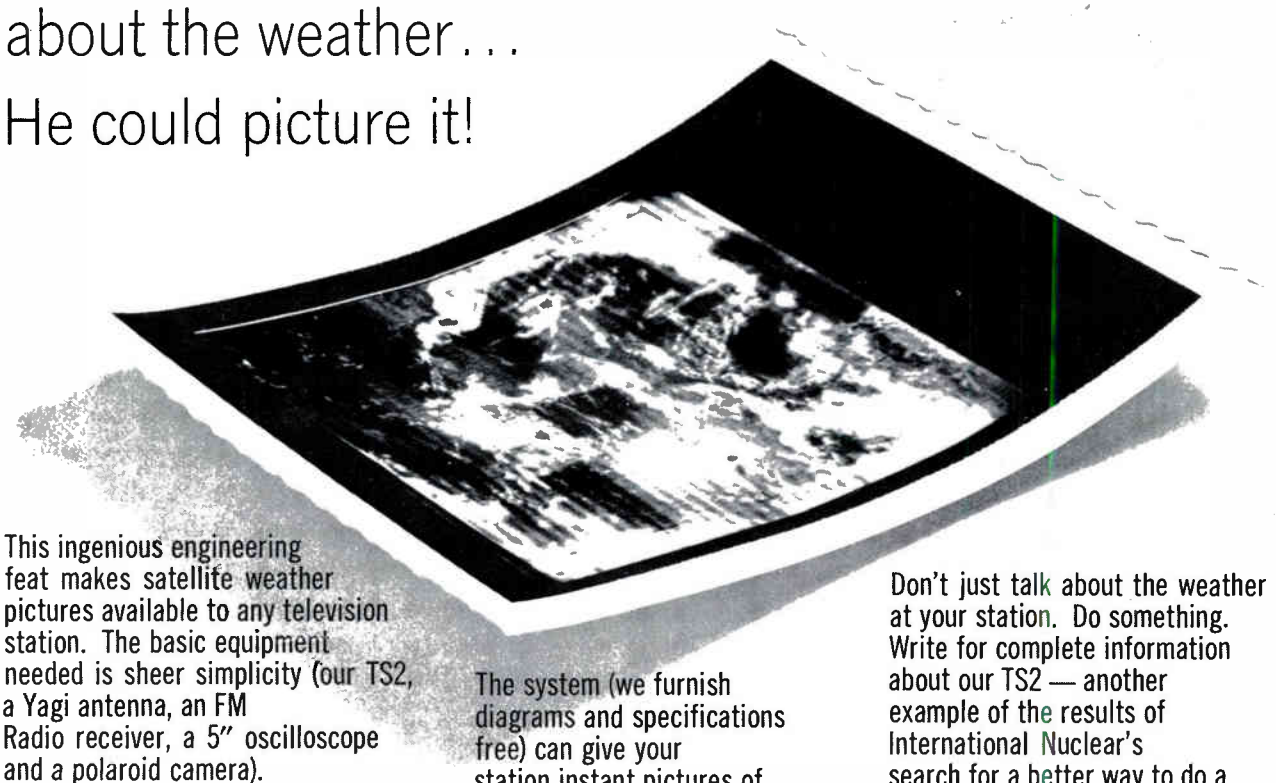

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