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quality video test equipment used to be expensive till NEWLINE got into the picture.

"Newline" is Riker's answer to the growing need for quality video test equipment at a price any station can afford. Through use of specially designed solid-state circuits, the economical "Newline" series is able to provide the same highly stable, long-term reliable operation typical of all Riker video equipment.

Only $1990 buys Riker's *"Newline"* Video Test Set Model 6601. Compact and light in weight, this trim unit is built to the same Riker standards as the widely used, field proven Model 1500 series. It has every feature needed for high quality video testing, including multiburst, linearity, and $\sin^2$ window.

Only $1990 also buys Riker's *"Newline"* Sync Generator Model 6620. Frequency reference on this new generator may be selected for crystal, AFC (power line lock) or sync lock operation. Master oscillator circuitry is expressly designed for precise timing accuracy.

If you're building video test and quality control capability on a budget, be sure to investigate the complete Riker *"Newline"* series. And if only the best will do for your station, just ask for Riker's standard video equipment.

Riker is the one company in the TV Broadcast industry offering a complete line of all solid-state instrumentation for video analysis, simulation and control. Call today for details.

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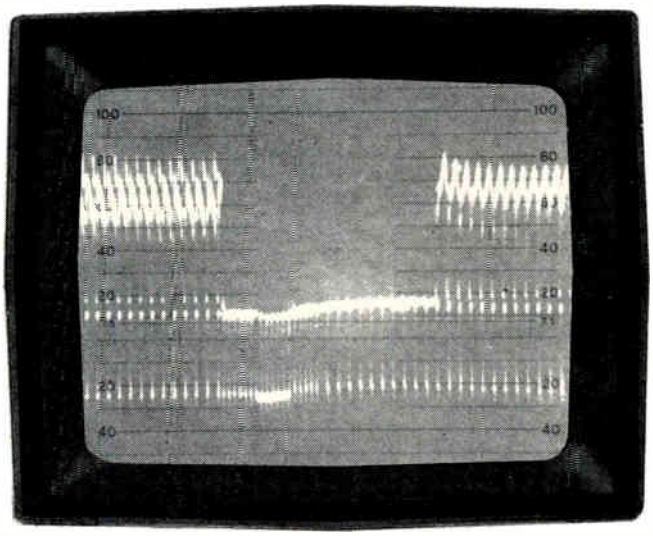
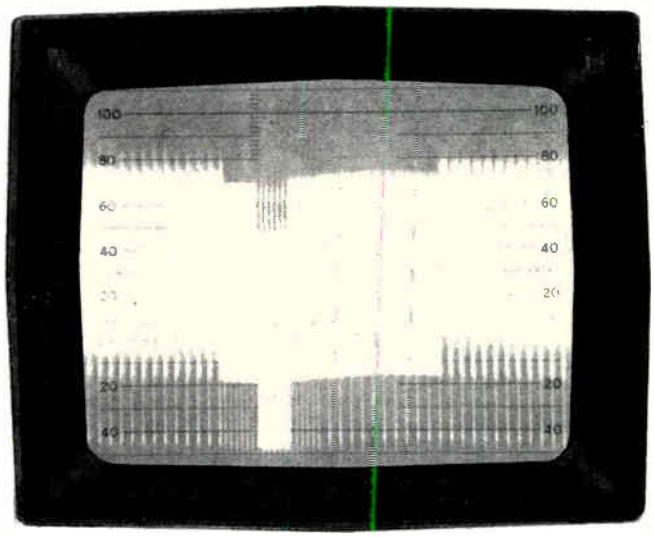


Triggers on clean signals.



Triggers on noisy signals, too!

NEW All-Solid-State hp 191A TV Waveform Oscilloscope triggers faithfully and locks on video signals from network, studio, remote, or transmitter—*even when the signals are noisy!* With the 191A's digital field select, you can look at an individual line and know you're seeing what you want to see! Look at VITS by using the discrete LINE SELECT for lines 16 through 21. The 20 kV acceleration potential in the CRT gives you a bright, crisp trace—even when you're looking at fast-rise-time sine-squared T/2 pulses, at X25 magnification.

Use the 191A as your station standard. The all-solid-state 191A was designed in cooperation with broadcasters to meet broadcast requirements. It is the new standard in VITS measurements—with reliability proven by interstate TV transmission companies. Use it to calibrate your other monitoring equipment, and for color or black-and-white setup measurements. It requires only 70 watts for operation—and needs no fan for cooling. You can rack mount it, or stack it without providing extra ventilation!

Use the 191A to make your VITS measurements with 1% accuracy. High tolerance filter design, the constant phase delay amplifier and the parallax-free 8 x 10 cm internal graticule combine to give you this accuracy. Use it on remote telecast, too. It has a temperature operating range of −4°F to +149°F.

Use the 191A probe input on the front of the scope and the 10′ hp 10009A Probe for troubleshooting composite TV waveforms. Probe tip is WECO Type 477B connector for easy connection to patch boards. Troubleshoot your equipment without disconnecting feed-through broadcast signals.

You'll find the 191A is more expensive than other scopes, but when you compare all the advantages and features, you'll know it's worth every cent! It's the scope designed to meet today's requirements and tomorrow's demands! Contact your hp field engineer for full specifications. Or, write to Hewlett-Packard, Palo Alto, California 94304, Tel. (415) 326-7000; Europe: 54 Route des Acacias, Geneva. Price: hp Model 191A TV Waveform Oscilloscope, $1475.00; hp Model 193A (similar to KS19763 except for nomenclature) for interstate television signal relayers, $1550.00; hp Model 10009A Probe, $50.00.

087/21

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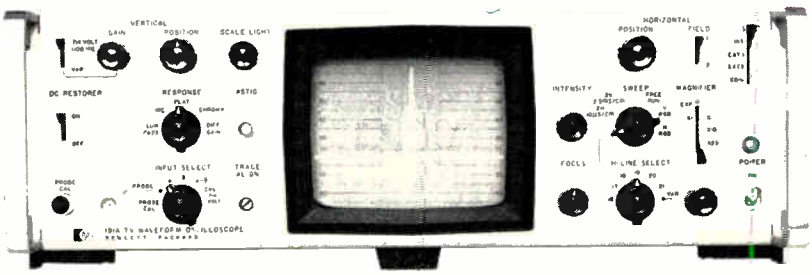

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World Radio History

AUGUST 1967/VOLUME 3/NUMBER 8

BM/E

BROADCAST MANAGEMENT/ ENGINEERING

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This month's cover: TV by any standard is a youthful medium, When used to instruct youth, it becomes of, by, and for youth, as students frequently produce, direct, and evaluate their own performance. No camera director is quite as young as Nicholas Sauter, age 5, who got a chance to perform at WNYC, channel 31, as we shot this month's cover. Channel 31, an N.Y.C.-owned station, has a heavy schedule in training aimed primarily at adults—city policemen, firemen, hospital administrators and other civil servants.

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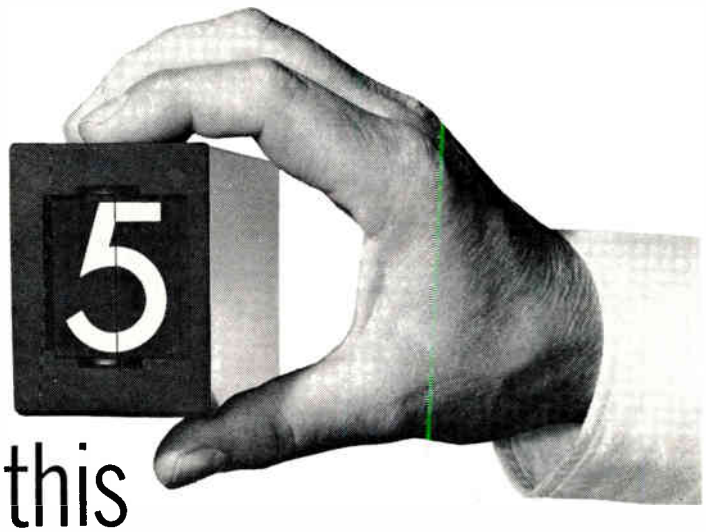
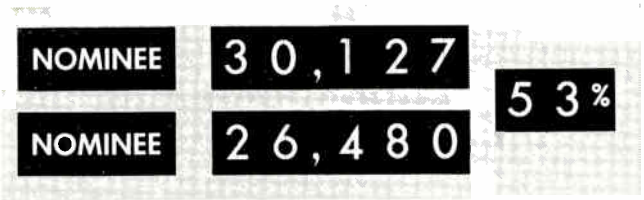
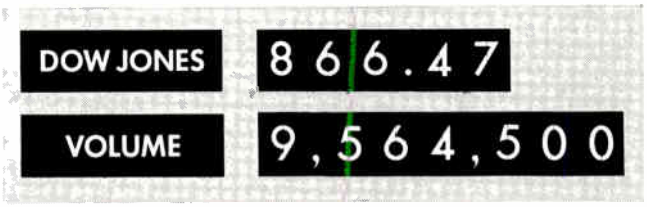
Look what your cameras can do with display units like this



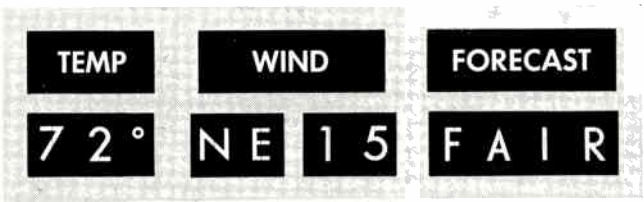
CBS Laboratories' Digital Display Units are part of a low cost, compact system that works daily wonders in any size TV studio!



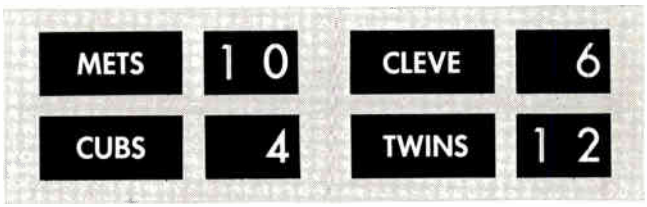
ELECTIONS – No contest.
These modular units were designed specifically for TV use to give optimum clarity up to 70 feet — from any camera angle up to 145 degrees.



STOCK REPORTS – Excellent for the long pull.
Rugged electro-mechanical operation is fool-proof and built to last. No bulb burn-out or the other problems of rear-illuminated displays.



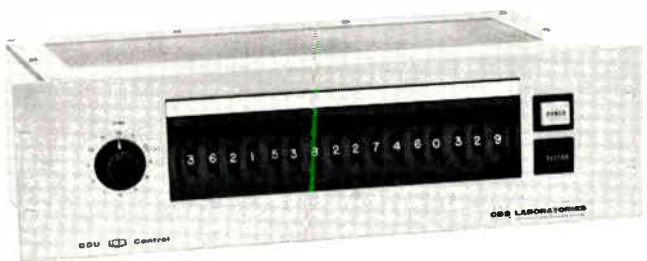
WEATHER – Cool operation.
Only 2.7 watts required per unit, with no power between postings. Glare-free even under the strongest lighting conditions.



SPORTS – An easy set-up.
Just stack these units in a flat to suit any requirement. Custom designed matrix wiring also available for complete flexibility.

And all operated by one Controller that can handle 192 units — as many as 12 groups of 16 units each. This means up to 12 two-candidate election races; or runs, hits and errors for all major league teams; or 40 local stock issues plus volume and Dow Jones closing. A one-time investment for the professional way to take care of all your daily display needs.

Our engineers will even design your system for you. Don't take our word for it. Write or call us collect (203) 327-2000, and let us show you.



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BROADCAST INDUSTRY NEWS

Hyde Calls for 'Spectrum Pollution' Control

FCC Chairman Rosel H. Hyde asked for industry cooperation to help solve the growing interference problems between fm radio and television. Speaking before a Government Industry Symposium of the Electronics Industry Association in New York, Chairman Hyde said the FCC had received more than 35,000 interference complaints in the past year, caused by electronic garage door openers, electronic toys (such as walkie-talkies), industrial equipment like electronic heaters, diathermy machines, welders and radio and television sets.

Under present procedures, the consumer is the subject of any enforcement action. The Commission with the support of the Electronic Industries Association, however, has recommended legislation that would give the FCC authority to deal with interference by requiring manufacturers to meet specific standards designed to eliminate spectrum pollution.

Broadcasting Printed Copy To Be Tested

Broadcasting printed copy into the home along with standard television programming will be done on an experimental basis by RCA.

The FCC has authorized NBC to use station WNBC-TV in New York for tests. The experimenting, however, will be done during non-scheduled programming hours. They will continue for a period of six months between New York City and Princeton, N.J.

The authorization provides for a detailed report on the project to be submitted to the Commission at the close of the experimental period. Effects of aircraft on the transmission, the effect of atmospheric variations and the performance of the system with "normal transmitting practices and viewing habits" will be studied.

Dr. James Hillier, vice president, RCA Laboratories, said that the system has the potential to bring about a dramatic advance in home information services by making it possible to print information of a newsworthy nature right in the living room along with normal TV reception. However, he emphasized that it will be a few years before an operating system might be available to the public.

Dr. Hillier pointed out that the system will not require any additional radio frequency spectrum and will not in any way limit present television services.

The facsimile signals are inserted during vertical blanking intervals. With present equipment four different printed messages can be transmitted simultaneously.

Emmy Equipment Awards

An Emmy award for the development of high band color videotape recording was presented to Ampex Corporation by the National Academy of Television Arts and Sciences at the 19th annual Television Academy Awards program. Thomas E. Davis, vice president and general manager, Audio/Video Communications Division, displays Emmy by photo of Ampex VR-2000 high band color videotape recorder.

The National Academy of Television Arts and Sciences also presented N.V. Philips Gloeilampfabrieken with an Emmy for the Philips' Plumbicon camera tube, considered by the Academy's blue ribbon of technical experts to be an outstanding achievement in engineering and development. The Plumbicon image tube is recognized as a major contribution to electro-optical science. For its development, Dr. E. F. de Haan, a director of N.V. Philips Research Laboratory, was awarded the 1966 David Sarnoff Gold Medal By the Society of Motion Picture and Television Engineers.

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Microwave links — for *now* TV. Bring local news and specials to the people that matter most . . . while they're happening, from where they're happening. Visiting VIP's, community functions, local news and sports. All live, all exclusive, all under your control with a minimum of fuss. In color or black and white.

All-solid-state microwave television links. Suitcase size, lightweight, run on a car battery (or 115 VAC), and reach out 30 miles or better. There are no tubes, no high voltages, no mechanical relays anywhere in the system. Just dependable, drift-free semiconductor components, including a solid-state RF source instead of a klystron.

Proved in action by more than 100 commercial TV installations around the world. Used in helicopters, blimps, jeeps, vans and station wagons, golf carts, and one space needle. Meet EIA and CCIR video and audio requirements and recommendations for both color and black and white.

More details on TV pickup, STL, and intercity systems in Catalog SF-9501. Yours on request.

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'Able Cable' Sees Victory and Vindication

NCTA conventioneers ended their 16th annual convention on Cloud Nine. This ethereal community would be forever fed by a giant umbilical coaxial cable.

The opening session was intoxicating, as speaker after speaker, talking about the communications explosion, said technological change had outmoded current communication systems and practices. To free the airways for mobile communications, to reduce interference in an overcrowded spectrum, and to distribute economically on the ground, satellite transmissions, cable would be needed. Cable was also viewed as absolutely necessary if the American home is ever to get not three or four or even 12 or 20 channels but hundreds devoted to facsimile transmission of newspaper and books, educational and business visual media, and data suitable for retailing and banking by computer.

Congressman Torbert MacDonald, chairman of the Subcommittee on Communications and Power, at Monday noon called for a complete revision of the Communications Act of 1934 to cope with new technology such as satellite TV and CATV.

Immediately prior to the luncheon, Al Stern, NCTA chairman 66-67, said that although, collectively, problems facing CATV were overwhelming it was his absolute conviction that ". . . nothing will stop the CATV industry from becoming a major factor in communications."

Monday evening Robert Beiswenger, President of Jerrold, exuded confidence for the future and through the show of force of Jerrold troops demonstrated there was a formidable group out making CATV a way of life.

Tuesday noon FCC Commissioner Lee Loevinger, cheered cable operators on by recommending that they dedicate a channel to public service—service on a local basis that broadcasters aren't able to provide. The presence of a brilliant articulate Commissioner, long identified in opposition to the FCC's method of obtaining regulatory control of CATV, buoyed the convention members.

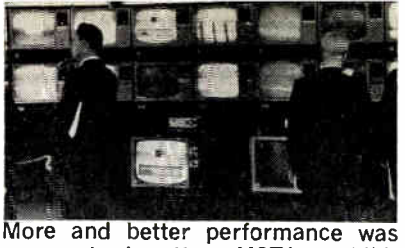
Wednesday morning, distinguished broadcaster, J. Leonard Reinsch, president of Cox Broadcasting called for a revamping of FCC control to give every community wide TV coverage, exorcized fellow broadcasters for hampering CATV, and vindicated cable from the abuse heaped on it by declaring that cable operators had shown the way to bringing TV to every community by an economical method in the best interests of the public and without artificial government stimulus.

Caught up in the exhilarating mood already prevalent, the usually cautious and sober NCTA president, Fred Ford, declared on the last day that the convention was a blockbuster. Settling copyright issues and court cases and procedural problems within the FCC was not enough, Ford said, and he too called for a complete revision of the Communications Act of 1934. "Its structure and charter is inadequate for the task at hand," Ford said. [Shortly thereafter on July 7, the FCC did announce a study of new specialized communication developments embodying CATV, and signal distribution for other than TV purposes.]

Earlier Ford masterfully coalesced the diverse CATV forces about him by identifying a common enemy. Said Ford, "There is no danger that CATV will be eliminated from the national scene. The only basic issue is who is going to own the industry." Calling CATV operators economic underdogs, Ford rallyed them to fight the intrenched interests in communications: the telephone companies, broadcasters, and now copyright holders.

Spirits were high early Monday morning but by Wednesday evening they couldn't be capped. No doubt conventioneers came in a buoyant mood. Judging by the conviviality and celebrations being shown in the hospitality suites even on Sunday evening (the seventh floor of the Palmer House must have out-swung Rush Street for the four days), no one was in a depressed mood.

Perhaps the only note of alarm that could be observed from this summit of headiness is that no one was really apprehensive over the precarious standing the industry has today. President Ford in his remarks reminded the group that the copyright bill in Congress is not settled, that the merit of the appeal to the Supreme Court over the United Artists vs. Fortnightly case will not be known until the latter part of the year, that the Eight Circuit Court case on the legality of the FCC First and Second Reports and Orders will not be known until later. It was then that he threw in the frightening prospect of larger interests



More and better performance was apparent in the NCTA exhibit section. Jerrold's twenty-channel service, claim reflected the clime . . .

Conventioneers were interested in exhibits, as this photo taken Sunday after ribbon cutting shows . . .

There was heavy emphasis on local origination. Hotel's MATV was piped with CATV matters originating from the Lower Exhibit Hall. Sylvania supplied and manned control room but various manufacturers' equipment was used . . .

FCC Commissioner Lee Loevinger, far right, became unexpected guest on a cablecast interview . . .

Six o'clock convention news on Tuesday was provided by BM/E Editorial Director Jim Lippke . . .

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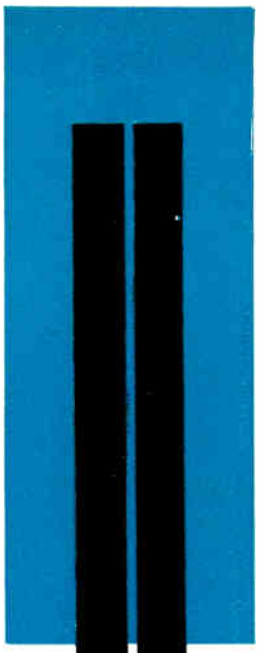
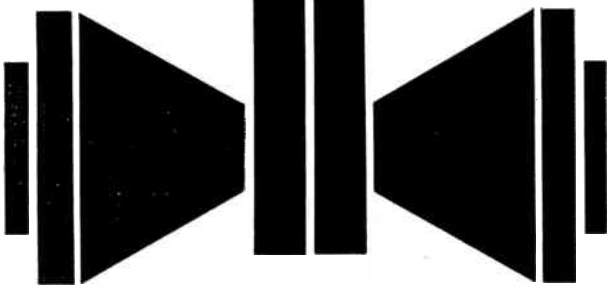


YEARS AHEAD IN VIDEO SWITCHING DESIGN

CAM 1	CAM 2	CAM 3	FILM 1	FILM 2	VTR 1	VTR 2	NET	REM.

CAM 1	CAM 2	CAM 3	FILM 1	FILM 2	VTR 1	VTR 2	NET	REM.

ALL SOLID-STATE VERTICAL INTERVAL SWITCHERS



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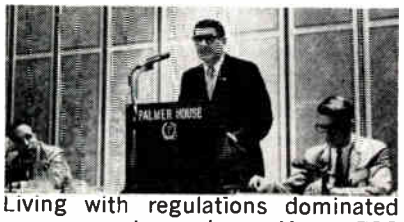
To promote local film showing, Tele-Mation and Modern TV had drawing to provide free equipment and film for 6 months. Winner was Frank Vielma, Rio Grande TV Cable Co., Eagle Pass, Tex.



Living with regulations dominated management sessions. Here, FCC CATV Task Force Chief, Sol Schildhause, introduces panel . . .


Five-minute rest period during management session . . .


Jerrold Task Force says nothing will stop CATV at courtesy reception and dinner . . .


Elated equipment salesmen, happy with the CATV world, live it up the final night by taking memberships (33) in new "Charge-A-Vice" credit card club. Ringleaders are Bruce Frazier (front center) and Lloyd Tate (right), both SKL.

Next month, photo tour of exhibits.

taking over ownership. But this wouldn't happen if courts and Congress see CATV the "true" way, Ford said.

Apparently convinced of the inevitableness of fair laws and favorable court decisions at the higher levels, members didn't critically question the lawyers present who have been fighting the battle. E. Stratford Smith, of Smith, Pepper, Shack and L'Heureaux, who was billed as the expert on section 111 of the copyright bill, amused the audience over the complexities of its meaning but did not put forth a platform clarifying the issues.

Thomas Wilson, of Dow, Lohnes and Albertson, saw clear anti-trust implications if copyright holders got their way since, according to Wilson, eighty-five percent of copyright holders that might have a claim against CATV operators are represented by only 14 individual entities. "This is tremendous concentration of copyright amongst the very few," Wilson said. Yet he failed to observe the success or lack of success that broadcast interests, continually referred to a "powerful" by other speakers, had in breaking up this monopoly.

Robert Barnard, of Cleary, Gottleib, Steen and Hamilton, counsel for the defendant in the United Artists vs. Fortnightly case, said the real issue was not how much a CATV system contributed to a public performance (the court's position was that the Fortnightly CATV contributed in a large magnitude) but whether a public performance ever took place at all. Barnard cited the ambiguity that will result in applying the court's ruling to other CATV operators (that is, interpreting magnitude, normal antenna, etc.) but spent no time supporting the argument that there was no performance in the first place. By dwelling on the extreme interpretations that could be drawn from the District Court's analysis, Barnard left the impression that the decision couldn't stand and that the Supreme Court would certainly have to rescue the situation.

A convention goer might have asked. "What if the Supreme Court elects not to hear the case?" Then a legislative solution would have to evolve since, to use Wilson's words, it is conceivable that the industry would be left to face the propect of paying staggering retroactive copyright payments (the minimum for each violation is $250).

But since no forthright legislative program was spelled out or reiterated, the problem as stated by the Deputy Registrar of Copyright, George D. Cory stood. Cory's recommendations for CATV operators were: no liability in a fill-in areas; full liability if the copyright holder's rights are infringed; and limited liability if the copyright holder's interests are directly damaged. No one discussed how grounds for limited liability might be determined.

CATV Investments Appear Sound

If the legal ramifications affecting CATVs are less than clear, it is not quite so bad from the financial viewpoint. Monroe Rifkin of Daniels Associates pointed out in a session devoted to CATV and the financial community that whereas once CATVs needed equity capital entirely, now commercial banks, pension trusts, insurance companies and investment bankers will provide purchase or construction capital.

The year 1966, however, was not a good one because of the tight money situation, Second Report and Order, and the unsettled copyright issue, Rifkin said. Further, some individual CATV systems did not meet projections planned and some loan requirements had to be deferred.

To meet the needs of public corporations investing in CATV, cash flow accounting and evaluation methods are giving way to maximizing earnings. Accelerated depreciation and amortization methods are being changed to 10 and 15 years to increase annual earnings. Rifkin predicted fewer runaway price levels in the future as more rational and conservative investment logic is brought to bear in buying situations.

Hard Sell Times Here

It is also apparent now that in very few instances will subscribers beat a path to the CATV operator's doorstep. Even if a community is getting spotty reception, advertising and promotion is not enough to make a sale and door-to-door selling is necessary.

Dan Aaron, International Equity Corp., defined the objectives of sales promotion and selling: maximum response in the shortest possible time at the lowest cost per subscriber. Direct selling may increase the cost per subscriber to $8 to $10 compared to the $4 once possible when subscribers came to you.

(Continued on page 66)

World Radio History

IC's are in... IF's are out!

New TR-66A SCA Multiplex Receiver has no tuned circuits.

In the multiplex field McMartin was first with heterodyning, and solid-state . . . and now is first with solid-state IF's and integrated circuits — those tiny silicon wafers first developed for rocketry and computers. The jump from transistors to IC's is as big a leap as from tubes to transistors.

The solid-state IF strip is invulnerable. There are no moving parts, nothing to "diddle" with. Dropping or jarring won't do anything. Temperature changes cannot affect performance. With Field Effect Transistors used in the RF section, overload characteristics are *very good*. Thus, there is no cross-modulation.

The all new TR-66A is now available. Accessories include the "piggyback" LT-10A, 5-watt and the LT-20, 12-watt basic amplifiers; MPA-20, plug-in microphone pre-amp; A-72-SF outside antenna and the A-72-PA indoor antenna; and rack panel assembly.

Order your new TR-66A's today; or write or call for literature.

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Omaha, Nebraska 68102

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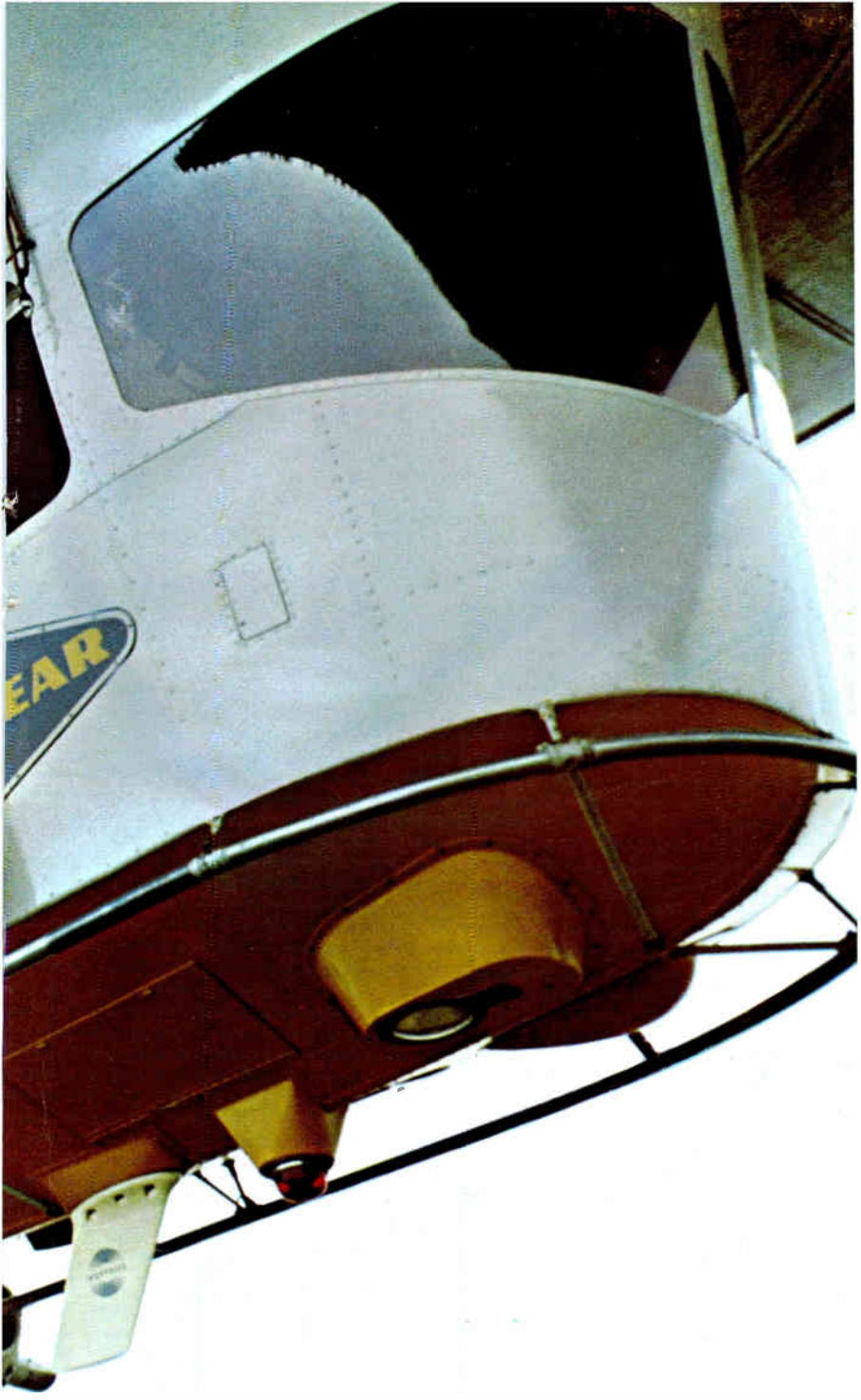

The PE-250 can "fly" for you, too...

Goodyear recently bought the General Electric PE-250 live color camera—on broadcasters' recommendations—for those famed blimp pickups in major network sports and news events.

This application—far more demanding than most studio and remote uses—is further convincing proof that the GE PE-250 is the world's finest all-around live-color camera.

Only the PE-250 met all these *must* requirements:

Performance: Finest consistent color pictures. Outstanding reliability and stability. Superior low-light-level pictures.

Operation: Low maintenance cost. Low power demand. Minimum set-up time.

Design: Lightweight, compact. Maximum installation flexibility. Superior ruggedness for remote operation.

Acceptance: By the most critical users.

Prove these points for yourself. Come to Syracuse. Watch the PE-250 being built and tested under GE's advanced Total Quality Control System. See your own personal demonstration of its unexcelled performance.

The PE-250 can "fly"—figuratively—for you too. Its performance, operation, design, and acceptance have made it the world's finest all-around live-color television camera.

Visual Communication Products Department, Electronics Park, Syracuse, New York 13201. GE-48.

GENERAL ELECTRIC

World Radio History

INTERPRETING THE FCC RULES & REGULATIONS

THE FINANCIAL SHOWING

ALL LICENSEES are familiar with the financial portion (Section III) of an application for construction permit (Form 301). Few, however, are cognizant of the tremendous number of cases and thousands of man-hours that have been expended in litigation relating to the showing necessary to meet the Commission's financial requirements. These requirements affect those who may be applying for: (1) a major change in facilities; (2) transfer of control or assignment of license; (3) renewal; (4) any application that estimates $5000 or more in expenditures; and, of course, (5) new stations.

Since the earliest days of broadcasting, the Commission has required an applicant to show that he is financially qualified to construct and operate a broadcast facility. Section 308 (b) of the Communications Act provides, in part, as follows:

> "All applications for station licenses . . . shall set forth such facts as . . . to citizenship, character, and *financial* . . . and other qualifications of the applicant to operate the station. . . ."

Analysis of the Commission's financial requirements should prove helpful to existing licensees and applicants.

Analysis of Section III (Financial)

Paragraph 1 (a) requests information relating to costs of: (1) equipment; (2) antenna system; (3) land for antenna and/or studio site; and (4) other expenses such as legal and engineering fees. All of these items can be supported by estimates from reliable sources. Usually, a simple letter from a recognized supplier is utilized. The two most nebulous and challenging portions of this paragraph relate to: (1) estimated cost of operation for the first year; and (2) estimated revenues for the first year.

Estimating the first year's estimated *costs of operation* by an applicant—in a manner that will withstand cross-examination—may not be as simple as first impression may indicate. When the applicant computes this figure, he should consider his programming and staffing proposals carefully. For example, if the applicant proposes extensive *local* programming, his staff proposal must be greater than that of otherwise comparable stations. Since the Commission tends to equate "public service" with the extent of proposed *local* programming, those involved in comparative hearings with other applicants are well-advised to propose a staff larger than average. Obviously, this increases proposed operating costs and, hence, the overall financial requirements.

The first year's *estimated revenues* create a problem only if the applicant intends to rely thereon for *any* portion of his financial commitment. The problem is one of *proving* (to the Commission's satisfaction) that the analysis of estimated revenues is correct. When an applicant reflects a "thin" financial picture and relies on projected revenues, the latter assumes monumental importance.

Paragraph 1(b) requests justification of the figures employed in response to 1 (a) (above). Antenna and equipment costs can be justified by obtaining a letter from a reliable supplier setting forth these various figures. The purchase or leasing of land, office space, and remodeling or construction of buildings may be justified by various means such as: (1) options to lease or purchase; (2) contracts of sale; and (3) estimates from bona fide contractors as to costs of remodeling or construction. Estimates of the first year's cost of operation and revenues may be based upon: (1) experience as a broadcaster in the same geographical area; (2) general broadcast experience elsewhere: (3) survey of similar stations in the same market; (4) survey of commercial establishments in the market to ascertain interest in advertising; (5) survey of population to ascertain interest in proposed programming as a gauge to approximate audience that would attract advertisers; and (6) numerous other methods.

Paragraph 1 (c), 2, 3, and 4 are basically designed to elicit the details of an applicant's ability to meet his financial commitments as outlined in Paragraphs 1(a) and (b).

Comparative Hearing Problems

An applicant who does not anticipate having his application consolidated in hearing with competing applications may generally employ the overworked characterization of "reasonableness" in estimating his expenses and revenues. Additionally, if the financial showing relating to the applicant's ability to meet expenses is not adequate or clear, a simple amendment setting forth additional details will usually satisfy the Commission. However, when a hearing with competing applicants is anticipated, a markedly different situation arises.

(Continued on page 16)

This section, providing broad interpretation of FCC rules and policies, does not substitute for competent legal counsel. Legal advice on any given problem is predicated 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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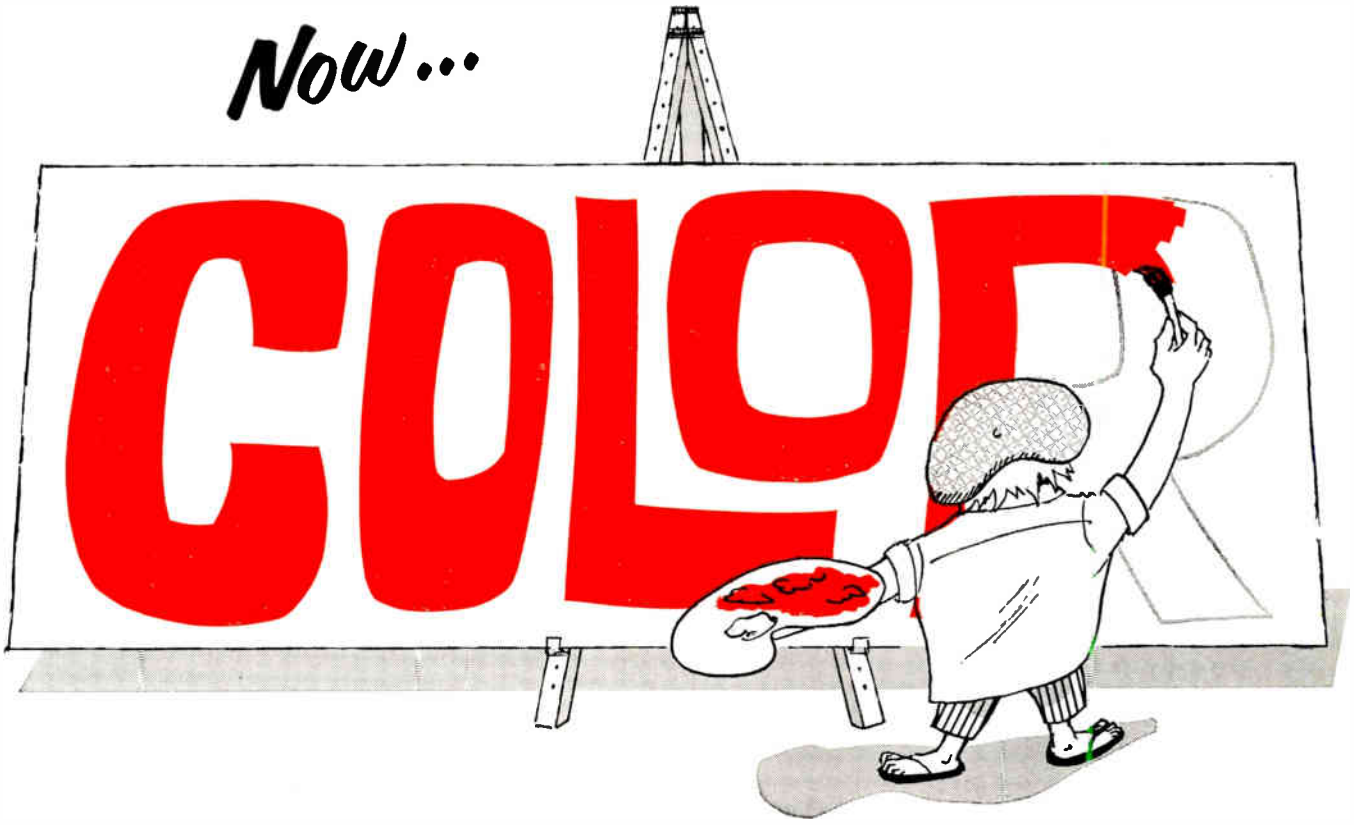

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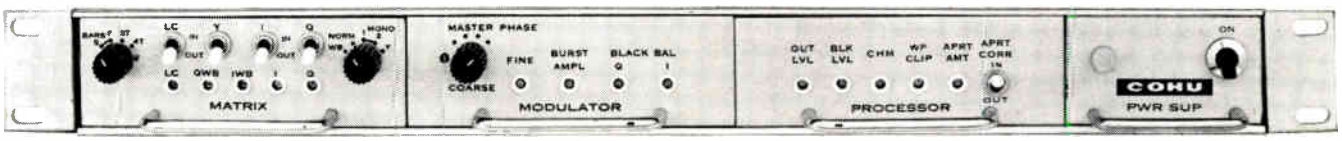

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In comparative hearing, one's application will *not* be considered with the "comparative criteria" (*BM/E,* Nov. 1966) unless the basic financial qualifications have been met. In other words, the financial showing is of a "threshold" nature, a condition precedent to the comparative phases of the hearing. The Commission has stated:

> "Where one applicant in a competitive proceeding has not been found by the Commission to be financially qualified, an affirmative showing will be required that such applicant is so qualified before it is entitled to comparative consideration with the other applicants in a proceeding. . . ." See *Brush-Moore Newspapers, Inc.,* 9 RR 922 (1953).

Basic qualification issues affect an applicant's ability to meet the minimum standards required of all applicants by the Commission. If an applicant cannot make an adequate showing, proof that he can meet his financial commitments, his application fails. With respect to this issue, *the main question relates to the applicant and his financial proposal.* It makes no difference that one applicant has more funds than another; *the major point is whether each applicant can justify his own financing scheme.* "The fact that one applicant has demonstrated greater financial strength will not be given weight in deciding whether to make a grant of it or to a competing applicant whose financial situation is adequate for carrying out its proposal if it is awarded a construction permit." See *Northeastern Indiana Broadcasting Co., Inc.,* 9 RR 261 (1953). However, if greater financial strength is pledged to more local programming, better equipment, and hence more public service, a comparative advantage may be achieved.

During the 30's and 40's, the Commission adhered to the basic premise that, in order to be financially qualified, every applicant must be able to meet: (1) *costs of construction, and (2) expenses for operation of the station over a reasonably extended period of time.* See *Radio Enterprises, Inc.,* 7 FCC 169 (1939). During the initial planning for a-m facilities, many applicants found it extremely difficult to prove that there would be adequate advertiser support. Those applicants relying, at least in part, upon projected revenues, were required to make an evidentiary showing that businesses in the community would support the station. Where an applicant for a new station had secured advertising commitments of $2,741.85 per month, thus indicating adequate commercial support, this overcame the claim of an existing station that the community could not support another station. See *Capitol Broadcasting Co.,* 6 FCC 72 (1938).

During the 1950's, with the meteoric growth of TV and fm facilities, it became evident that the portion of the Commission's financial criteria (relating to the availability of financing to meet operating expenses for a *reasonable period of time)* required more explicit definition. Too much time and effort had been spent in haggling over the interpretation of "reasonable period of time." Therefore, *the Commission established a more definite criteria.* Applicants must demonstrate adequate financing to meet costs of construction plus *the first three months' operating costs.* The Commission said:

> "The Commission in considering an applicant's financial qualification is not concerned with the question of whether, *in the long run, a station can maintain* itself economically . . . An applicant who has sufficient funds available *to build and operate his station for at least three months is* financially qualified . . ." (Emphasis supplied.) See *Sanford A. Schafitz,* 24 FCC 363; 14 RR 582 (1958).

The new criteria established a practical pegboard upon which the Commission and all applicants could base their analyses. However, the early 1960's witnessed a veritable deluge of new applications for fm facilities; additionally, with the advent of the all-channel receiver law, applications for new uhf television stations increased appreciably. Many of the new applications were in markets where there were numerous facilities in the same broadcast service. Naturally, the major networks were affiliated with the vhf stations. Since these stations covered larger areas (thereby delivering larger audiences), the ability of a new uhf station to attract network affiliation was practically nil. Since, from the outset, the economic viability of uhf was poor, many individuals decided to obtain a uhf construction permit and "sit on it" until the economic climate changed. The Commission was so anxious to encourage uhf activity that they were most lenient in applying the financial requirements. As a result, many financially weak applications were granted, and construction permits were held for years without any construction. The Commission finally realized that it must augment financial requirements to avoid further useless grants of uhf CPs. Finally, the Commission's concern was evidenced by the promulgation of new financial qualifications criteria. On June 30, 1965, the Commission adopted these new guidelines in the pivotal *Ultravision* case (*Ultravision Broadcasting Co.,* 5 RR 2d 343 (1965)):

> "Applicants for commercial uhf television stations in markets where there are three commercial vhf television stations will be required to submit evidentiary proof relating to estimated construction costs and estimated operating expenses during the first year of operation. The applicants should not encounter any particular difficulty in submitting evidentiary proof concerning amounts allocated for staffing, programming, fixed charges and other expenses during the first year of operation, and in establishing that the funds allocated for programming are reasonably likely to suffice for effectuation of program proposals."
>
> "*Applicants* for commercial uhf television stations in three-vhf-station markets *should be permitted to demonstrate their ability to meet all fixed charges and operating expenses during the first year of operation* either by proof that adequate funds are available and committed for the purpose without income, or by a convincing evidentiary showing that the available and committed funds will be supplemented by sufficient advertising or other revenue to enable the applicants to discharge their financial obligations during the first year. *Where viability of the proposed facility during the first year is dependent on income, the accuracy of the estimate becomes a critical factor in determining whether a continuing operation is likely.* In such cases, it is essential that applicants demonstrate the soundness of figures submitted. Where applicants are able to demonstrate financial ability to meet costs and expenses for the first year without income only because the first monthly or quarterly installment payments for equipment or other fixed charges have been deferred beyond that period, the Commission will

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scrutinize with care the applicants' itemizations of expenses." (Emphasis supplied.)

Shortly thereafter, on July 7, 1965, the Commission issued a public notice (FCC 65-595), *Clarification of Applicability of New Financial Qualifications Standard Concerning Broadcast Applications,* whereby the new standards discussed in the *Ultravision* case would be applied to *all other broadcast applications.*

". . . we shall hereafter require all applicants for commercial broadcast facilities, whether a-m, fm, vhf-TV or uhf-TV, to demonstrate their financial ability to operate for a period of one year after construction of the station. In those instances where operation during the first year is dependent upon estimated advertising revenues, the applications will be required to establish the validity of the estimate."

How does the new standard affect applicants from a practical standpoint? First, each applicant must present a showing that there are adequate finances to construct and operate his facility the first year without any income. Therefore, he will be able to obtain grant of his application without any delay caused by searching questions from the Commission. Additionally, if the application should be designated for hearing with other applications, no financial issue will be designated against his application.

Second, if the applicant must rely on projected revenues, he should be sure to heed the Commission's admonishments relating to "the accuracy of the estimate" and the ability to demonstrate the "soundness of figures submitted."

A new slant to the financial requirements was developed by the Commission's Review Board in the *Chicagoland* case, 7 RR 2d 221, by holding that since the burden of proof with respect to the *Ultravision* issues was the applicant, it could rely on the testimony of one of its principals to establish that there was a reasonable possibility that the station would be constructed and continue to operate; however, it took the risk that the proof might not be adequate without further evidence. Upon review (Chicagoland TV Co., 7 RR 2d 612), the Commission ruled that proffered letters from potential advertisers could be considered in order to reach a determination as to the reasonableness of the applicant's projected revenues. Accordingly, applicants in hearing must *prove* that their estimated costs are reasonable and, if they seek to rely on revenues during the first year of operation to defray any of those costs, their estimated revenues are reliable. The applicant will not be advised by the Examiner if its proof is adequate. The applicant will learn its fate in the Examiner's Decision.

Clearly, the Commission has augmented its financial requirements appreciably since the 1930's and 1940's—from funds sufficient to operate "a reasonable period of time," to "three months without any income," to one year. While estimated revenues may be relied upon, they are difficult, if not impossible, to prove. In any event, they constitute a very "risky" financial basis. Perhaps the essence of the changes in financial requirements may be summed up by the word "proof." The applicant, more than ever before, must prove all statements relating to his financing. ●

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How to have the BEST FM System in your area

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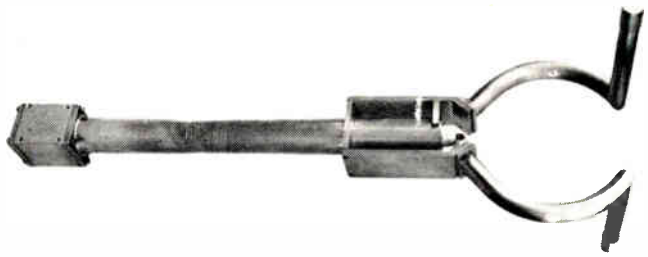
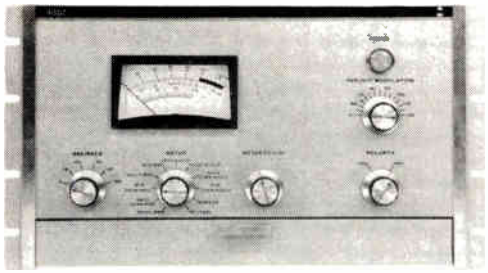


37CP Circularly Polarized Antenna. Electrical and mechanical design reduces dead weight and windload to a minimum. Does job previously performed by combination of vertically and horizontally polarized antennas. Cost about 30% less than combination arrangement. Fills in shadow areas, reduces null effects and improves fringe area reception. Design simplicity offers savings in new tower costs, erection time and maintenance.



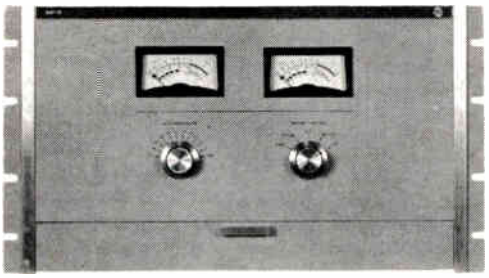
900C Series Stereo Modulation Monitor. Accurately measures and monitors FM stereo and mono programming in accordance with FCC Rules and Regulations. Removes all doubt about stereo signal. Fully transistorized.

212S-1 Stereo Speech Console. A solid-state speech input console designed for stereo or dual-channel operation. Has provisions for 10 local stereo inputs, one stereo network input and four stereo remote inputs.

Employs new, noiseless photoconductive cell technique for switching and level control of program material. Utilizes plug-in card construction to provide choice of solid-state amplifier units.

54N-1 FM Frequency Monitor. Features digital readout and display to provide broadcasters with accurate indication and detection of carrier frequency errors.

Detects errors in 100-Hz increments from 0 through ±2 kHz. Interlocks and/or alarms are activated when frequency error exceeds ± 1 kHz and ±2 kHz respectively. Completely solid state.



26U-2 Stereo Limiting Amplifier. Permits maximum modulation with minimum distortion. Provides full audio range broadcasting with thump-free performance.

Limits loud audio passage to prevent over-modulation, distortion and adjacent channel interference. When used in stereo mode, prevents overloading and improves signal-to-noise ratio by allowing a higher average audio level.

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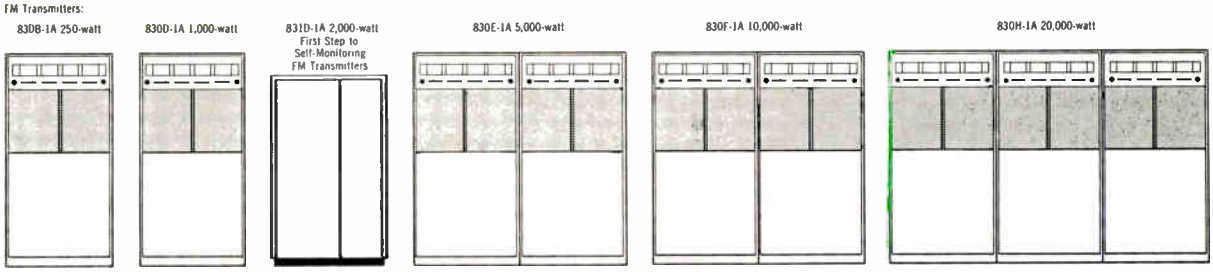

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World Radio History

ITV/ETV:

Long a poor relative, noncommercial ETV may soon outspend commercial broadcasters for equipment and personnel. And ITV, ignored as inconsequential closed circuit TV, threatens to compete for production professionals. But educational-instructional use of the medium is self-generating. Youth not only learns from TV, it learns to use TV. It all portends a future world of electronic communication.

EDUCATIONAL TELEVISION has long been viewed as a stepchild by many in commercial broadcasting. ETV stations would get hand-me-down equipment and personnel. If one left commercial broadcasting to go to an ETV station it was only an interim measure maybe to do a special job or to wait for something better to open up. If one started in educational television, it was to get a start and make a name for one-

The Promise

"It is my prediction that within another ten years almost the entire academic portion of instruction will be on an individualized basis in most schools. I also predict that programmed instruction, instructional TV, computerized instruction, and use of other new media increasingly will be important factors in providing education of the scope and depth our young people need. How else can we provide the necessary sustenance for increasing enrollments, characterized by a multiplicity of threads of interest, wide variation in learning styles and rates of progress, and great diversity of motivations and goals?" — R. Louis Bright,[1] Associate Commissioner for Research, U.S. Office of Education.

The Challenge

"In spite of the fact that ITV has been with us for fifteen years, there are few examples of what I would call really effective programs — programs that produce the effects instruction TV is capable of. . . . two reasons why it hasn't made better advances are, first of all, nobody has put the necessary funds into its development; and secondly, there has not been the interdisciplinary teamwork necessary to develop TV's full capability as an instructional tool. . . . excellence in instructional television takes a combination of four kinds of competencies: 1. a subject-matter expert. . . . 2. a Walt Disney type of producer or director who knows the full capability of the media — the trick effects that can be helpful. . . . 3. the team needs a programmed instruction expert. . . . 4. a cognitive psychologist." — R. Louis Bright.[1]

"Of all the media, television has suffered most from being misused and oversold. In the early 1950's proponents were sure that it would be the 'wonder drug' for educational problems. More recently, the same statements have been made about teaching machines and computer-based instruction. Unfortunately, more than one school district or college adopted television simply as a publicity gimmick. . . .

"One basic fact that must be recognized before television will attain its potential role in a quality instructional program: Television is but one of a series of effective instructional tools now available. . . . For example, 8mm film may prove far more economical for required playback than videotape; a tapeslide presentation may be more practical; and some objectives may be reached far more efficiently by the use of programmed instruction. . . .

"Some of the major causes of failure in the use of instructional television: 1. Projects are not given full administrative support — quality television requires time, talent, and money. . . . 2. Entire courses cannot be taught with maximum effectiveness on television. . . . 3. A television project needs time to develop. . . . 4. The 'star' system will not work — the television instructor must realize that he is part of a team and must be willing to accept criticism and suggestions. . . . 5. Production formats and procedures associated with commercial television will not always work effectively in instructional television. . . . 6. Television lessons should be limited in length." — Robert M. Diamond,[2] Director, Instructional Resources Center, State University College, Fredonia, N.Y.

[1]Excerpted from "The Place of Technology in Educational Change," Audiovisual Instruction, April 1967, p. 340

[2]Excerpted from "Let's Learn From Our Mistakes: A Hard Look at Instructional Television," Audiovisual Instruction, March, 1967, p. 232.

World Radio History

InEvitable TV

self so one could *then* move on. True, there were dedicated souls who sacrificed personal gain to work for ETV, but the image of second-class TV held.

But ETV grew and achieved self identity and gained viewers. Patrons and operating funds have never been in adequate supply but federal funds matched by state and local appropriations have put ETV in the big league. Educational stations reach even the most remote rural citizens and N.E.T. is close to being a fourth network. ETV management offers both challenge and good pay.

Where once the hope of ETV relied on a "Ford [Foundation] in your future," now the future is more secure with the establishment of the Corporation for Public Broadcasting.

*I*TV, instructional TV, intended for student improvement as opposed to *E*TV, adult enlightenment, has not been stunted in growth even though community-owned and university-owned ETV stations have gone more adult. President Johnson has asked for more money for HEW in the 1967 Education Act than was available under the Title I and III provisions of the just-expired Educational Facilities Act of 1962. For 1967, $10.5 million was requested. Further, a $0.5-million grant is to be spent to study ITV in the classroom. If the right answers are found, ITV might receive even larger sums to best the "educational crisis" that is so much talked about in the nation today.

As Louise Sweeny, TV critic of the *Christian Science Monitor,* wrote in March, "The revolution has begun without a shot. But a national uprising for public television is unmistakable." Columnist James Reston of *The New York Times* viewed the Carnegie Commission report on educational television, if adopted, as it seemingly will be, "one of those great events that, in the perspective of a generation or more, may be recognized as one of the transforming occasions of American life." Television stands as a national instrument of mass education.

Thus in 1967 we see top professionals joining the ranks of ETV stations, and if we are ever to see ITV play the role vaunted for it, we will find more professionals going into production of ITV programs. For the short range this may create a manpower shortage for commercial broadcasters. For the long range, as TV becomes the medium of the educator, TV more and more becomes the medium of youth—not only in front of the classroom monitor but in back of the camera as well. If the medium is the message, and the medium is the medium of youth, TV will become more and more teen TV.

This trend is probably inexorable. Nevertheless the adult establishment of today will modulate or moderate the trend. This report will therefore look at the present in ETV stations and what is happening in several schools to provide perspective for those who may soon find themselves caught up in the ETV-ITV revolution.

And since TV, as radio, is but one aspect of a broader mainstream of electronic communication, we should not overlook the role of computer-aided-instruction, CAI. In CAI, TV is but a fraction of a larger system. TV is essentially an electronic blackboard. The computer memory, however, if it is to be valuable, will switch to reels of videotape (as well as

Where the Money Comes From

In fiscal 1966 the federal government's contribution for facilities was put at only $6.8 million. Total funds for ETV stations in 1966 amounted to something like $58.3 million. State and local governments provided more than half. N.E.T. (National Educational Television) as a partial program source for 104 affiliates operated with a budget of $8 million in 1966. The Ford Foundation contributed $6 million of this.

The Educational Television Facilities Act of 1962 expired in 1967. To replace it, President Johnson outlined to Congress the Public Television Act of 1967. Included were requests for the establishment of a corporation for public television. (As approved by the Senate, a Corporation for Public Broadcasting), with $9-million initial funding and authority for Health Education and Welfare to match local funds for ETV up to $10.5 million for radio and TV facilities for the next fiscal year. (The terms of the match were 75 percent federal for 25 percent local.)

The Carnegie Commission's report to the President outlining a plan for public TV recommended an increase in stations from 150 to 240 by 1971. Average operating and capital cost initially was put at $178 million: $56 million from the Corporation for Public Broadcasting; $68 million from HEW and $54 million from state and local governments and private sources. By 1980 this amount would grow to $270 million annually: $104 million from CPB; $91 million from HEW; and $75 millon from nonfederal sources. The amount needed for capital equipment would be $66 million annually through 1971 and then dropping somewhat.

World Radio History

film and slides). The promise of CAI is that the system permits individualized self instruction. Can you imagine 50,000,000 school youngsters in elementary-, high-, or upper-learning schools, each having the opportunity to pursue any studies of his own choosing at whatever time he has access to in an individual study carrel?

Fifty-million channels may be beyond imagination (and certainly not feasible) but some schools are now equipped with, or plan to have, as many as 250 study carrels. This means, ideally, 250 channels. The TV entertainment industry and the movie industry currently cannot keep even a few channels of some hundred cities filled twenty-four hours a day. The demands of 25,000 schools with 100 carrels is indeed staggering but not beyond grasp. To the three Rs will indubitably be added a fourth, Rerun, but the lifetime of a modern educational film or videotape will be less than a 1940 movie. The point is, hardware is available to make ITV or education by electronics a reality but, software, or programs, are lacking. The gap will be closed and you may be part of it.

One clue to the future in education can be found in the architectural or real estate pages of the daily newspaper. Not a single self-respecting college or university is expanding without adding a multimillion dollar "Learning Resource Center." A Learning Resource Center suggests a center devoted to learning theory, but in terms of physical facilities, it is synonymous with TV, radio, audio-visual, production centers, film and tape libraries.

Although ITV promise is great, and here now, as the pages that follow indicate, it is used as a medium for only 19 percent of the nation's students, according to a study made by the National Center for School and Television.

Several closed circuit systems have been failures. Television is relatively cheap in upgrading a school system but probably is too expensive to be used just as an enrichment tool. ITV, to play its full role, must be integrated into the whole school system and this calls for a major commitment by the school.

Part 1: ETV

MAXIMUM QUALITY WITH MINIMUM BUDGET

By Harold G. Wagner

The WMVS/WMVT charter includes the training of television technical and production personnel. It thus makes good use of staff and students to get what it needs at a minimum equipment cost. This means building your own and converting obsolete gifts. Nevertheless WMVS was the nation's first ETV station to broadcast color.

THE WMVS/WMVT STAFF of 30 full-time professionals is augmented during the school year through the use of student technicians, camermen, floor crews and production assistants. Each student enrolled in the telecasting major offered by Milwaukee Institute of Technology must participate in station on-air operations ten hours each week in addition to the academic and laboratory requirements of the course. This is of great benefit to the student who receives on-the-job practical training, much as if employed in a TV station, but it also greatly augments the stations manpower. This manpower has been used in station expansion.

The stations began to feel the pinch caused by inadequate space in the early 1960's. Thus, when plans were laid for the Continuing Education Building in 1963, studio facilities were included for WMVS and WMVT. Building construction was complete in December, 1965, and operations dictated the necessity of activating the new 40,000 square foot studio plant no later than September of 1966. This represented a monumental task for the 10-man engineering department. It was further complicated by a limited construction budget and the necessity of maintaining uninterrupted station operations.

Budgetary considerations precluded the purchase of additional equipment other than studio lighting packages and equipment deemed absolutely essential for effective use of the new studios. It required that existing equipment be moved to the new plant in a short period of time to minimize interference with operations. The move was accomplished in a 3-step process:

1. Pre-wiring as much of the new studios as possible to permit equipment to be moved in and set up in a short time.

2. Moving a portion of the stations' equipment to the new plant to form a nucleus from which to maintain programming during the balance of the move. (This was accomplished during the July 4, 1966 weekend, with programs coming from the new master control on July 5, 1966.)

3. Completing the move with the installation of the balance of the stations' equipment and the activation of the studios during the third week of August, 1966.

Much equipment required for the move was designed and constructed by the station engineering staff and technical students. During the two-year period prior to the move, station engineering personnel, in spare time and with the aid of technical students, constructed 50 solid-state video DSs and 14 solid-state pulse DAs using an empirical design worked out by the chief engineer. Material costs amounted to less than $65 per DA, and specifications surpass color requirements. The design of the solid-state vertical interval system was patterned after that supplied by WHA-TV. As shown on the floor plan, each main studio is 47 × 63 ft in size, with a 22-ft ceiling. Lighting grid is set at 16 ft. Video and audio control rooms, as well as observation rooms, are at the penthouse level. The entire plant is built around the master control room, centralized film and VTR room concept.

Switching Plan

All signal processing is accomplished in master control. The studio control rooms provide only remote switching of video signals, quality control being a function of master control, thus allowing the studio switcher to concentrate on program makeup.

Each studio video control room provides 8 monitors for the switcher and director. These monitors

Mr. Wagner is chief engineer of WMVS/WMVT

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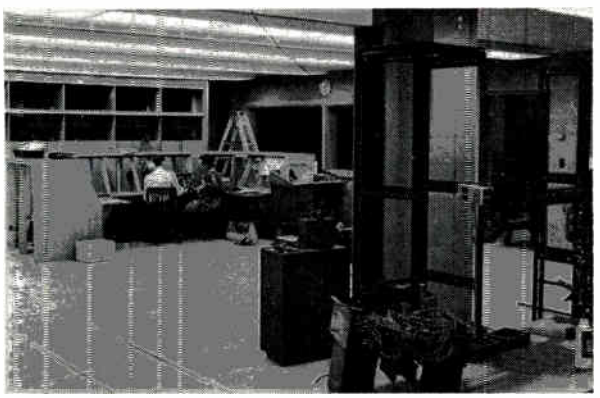
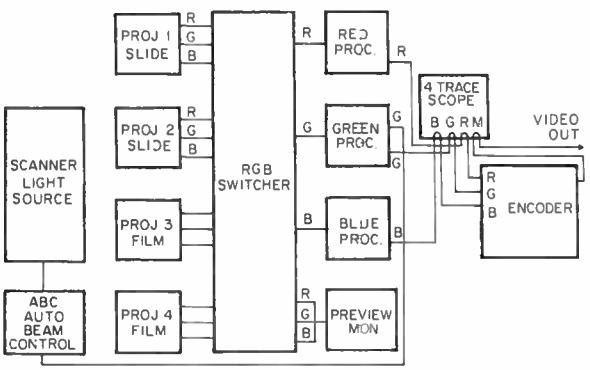
Master control console for two station outputs. WMVT switcher on left, WMVS switcher on right, camera and film controls in center. Color control console (lower right) incomplete. Line and preview monitors in rear monitor rack.

View of videotape and kinescope operations area.



Note use of computer floor eliminating wiring trenches. Photo taken during construction phase.

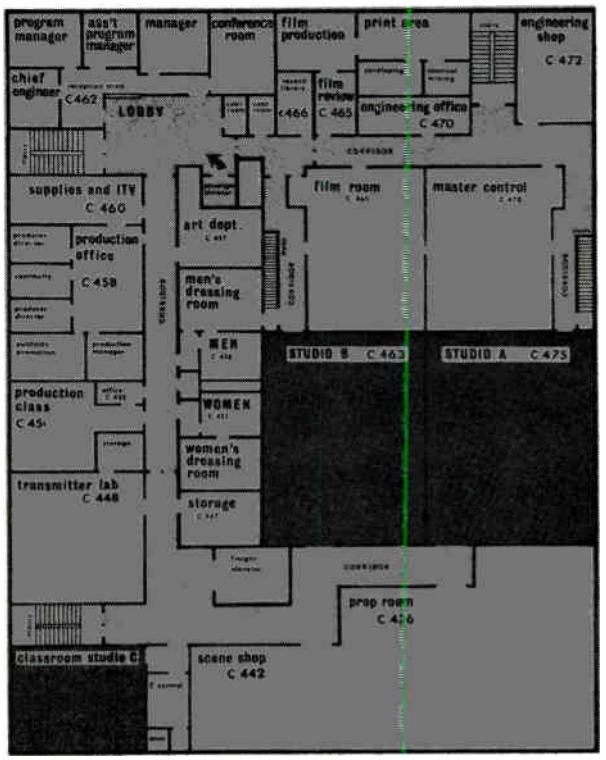


Milwaukee ETV Roots in CCTV

The beginning of educational television in Milwaukee, Wisconsin, dates from 1954 when the Milwaukee Board of Vocational and Adult Education saw the need to provide a facility for the training of students in both the technical and program production aspects of television. A closed circuit laboratory was set up that year, using all professional equipment, including a kinescope recorder. Studio and control room facilities utilized converted classroom space which, due to the physical characteristics of the building, limited studio ceiling height to 12 ft, and studio size to approximately 28 × 40 ft.

The Milwaukee Institute of Technology, a junior college operated by the Milwaukee Board of Vocational and Adult Education, established the academic and laboratory requirements for the telecasting courses, a two-year program of instruction leading to an Associate in Applied Science degree.

Envisioning the need for on-the-air community educational television, the Board successfully sought means of operating an educational broadcast station. A construction permit was operated in 1957, and WMVS, channel 10, began broadcasting on a regular schedule on October 28, 1957. Because of overflow programming and a need for flexibility in instructional service, a second channel was applied for and WMVT, channel 36, began broadcasting in January, 1963.



WMVS/WMVT floor plans. Two studios are in a penthouse floor, not shown.

Educational stations often must "make do" with gifts. This diagram show how Dumont film and slide equipment was modified by WMVS for color.

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consist of three 14-in. units for cameras and line output, four 8-in. units, switchable to any VTR or film source for preview usage, and one 12-in. unit, switchable to studio output, air or CCTV feeds.

The switchable preview monitoring was considered necessary because of the large number of film chains and VTRs used as sources to any studio. Each preview monitor has a readout to indicate the VTR or film chain in use, as well as a tally to provide on-air indications. A solid-state coincidence gate was developed to provide the tally indication. The coincidence gate for each monitor tally uses ten transistors and twenty inexpensive diodes—less costly than a relay system.

Each studio switcher consists of an 18 × 5 and a 4 × 2 matrix to provide mix, special effects, keying/preview and program or preview output from the switcher.

The operating switchers in master control for WMVS and WMVT each consist of a 14 × 3 matrix with audio follow to provide mix preview outputs. An innovation here provides for emergency backup of the mixer and sync adder. The preview section, which may be switched as the switcher output, is fed composite video only, directly from the camera or VTR involved, bypassing all DAs, mixers or sync adders.

Another feature of note is that through the use of automatic sync addition, each switcher will accept either composite or noncomposite inputs without operator attention. This is particularly valuable when operating a VTR in pixlock mode for effects usage. The VTRs have also been modified to provide a noncomposite output when fully locked up in pixlock mode to further simplify usage of effects with VTR. Should the VTR lose pixlock synchronism, the output reverts to composite, and the switcher's sync adder deletes sync, all with minimal effect on the picture.

Additional switchers are a 10 × 6 master line routing switcher used to feed transmitter STLs and VTR or kinescope recording lines, a 9 × 6 house monitor switcher, and a 10 × 10 composite switcher which provides 10 × 3 monitor switching in each control room, two campus CCTV channels and master control preview buses.

First with Color

WMVS was the first ETV station in the nation to begin color broadcasting on a regular basis, starting in January, 1965, with film and slide color. This was made possible through the generosity of two local commercial channels, WISN-TV and WITI-TV, who both donated obsolete Dumont flying spot scanner equipment to WMVS for possible student lab or other such use. The author recognized the possibilities of this equipment for color broadcasting, and, after much revision and modification, converted the equipment for color purposes.

Major revisions included: substitution of high quantum efficiency S-20 phototubes in the red channels to increase signal-to-noise ratio; and adding nuvistor cathode followers at each phototube to permit reduction of photomultiplier current and lower output impedance. This modification, in turn, permitted RGB switching at the output of each film or slide source. Electrical multiplexing of all sources into only three video process amplifiers was thus possible. This was a great simplification of the original system which required 12 process amplifiers. The RGB multiplexer provides a preview output as well as studio follow video.

Other modifications included stiff regulation of phototube high voltage supplies and a unique method of controlling video output level. The original system used three pots plus a master for each cinecon source—workable but difficult to track properly. To be practical it was decided to control the video output level by varying the scanner beam intensity and thus the light output of the scanner kinescope. This method of level control does not shift color balance as it is varied, and permits establishment of optimum operating points for the phototubes. The individual phototube gain controls are merely "paint pots." Since automatic control of scanner beam intensity appeared feasible, a solid-state peak detector and dc amplifier was added to sample the system video output and control the scanner beam intensity. At completion of all these modifications, the scanner was deemed air worthy and placed in regular service.

The public response to color ETV broadcasting was so great, it was decided that WMVS/WMVT should have the finest color TV equipment available. Application was made to the Department of Health, Education and Welfare under the ETV Facilities Act to obtain additional color broadcast equipment. RCA won the competitive bidding and a TR-22D colorized VTR was placed in service in November, 1966.

An RCA TK-27 film chain began serving our color film needs in January, 1967, supplanting the revamped Dumont color film equipment. After months of waiting, the live studio cameras, RCA TK-42s were delivered and live broadcasting was inaugurated on May 22, 1967. Color TV is not used solely for the sake of color, but, rather, as a program enhancement tool that is to be used with discretion where and when color telecasting benefits the viewing public's understanding or enjoyment of a particular program.

To program two TV channels and provide instructional television on the MIT campus, WMVS/WMVT equipment includes two color and six monochrome studio cameras, two color and four monochrome film chains, six television tape recorders and a mobile unit with three monochrome cameras.

Training Broadcasters

As mentioned, usage of television personnel is a goal. Since its inception in 1954, MIT, in cooperation with WMVS/WMVT, has graduated from 8 to 12 production and 7 to 15 engineering technicians yearly. Many are employed at Milwaukee stations, stations in the State of Wisconsin as well as stations throughout the United States.

The WMVS/WMVT engineering department, which has its roots in the original CCTV operation, recognized early the need of maintaining technical excellence of both equipment and operating standards. Equipment purchases and construction always recognized future needs, and this greatly simplified the later addition of color origination equipment as well as providing the finest quality monochrome broadcasts. The maintenance of high quality has had a salutary effect on students.

ETV/ITV IS MULTICHANNEL PROGRAMMING

By James R. Potter and Philip Walden

Perhaps the most significant difference technically between commercial broadcasting and educational broadcasting is that the former has only one channel to feed. The latter, when serving schools, have to have

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many outputs. System design is therefore more complex. The Purdue Television Unit has more than 40,000 combinations of program sources and distribution channels.

IN ITS SIMPLEST FORM, the programming function can be discharged with relative ease. That is, if there is only one origination point (source), one path of distribution (channel) and one receiving location, the programming alternatives become merely "yes" or "no" or "off." However, when components are added to the origination and distribution function of the system programming alternatives being to grow dramatically. Add to this structure two-way audio communication ("talkback") and remote origination at various reception points on the system and the possible programming alternatives zoom to tremendous proportions.

In the ITV system currently operating at Purdue University more than forty-thousand possible combinations of program source and distribution channels are possible!

How can multichannel, multisource programming be handled? A description of the ITV programming system currently operating at Purdue University follows. Assumptions that were basic to system design, and indicate possible directions for future expansion in order that the system may integrate with a twenty-city statewide telecommunications network include:

- Maximum flexibility in programming. This important feature was accomplished by providing a quick, simple reconfiguration capability which allows the matching of any program source with any single distribution channel of combination of channels.
- System reconfiguration must be simple. A single operator at one location can do the switching. This permits centralized programming responsibility capable of dealing with last minute emergency changes.
- System must be capable of expansion to accommodate additional program sources and distribution channels. Its design permits compatibility for interconnection with other TV systems.
- Central monitoring is necessary. Monitoring of all sources and distribution channels are provided at central control point.
- Fast maintenance provision is made for technical surveillance and trouble reporting.
- Design for automation. The entire system is designed so that future automated operation can be accomplished with relative ease.

The Purdue ITV Programming System

Five elements are key to the Purdue ITV Programming System which is under the control of the Purdue Television Unit.

1. Program source (inputs)
2. Distribution channels (outputs)
3. Switching and monitoring
4. Communication and trouble reporting
5. Talkback

There are ten program sources currently active in the Purdue ITV system. These are: two television studios (each with an associated Control Room), five videotape recorders, one telecine (film and slides), one incoming microwave (from Indianapolis and Bloomington), and a test pattern. Additional sources contemplated in the immediate future are the television studios currently operating on the Purdue campus in the school of Veterinary Science and Medicine and the Life Science Building. A cable interconnecting these studios to the central ITV system will be installed in the next few months.

Distribution channels currently active in the Purdue system include three rf channels serving the Lafayette campus (standard vhf channels 2, 4, and 6, two video channels serving two large lecture rooms on the campus and three microwave connections to Purdue Regional Campuses in Ft. Wayne, Hammond and Indianapolis (this link also extends to Indiana University in Bloomington). Microwave connection to the Purdue Campus at Westville is planned for next year.

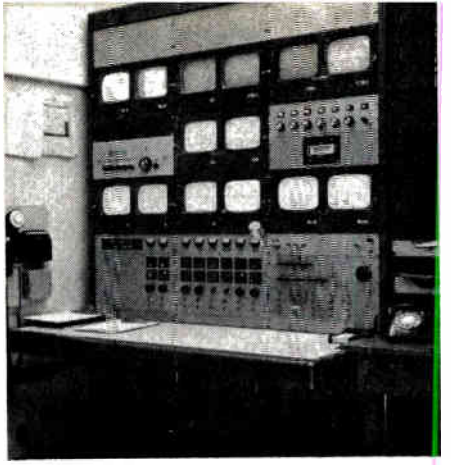

Fig. 1. Programming desk at Purdue TV-unit. Input monitors are the top row of six. Eight monitors showing test patterns are eight output channels. Switching details are shown in Fig. 2.

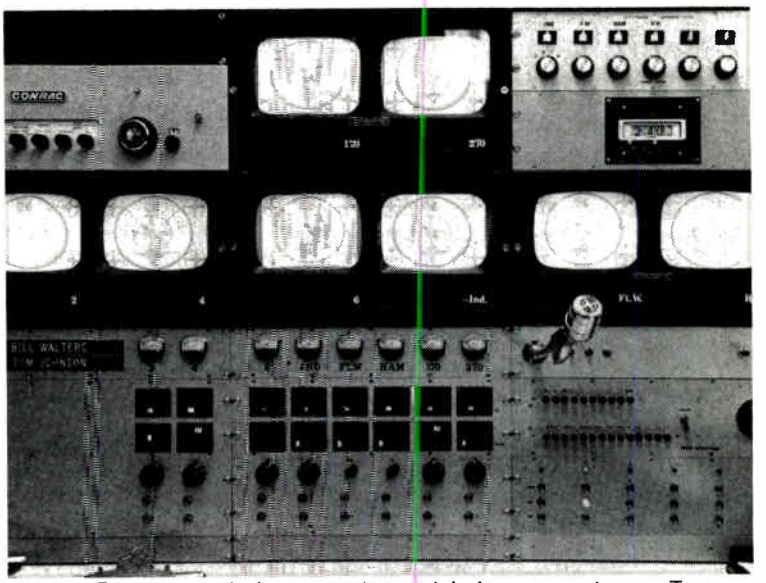

Fig. 2. Program switchers are located below vu meters. Top row displays, program sources on the air for the various channels. The second row indicates the next event selected. Rotary switch below selects the programming for specific channels. Channel code is rf channels, 2, 4, 6; microwave channels, Ind. (Indianapolis), Ft. W. (Fort Wayne), Ham. (Hammond); classroom direct, 170, 270.

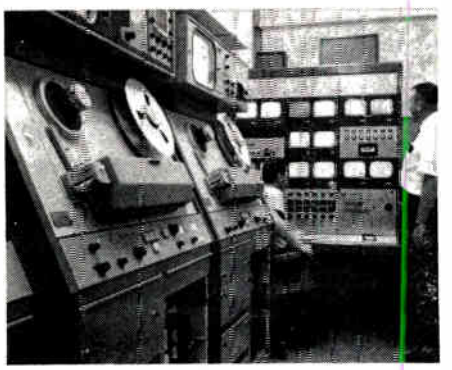

Fig. 3. Three VR 1100s shown in foreground. Chief engineer Phil Walden operates the programming desk while Manager Jim Potter looks on.

Mr. Potter is TV-unit manager of Purdue University. Mr. Walden is chief engineer.

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Microwave and Telephone talkback connectors are furnished by communication common carriers.

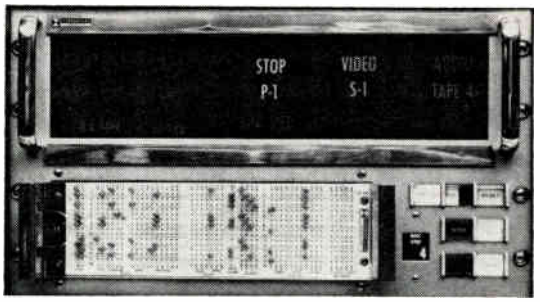
Switching and Monitoring. Switching and monitoring of all ITV programs is accomplished at the programming desk in the Television Building where a continuous monitor is provided on all distribution channels as well as program sources. This desk is the control point for a master switcher which accomplishes the programming of the eight distribution systems listed above. Audio and video signals appear at the master switcher for cross switching to the various distribution channels as necessary.

Fig. 1 illustrates the programming desk. TV pictures coming in from the various programming sources appear on the eight-in. video monitors in the upper portion of the desk. Reading from left to right

Automated Studio Control In ETV

While some stations may have staff in the form of trainees as does WMUS/WMUT, Milwaukee, others must design to reduce ever-increasing operating costs. The Chicago Educational Television Association (channels 11 and 20) has designed a semiautomated studio control room.

A Chrono-Log 16-event automatic switcher is used to switch in VTRs and station breaks (slides and audio cartridges or videotape). The master control room is designed to enable one



The Chrono-Log template used by WTTW-TV Chicago

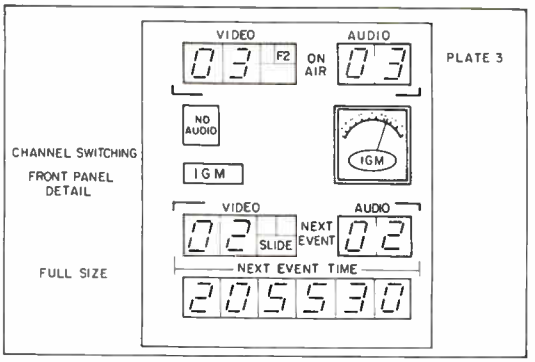
person to control audio and video levels to the transmitter to both channels and to act as operators for up to five 10 cameras and three vidicons. In addition, he is able to act as video man for the VTR on air. In addition, he delegates any video or audio source to any one of three studios (using custom designed Central Dynamics, Ltd, switchers).

This design enables the station to operate two channels on the air and videotape a full production program with six technicians. Details of WTTW/WXXW-TV will be given in the next issue of **BM/E** devoted to automation.

A special 36-input, 12-channel automation television switcher is being manufactured and installed for the South Carolina Educational Television Network by International Good Music, Inc. Design is an adaptation of IGM's punched-card actuated Series 600 audio control used for automated control systems for radio broadcasting.

IGM is providing complete video/audio controls to handle inputs from live studios, tape playbacks, film chains and network facilities at the S.C. ETV center in Columbia, where all the network's program material originates. The network currently uses eight videotape machines and three film chains; it is adding five film chains, three videotape recorders and 14 videotape playback machines.

Requirements for the switching system for



Above, one of twelve individual output channel consoles. On-air readouts at the top show audio and video inputs being used. Vu meter monitors audio level. Failure of program audio is indicated by the flashing light above the IGM logo. Lower section shows "next event" video, audio, and switching time. A video monitor mounts just to the right of the panel.

this ETV application are considerably more elaborate than those of commercial TV stations, in that provisions are made to switch automatically a total of 36 potential video and audio input sources to any single output channel, or combination of channels up to a total of 12.

Automated operation of the system originates from punched cards. Cards are punched with information on the program to be broadcast, video and audio sources, and switching time in hours, minutes and seconds. If the program is to be fed to more than one output channel, this information is also punched into the card. All this data is stored in the system's solid-state memory. When real time matches switching time, switching occurs automatically. Preroll of film chains and video tape recorders is also automatic. Subsequently, a new card feeds the next event information to the channel memories and the process is repeated. The next event is visible on a readout on the console.

The "program override" section of the console permits the program memory of any output channel or combination of channels to be displayed in a readout in front of the operator. Manual access to the memories allows instantaneous changes, which can either be stored in the program memory of the output channel, or put on the air immediately with the "take" button.

A special network and local station identification system is provided to allow up to 12 functions to be remotely controlled at any of the network's five transmitter locations from the cencentral programming point in Columbia.

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these are STUDIO A, STUDIO B, MICROWAVE FROM INDIANAPOLIS-BLOOMINGTON, VTR NO. 3, VTR NO. 4, AND VTR NO. 5. Space has been left at the top of the rack to provide monitoring for future program sources.

The center-left section of the programming desk houses an rf tuner which is utilized for off-the-air reception of television broadcasting stations in the area. At the center-right is the talkback control panel and the official clock for program switching and log entries.

The eight video monitors located in the center section of the rack provide a constant monitor of the eight distribution channels described earlier. Monitors for the rf channels are fed from rf tuners (located below the desk top) permanently tuned to each channel.

In the lower-center portion of the program desk, shown in greater detail in Fig. 2, are switches which control the programming of each distribution channel as well as vu meters which indicate the audio levels being fed to each channel. The program readout (upper portion switch directly below the vu units) visually indicates the program source feeding each channel at a particular time. The lower portion indicates the source of the next event selected for each channel. Rotary switches below the read-out are utilized to pre-select programming for specific channels.

The pushbutton directly below each selector switch is used to make the switch from the program source currently on the line to the next program source as indicated in the lower section of the program readout. As this switch is made, the pre-selected program source will appear in the upper section of the readout as being on the line. The pushbutton at the very bottom of the panel may be utilized at any time to switch that particular channel directly to test pattern. Thus if two programs in sequence are to originate from the same source, it is possible to switch to test pattern for the desired interval of time and then switch back to the program source without changing the selector switch.

At the bottom of the low-right section of the programming desk there are REMOTE PLAY, STOP and RECORD buttons for the five videotape recorders in the system. These are illuminated buttons and, show at all times, the status of each machine. Directly above the remote VTR controls are switches for monitoring the audio of various program sources and distribution channels.

Directly above the audio monitoring panel is a communications panel. At the left end of this panel is a microphone and two switches. By depressing the appropriate switch and speaking into the microphone the Program Center operator may talk directly to the control room of his choice. Appearing at the right end of that panel is a station on the Control Room intercoms system. This feature allows the Program Center operator to be included on the intercom circuit of studio programs in progress by simply plugging in a headset.

Communications and Trouble Reporting. On the wall to the left of the programming desk, Fig. 2, is a standard telephone and a communications telephone which are associated with the television talkback circuits. All TV reception classrooms are equipped with communications telephones. These phones provide direct-line access to the Program Center operator. Since all television classrooms at Purdue Regional Campuses are equipped for talkback, an individual in Hammond, Ft. Wayne, or Indianapolis may at any time call the programming center. This system is utilized to report any reception or technical trouble, to confirm ITV schedules, and to exchange general information.

The Program Center operator has complete information on all remote installations and is prepared to handle operational or technical problems which might arise at any remote point. He is responsible for receiving all trouble reports, logging these reports, and then following through with the proper individuals to make certain that troubles are corrected. He has information at his fingertips regarding the utilization of television classrooms in the system. He also has the names and telephone numbers of technical and academic representatives at all remote campuses, as well as faculty members in charge of each particular class. In addition, he has telephone communication with the TV Operation Center for the telephone company in Indianapolis.

The Program Center operator's first duty upon receipt of a trouble report, is to determine the location of the trouble. When trouble is found to be in telephone company equipment, this is immediately reported to the telephone company, T.O.C. When problems are found to be in the Purdue system, the appropriate people are immediately contacted to correct the problem as soon as possible.

Communications phones are also available in the Video Distribution Centers at each campus so that surveillance of the microwave systems and routine testing can be carried on with two-way communication. An additional feature of this phone is an "audio loop back" which is incorporated with Ft. Wayne and Hammond. This feature allows the Program Center operator at any time to monitor the program sound being received at any of these remote points. By lifting the communications phone handset, selecting the remote center to be monitored, and depressing the signal switch, a loop back configuration is established with that particular center. Thus, the program audio being received by microwave at the remote location is fed back to Lafayette over telephone lines and into the communication handset at the Program Center. Since the program audio to each remote center is actually multiplex on the video and relayed by microwave to the regional center, loss of audio would cause one to suspect microwave trouble with perhaps loss of video also.

Classroom Talkback. The Talkback system provides viewing students at any remote point an opportunity to communicate with the studio instructor by asking questions, making comments and participating in class discussion. Classrooms are presently equipped for talkback operation in Hammond, Indianapolis, Ft. Wayne, Lafayette and Bloomington. These classrooms utilize push-to-talk telephone handsets or microphones on long coil cords.

A student in each remote classroom is always within easy reach of a talkback microphone. By depressing a button on a talkback mircrophone near him, a student in a remote classroom may at any time light a signal lamp in the TV Studio. This indicates to the instructor that there is a question. When ready for the question, the instructor will ask the student to go ahead. The student then depresses the button on his microphone and proceeds to ask the question. As he speaks the student will hear himself over the TV speaker in his classroom. In addition, *all* classrooms receiving the lecture on all campuses will hear the question as well as the answer.

All classrooms equipped for talkback may be channeled to a single studio or may be configured so

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2500-MHz Links Permit Multichannel Broadcasting

Distinctions between broadcast TV and closed circuit TV begin to blur particularly as closed circuit operations become more complex as they do in ITV. Once distribution channels are needed between schools in different locations, CCTV takes on the character of: CATV (coaxial cable), pseudo broadcast (2500-MHz links); network distribution (microwave or telco); or regular broadcast (vhf or uhf). Studio operation of CCTV may be as complex as some broadcast TV.

As mentioned elsewhere in this report, some ETV-ITV operations are more complex than commercial broadcast since multichannel programming is necessary. The 2500-MHz system, or Instruction Television Fixed Service as it is called by the FCC, is limited in power output (10 W) and coverage (15 to 20 mi although 50 to 60 mi is possible with directional antenna at good height and farther with translators). However, the 2000- to 2660-MHz band is divided into 31 channels in groups of 4 each and a system may be assigned 4 channels. The channels have the same characteristics as standard TV broadcast channels.

Several large Florida school systems are using or planning to use 4-channel, 2500-MHz system. Thirty-eight schools in Palm Beach and the southern half of Broward county will be linked by Varian Micro-Link Systems under a contract awarded in January of this year.

Dade County (Miami area) in May announced a link that will tie in 200 schools and eventually will be 4-channel. The first phase calls for connections of 41 junior high schools. The district operates vhf and uhf TV stations as well as an fm radio station.

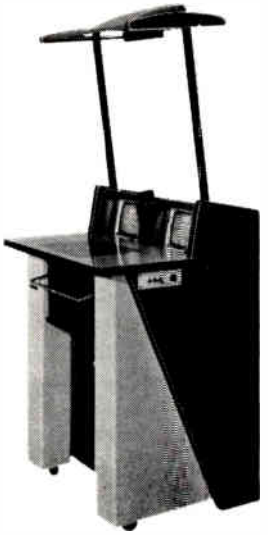
One of the largest 2500-MHz ITV systems is operating in the Fresno (Calif.) county schools. The first phase reaches 47 schools with 2 channels, but ultimately 110,000 students will receive telecasts via 4 channels blanketing the 6000-mi² county. Fresno county uses broadcast quality equipment including 4-head VTRs.

A most elaborate 2500-MHz ITV system is serving 236 schools of the Roman Catholic Diocese of Brooklyn in New York City. Two channels will serve 225,000 elementary and secondary students in Brooklyn and Queens. In all, 4000 classrooms will have TV monitors. Thirty-one teachers from the dioceson instructional staff have been trained to produce TV lessons in science, art, math, and social studies.

Large as the Brooklyn diocese may be, the Archdiocese of New York is still larger. Encompassing the counties of Ulster, Duchess, Sullivan, Putnam, Orange, Rockland, Westchester, Bronx, Manhattan, and Richmond, the Archdiocese will link 400 schools.

Rochester (N.Y.) Public School District is a pioneer in 2500-MHz ITV, currently using three channels. The staff reads like that found in many commercial broadcast operations: executive producer, producer-director, director, chief engineer, technician, artist, secretary. Studio personnel (who are part-time college and high school students) include: 6 production assistants, 6 cameramen, 1 artist, 1 typist.

Control console and studio, with RCA type TK-60 camera in use at Yonkers, N.Y. Television Center of Archdiocese of New York closed circuit ETV system.



In less elaborate ITV systems, there is no "studio control"—"Telectern" by TeleMation Inc. permits the instructor to select what's "on-air." Instructor controls whether output is slides or transparencies scanned by an internal camera (with 10 to 1 zoom) or external camera (aimed at himself) VTR, film chain, etc.

Actually 2500-MHz ITV can be used to supplement ETV stations services. FCC Rule 74.932 states that a noncommercial educational television station is eligible for an ITV station license. By combining on-the-air ETV channels with multiple ITC channels in a single complex, the classroom and the community at large can be served simultaneously with separate programming. Such a project is getting underway in Clark county Nevada (Las Vegas). Under the coordination of Harold Hickman, the system will include a vhf station, 4 ITV channels and receiving equipment in most of the county's schools.

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that some classrooms talkback to one studio, while other classrooms talkback to a second studio. This grouping can be changed instantaneously to meet the needs of the hour.

In order to make this grouping and regrouping operation as simple as possible, a talkback switching system was designed and incorporated into the Programming Center. The switching of this system follows the switching of picture and sound from the originating studio to the proper distribution channel or channels. Thus as the combining of program sources and distribution channels is changed from hour to hour by the Program Center switcher so are the talkback classrooms grouped and regrouped as needed with no patching involved.

KNME-TV BOAST! THE NATION'S HIGHEST

By Robert M. Gordon

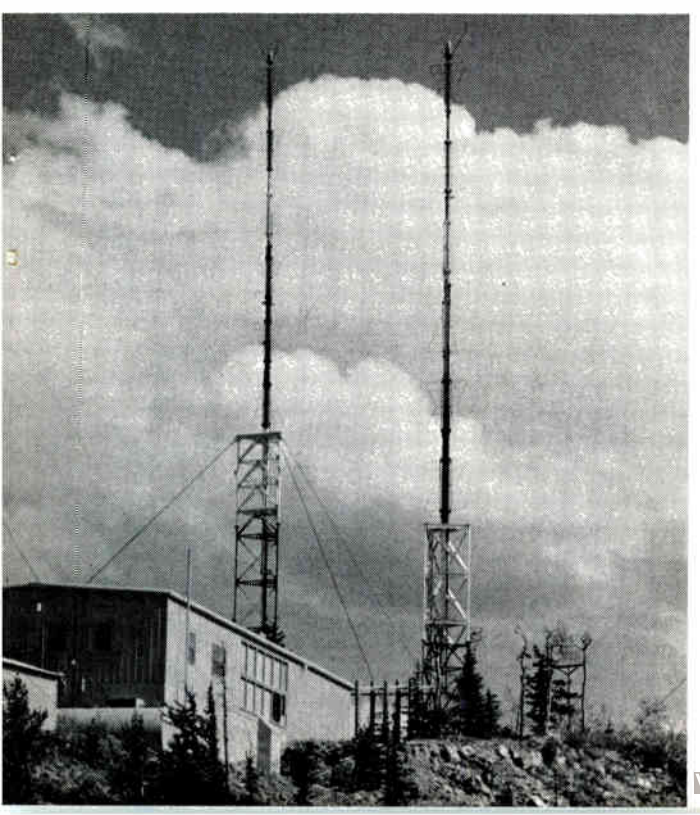
Above sea level by 10,678 ft, KNME-TV transmitter is the nation's highest ETV. But KNME has more to boast about. It never gave up the battle of the budget and will soon go color. But such refrains are now familiar so more about the transmitter.

OUR NEW TRANSMITTER is located atop Sandia Crest, the higest ETV transmitter in the United States. Our three new highband videotape machines with Colortec and Editec are now in operation. Also in operation is a new dual-link transistorized color microwave studio transmitter link. In the final stages of planning is a complete production center with two 40 × 80 ft studios. But it was not always so!

Reading the Carnegie Commission Report was like re-reading the past and future plans of KNME and television in the State of New Mexico. After ten years of struggling (see box) it is gratifying to realize there is keen interest by the people of the United States in Public Television.

Mr. Gordon is director of engineering, KNME-TV channel 5, 1801 Roma, N.E., Albuquerque, New Mexico.

View of KNME-TV transmitter building showing location on crest of mountain and microwave room wood panels (center of wall).



Plans for the Sandia Crest transmitter building had to provide space for additional television and fm transmitters, microwave equipment for STL and a proposed statewide microwave network, living quarters for personnel (one must plan for being snowed-in when atop a mountain), storage of water and diesel fuel, emergency power generator, vehicle storage, and workshop.

Since the building site contained a 14-ft difference in elevation between the southwest and northeast corners, the decision was made to construct a metal building meeting hurricane specifications on half a basement foundation. The basement area provided space for a 153-kW emergency generator, two 2880-gallon water tanks, furnace, vehicle storage, and a workshop. The upper level provided space for transmitters, control room, microwave equipment, and living quarters.

Construction of the transmitter plant was completed in the spring of 1966. The total cost of the building ran $\$28/ft^2$ which included emergency power generator, voltage regulators for public power, and storage tanks for water and oil. This is considered quite reasonable for construction 10,678 ft above sea level and 40 mi by road from Albuquerque.

Maximum power operation began September 5, 1966 from this new transmitter building. Located on Sandia mountain 15 mi northeast of Albuquerque, the antenna is 4214 ft above average terrain. This affords excellent coverage with a minimum of equipment. Maximum authorized power of 27 kW effective radiated power is achieved with a six bay turnstile antenna mounted on a 40-ft self-supported tower, and a five kW transmitter. Reception of KNME-TV is reported from as far north as Mancos, Colorado, and Montecello, Utah, which is beyond our Class B coverage area. Excellent reception within the Class B 110-mi radius makes possible coverage by translator or cable into Farmington, New Mexico; Durango, Colorado; Cortex, Colorado; Gallop, New Mexico; Chinle, Arizona; Roswell, New Mexico; Carlsbad, New Mexico; Ruidosa, New Mexico; and Las Vegas, New Mexico. The spread in mileage between the most distant points of this system is a phenomenal 500 mi!

The coverage area of KNME-TV encompasses ⅔ of the populated area of New Mexico and surveys show 200,000 in-school exposures per week.

Some of the advantages of an excellent transmitter site are offset by extreme weather conditions, which handicap transportation in the winter, cause frequent antenna maintenance due to extreme ice and wind loads, and in general make operation almost impossible. Winds have been recorded in excess of 125 mi/hr, rim ice accumulates to a thickness of several feet, measured snowfall as much as 30 in. per single fall, 60 in. accumulated in one month and 120 in. accumulated in a season.

Transportation to the site is by ¾-ton four-wheel drive trucks that have 258-gallon water tanks mounted in the front of a wide style pickup bed. This type of mounting distributes the load and leaves space to haul supplies.

The living quarters had to be comfortable for a family unit since the remote nature of the site requires the engineer to remain on duty for three days or more at a time. The two bedrooms, bathroom, laundry room, kitchen, and large living/dining area were furnished by an interior decorator. The living quarters, microwave room, and control room are carpeted with new industrial carpet cemented to the concrete floor slab. This method of floor covering is economical and the aesthetic effect combined with ease of maintenance

(Continued on page 33)

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KNME-TV Ontogeny

On February 12, 1957, the University of New Mexico received $150,000 from the Ford Foundation for the Advancement of Education to conduct an experiment in educational television. Later that year application was made jointly with the Board of Education of Albuquerque Public Schools to the Federal Communications Commission for a construction permit to operate channel 5. A closed circuit workshop was conducted in the fall of 1957 and on May 1, 1958, operation on channel 5 commenced, using a third-hand transmitter and a temporary antenna, but KNME-TV was "on the air." Operation during the next two and one-half years saw an increase in hours of operation from two hours per day 4 days per week to 13 hr/day, 5 days/week.

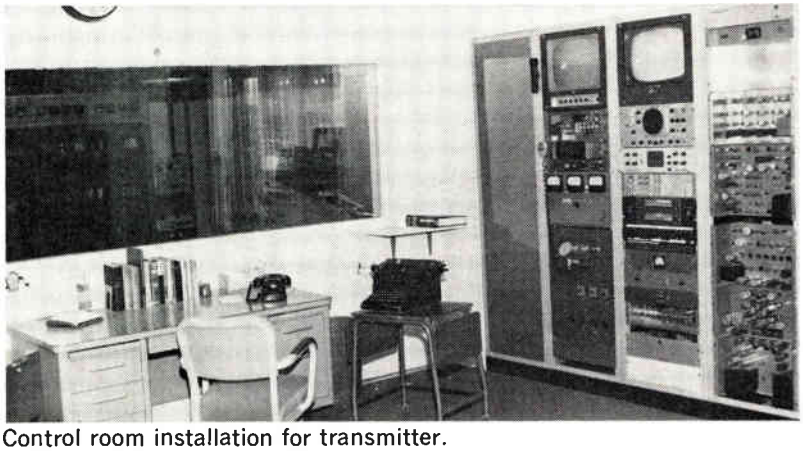
The hours of operation increased almost parallel to the increase in technical facilities required from the date operation began. The antenna system was "on loan" from a commercial television station and was replaced with a six-bay turnstile; the studio cameras replaced with image orthicons; the video switching system replaced to handle more inputs; a new microwave system installed; but the most important addition, in January 1960, was a videotape machine with $10,000 worth of videotape made possible through the National Educational Television and Radio Center with Ford Foundation funding.

During the years when the station was struggling with this hand-to-mouth operation, the administration was struggling with the budgetary problems that plagued many ETV operations. Services and money were donated by the Albuquerque Junior League and volunteer aids were used in the operation of the station. A debt of gratitude is owed to these citizens who bridged the gap in the early days of operation until professional television staffing was financially possible. The professional philosophy of operation began to bear fruit when the station received awards such as:

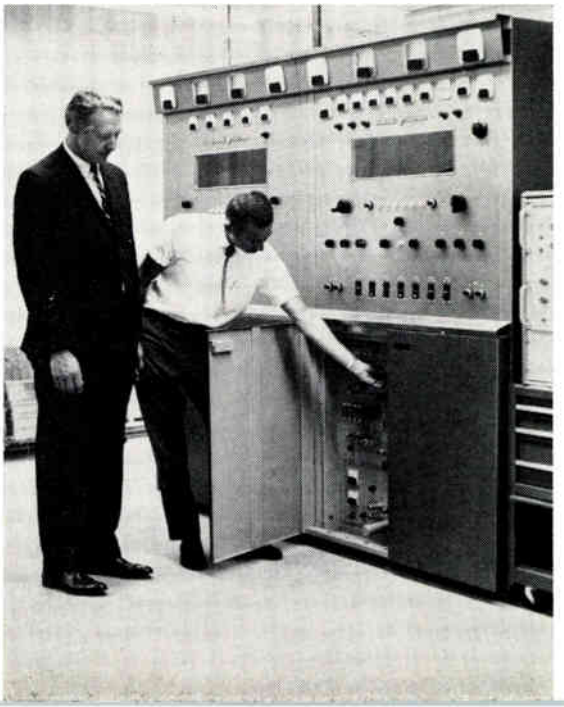
- McCall's Golden Mike Award to Joyce Marron for TV-KINDERGARTEN, 1961
- Ohio State Award for GENERAL SCIENCE, 1961
- Ohio State Award for INTRODUCTION TO GUIDANCE, 1962
- Ohio State Award for TV-KINDERGARTEN, 1964
- National Educational Television Award for Excellence in Creative Programming and Community Service to TV-KINDERGARTEN, 1965
- Ohio State Award for ELEMENTARY SCIENCE-5, 1966
- Ohio State Award for SCIENCE FARE-5, 1967

The station was becoming recognized for the efficient use of the television media in education and was selected in 1963 to train two groups of Peace Corps volunteers for service in Colombia. The training program was conducted in a very crowded facility that was used to produce 68 hours of local programming per week. This heavy production schedule required that pre-tape sessions be scheduled when film programs were presented on the air, and if a pre-tape schedule was missed due to technical or production error, it often had to be rescheduled when the station was off the air.

When the late President Kennedy signed the Educational Facilities Act on May 1, 1962, final stages of planning to expand the operation of KNME-TV to maximum power operation with increased technical facilities and a new production center were nearly complete. Application for matching funds was filed with the Office of Health, Education, and Welfare on June 28, 1963, and File Number 11 was assigned. The application was amended November 16, 1965 and $397,465 was granted February 23, 1966, which would provide technical facilities for a new transmitter building and a new production center.



Control room installation for transmitter.



General Electric TT-50 5 kW transmitter. Dr. F. Claude Hempen, director of television (1), and Robert M. Gordon, director of engineering, KNME (r).

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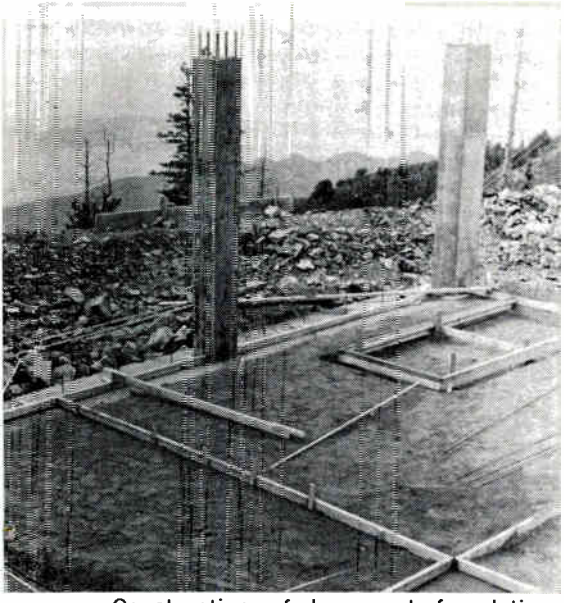
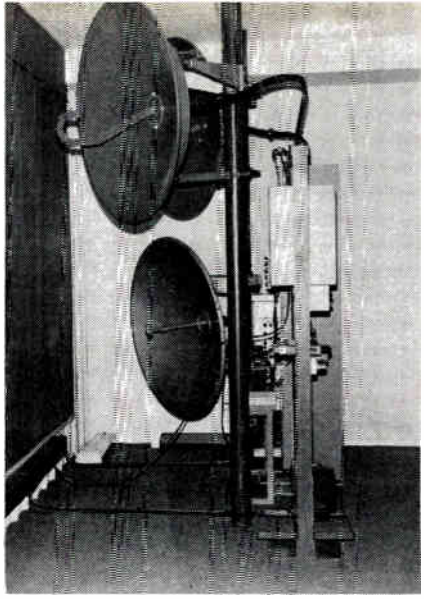
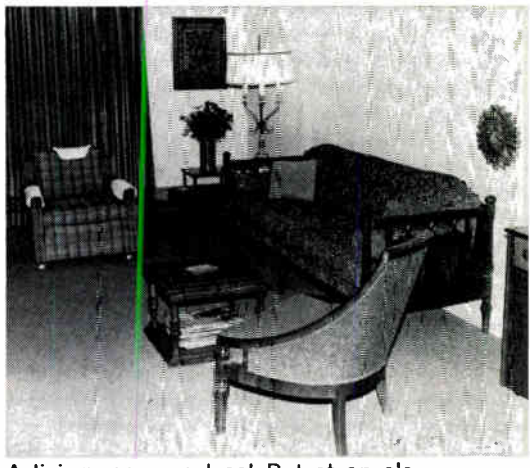


Construction of basement foundation, showing form for vibration isolation pad for emergency generator (2-in. cork used under and around floating pad for generator mounting). Valley is 5000 ft below the crest.



Microwave installation showing dual-link STL, and remote pickup receivers, and intercity relay transmitter. Wall is all wood and sealed against moisture.



A living room no less! But at an elevation of 10,678 ft it gets a lot of in-residence use.

and noise reduction merit consideration by anyone planning new construction.

The workshop has an 18-in. floor pedestal drill press, heavy duty grinder, 6-in. metal lathe, oxyacetelyne and electric arc welding equipment. A valuable asset during construction, the shop will provide facilities necessary for any antenna, vehicle, and building maintenance.

We are anxious, now, to complete our new production center with facilities for color and participate in the advancement of Public Television with all the ability and pride of performance that has made possible acceptance of television for educational purposes.

KNME Teleclasses

TV-Kindergarten, Elementary Music-4, Hablemos Espanol (grades 4-6), Elementary Music-5, Elementary Science-5, Science Fare-5, Elementary Music-6, Elementary Science-6, Science Fare-6, General Science-9, and Better Driving. Credit courses at the University level are offered in Humanities-1 and-11 and Electrical Engineering 361, 202, and 362.

Part 2: ITV

TV provides an opportunity to reach several class rooms simultaneously and with techniques and materials not ordinarily available. Mass viewing in large classrooms is common—it's called common learning. But, TV offers more than such brute force methods of exposure. With central libraries filled with videotapes or film for telecine projectors, students are given the opportunity for individual study. Student equipment needed is a TV receiver, headset and a dialing system. Of course, backing up such a system are production teams. **BM/E** takes a look at six schools stressing full exploration of the TV medium.

NOVA SCHOOLS

"The Nova Plan places emphasis on the student. Nova public school provides experiences merging social functions, cultural influences and individual needs. Perceiving a method that would meet individual students' needs was a major concern . . . (the conclusion) . . . a firm belief that an audio-visual system was a key factor in individualization of instruction."

NOVA SCHOOLS include the Nova University of Advanced Technology, Junior College of Broward County, Nova Jr./Sr. High School and Nova Elementary. The high school closed circuit system is autonomous. (The elementary is wired to receive a signal; however, to date, the coaxial cable has not been laid connecting the two schools.)

Every classroom in the high school complex is capable of receiving the closed circuit signals. Classroom's have 23-in., broadcast-quality monitors, designed for educational purposes with all controls under a locked panel. In addition to reception in classrooms, the lecture halls are equipped with a television enlarger which projects the image into an 8- × 10-ft lenticular front projection screen. While the quality of the TV picture suffers slightly in comparison to the high quality classroom monitors, these units give satisfactory results and allow 200 students to view the TV program in one hall.

In order to allow for virtually unlimited expansion of the programming capabilities, the television picture is distributed by cable rather than rf.

The Nova plan embodies the concept that successful use of instructional materials is influenced by immediate accessibility. Based on this belief, the traditional library has been replaced by separate resource centers, each located in the central part of the various discipline buildings. Students enjoy the freedom of using these centers for individual study, utilization of

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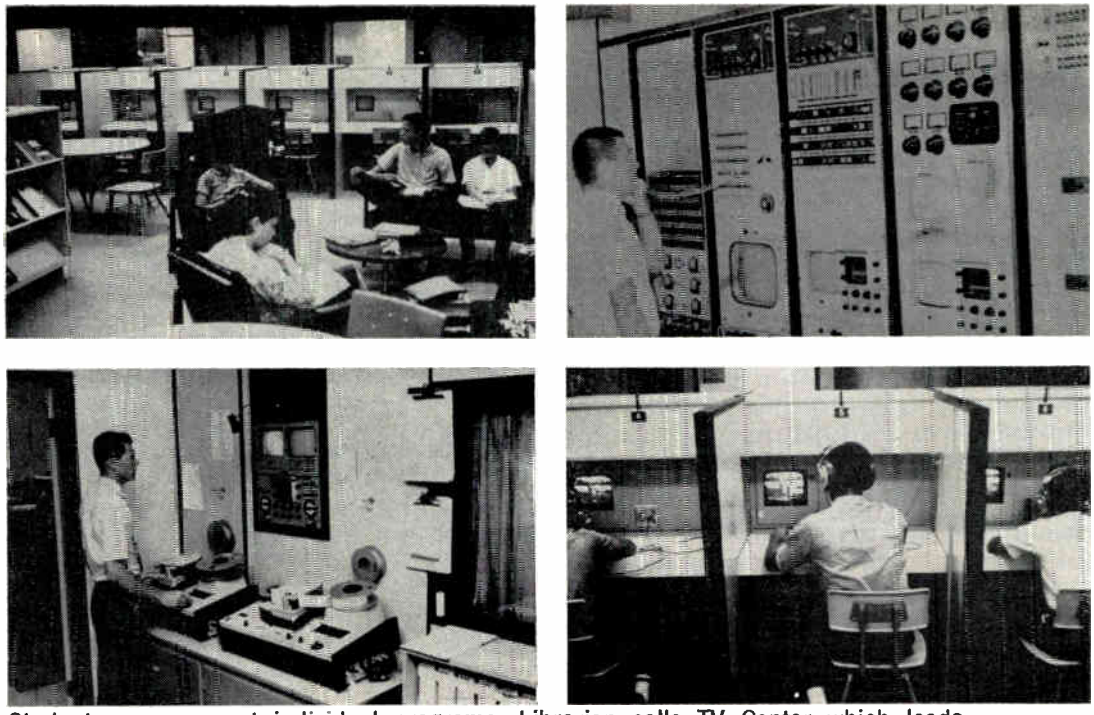
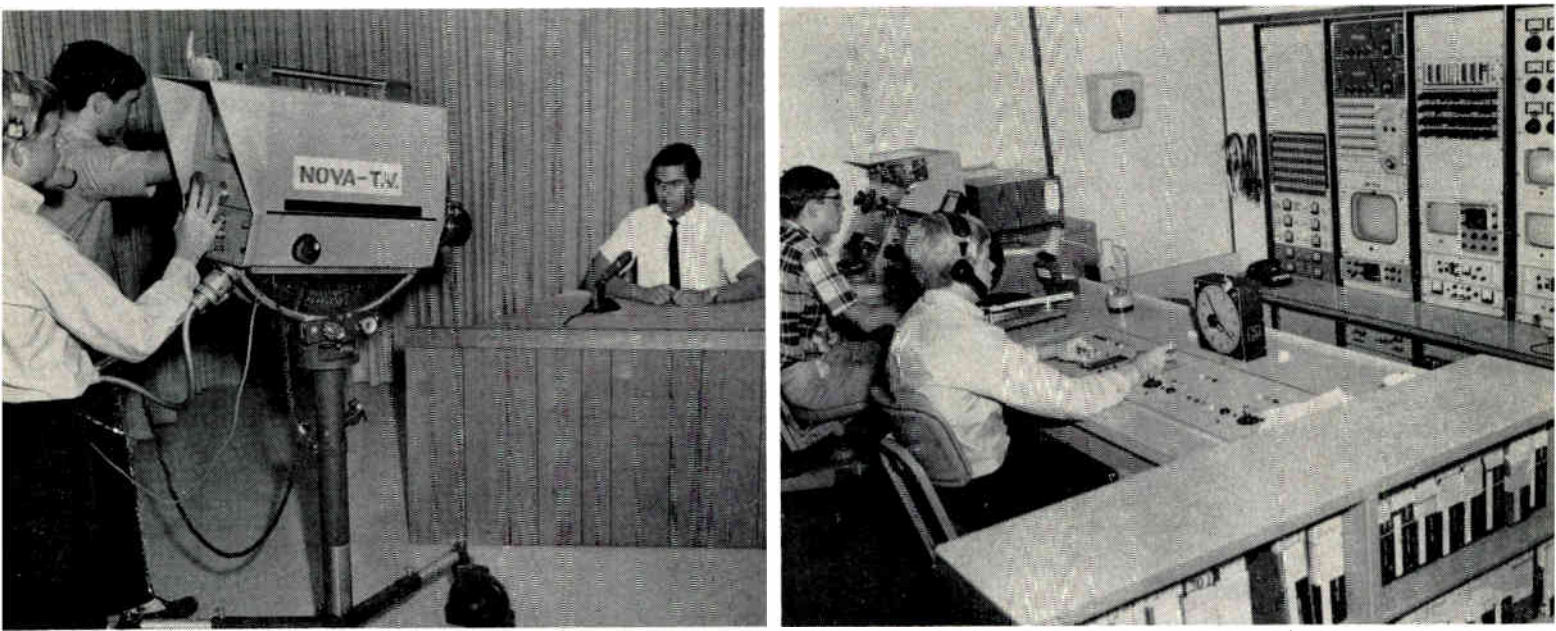


Students may request individual programs. Librarian calls TV Center which loads VTR and runs it.



Students at Nova School have the opportunity to write, produce, direct and be talent of videotape presentations.

prerecorded audio tapes, videotapes, microfilmed material, as well as standard library information. The audio and video tapes are received in individual carrels. Video carrels (or booths) are equipped with an eight-in. TV monitor and headsets. A student requests a particular tape (after consulting a current 3 × 5 card file summary and tape number index) at the Center's charging desk, the librarian on duty assigns the student to a particular carrel for viewing and contacts the TV Control Center by means of a direct, no-dial telephone line. Each Center has four to eight video carrels.

All classrooms and Resource Centers are equipped with the telephone communication system connecting them to the TV Control Center. Picking up the telephone receiver activates a chime in the TV Center, and a lamp on an annunciator panel indicates to the technician which location is requesting programming.

Programming

Television technicians schedule program requests in advance to guarantee specific viewing times. After contacting the Control Center, a teacher or student need only to wait until the machine is started, and adjust the volume. Turning the monitor on and selecting the requested program is done remotely by the technician located in the Control Room.

Each program source may be sent to any one or

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all of the receiving points at once. Plus, the receiving points may be divided, in any order, among the available programs. This type system has two obvious advantage: 1) eliminates adjustments by the classroom teachers to the TV monitor and, 2) allows complete flexibility and expansion of the facilities.

Nova's present closed circuit system was built to route a maximum of ten separate programs (sources). However, at the present, only six input circuits are in use. Two of the six available programs are from off-the-air channels.

A third source of programming originates from a film chain, also located in the center. If these films are videotapes, individual students may conveniently review them in study carrels even though the film was returned to the dissemination center.

A fourth means of programming is *live* camera originations. Although used in the TV studio for most programs, the camera can be rolled to any location either indoors or outside on the campus. Each classroom has an outlet on the wall for plugging in a microphone and sending the sound portion of the program back to the Center. The camera has been used to pick up an individual student's performance of a physical education activity which may be taped for later evaluation by that same student. Utilizing this same method, a play in rehearsal may be taped for review by the cast; thus the students identify their own strengths and weaknesses.

Two videotape recorders offer the fifth and sixth means of programming and are by far the most used of any in the system. Nova expects to purchase two additional VTRs in the immediate future.

In addition to the closed circuit TV facilities, Nova has a language learning lab which connects 50 student stations. Twenty-four tape decks are housed in two equipment racks. Fourteen are four-track machines, thus offering 66 programs. The TV center will also record a lecture upon a request from the instructor.

Nova closed circuit television has had an impressive impact on curriculum development. Each discipline is developing Learning Activity Packages built around the A-V system of meeting the individual student's needs.

Guided by the carefully-prepared Learning Activity Package sequence, the student requests to view and/or listen to the respective tape at the time he himself is ready to receive the content. In addition, the student himself has the opportunity to write, produce, direct, and be talent for a videotape presentation as an option activity of the Learning Activity Package. Taped material emphasis may vary in utilization from providing supplementary experiences to providing core information.

Use of CCTV Widespread

The Board of Public Instruction sought and employed experienced commercial broadcast television technicians at the outset of the program. Their duties were to write the specifications and oversee the installation of the present Nova closed-circuit television system. These specialists have remained as permanent staff members assuming responsibilities in the areas of programming, operation and maintenance. Their present duties, in addition, include the coordination of the recording schedule and aiding the teachers and students in the preparation of TV programs.

—Material supplied by **Mary S. Arnoff**, Assistant to the Director, Nova Dissemination Department

WEST HARTFORD

"Objectives [include] . . . to reduce the lag time that exists between the occurrence of a specific event and learner's perception of the event, to provide immediate accessibility to primary source material, to exploit the talents and creativity of the best available specialists and generalists, and to add a multisensory dimension to the learning process in a systematic manner."

AT WILLIAM HALL HIGH SCHOOL in West Hartford, Connecticut, a pilot project built around the dial-access concept is now in operation and has been since April of 1966. It is the first of three phases that will precede a major dial-retrieval installation to be housed in a New Williams Hall High School, slated to open in 1969.

Phase I

Phase I is the pilot project. Its purpose was many fold. To rush headlong into the highly sophisticated system that is now being planned for the New Hall High School, would have been technological suicide. To, one day, throw the "Big Switch" and announce to faculty and students that they have now been blessed with 150 receiving stations, 20 video channels and 100 audio channels, complete with computers, etc, would have sounded the death knell for the project and turned it into another of the "electronic graveyards" that are beginning to dot the countryside. The Administration realized from the beginning that mistakes would be made, some curriculum experiments would fail, there would be some technical problems. Above all, they felt that technology must be tailored to fit curriculum needs rather than attempt to force-fit curriculum needs into existing technology. With these guidelines, successes were certain to be less spectacular, but the failures were less likely to upset the delicate balance of existing teaching techniques or impede the overall progress of the project. Phase 1, then, was planned to provide:

1. "Lead time" for faculty and students in usage and familiarity.
2. Evaluate the "state of the art" in the area of technology.
3. Survey existing "software" and its potential sources, and relate it to curriculum needs.
4. Determine personnel requirements and back-up facility needs.
5. Investigate attitudes, achievements and interests.

To accomplish these goals, a classroom was converted into a Program Center. Ten large group monitors, 25 in. in size, were distributed in a cross section of departments throughout the building. Eight "wet" study carrels were installed. Five carrels were located in the library, one in an auxiliary study hall and two in the Program Center. The program sources consist of the following:

1. Two videorecorders, capable of starting, stopping and rewinding on dial command.
2. Two off-the-air tuners for commercial and/or ETV channels.
3. Two microscope chains (consisting of a microscope optically mated to a television camera for image magnification of microscope slides).
4. One film chain, with three options that are exercised in the control room. These options are:
   a. a 16mm film projector

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b. 35mm slides, activated by an audio tape deck provides an audio narrative and automatically advances the slides
c. 35mm filmstrips

5. Live camera capabilities from the control center, any one of the ten classrooms and the auditorium.
6. Sixteen audio channels available through four, four-track audio tape decks, each track having a separate dial code number.

All of these sources are available by dialing from any one or combination of receiving stations. The only manual functions are the initial loading of videotapes, films, etc. This is easily accomplished by student aides. These students also man the master console and maintain communication through an internal intercom system where they are most helpful in answering questions and requests. Much has been learned in this phase and this newly gained knowledge is being put to use in Phase II.

Phase II

The second phase of the dial select project involves expansion into eight other schools in West Hartford. This is implemented through the installation of miniature versions of Phase I. Each school is an independent installation that houses its own switching, videorecorder and audio tape deck. The number of receiving locations range from three to seven. The schools involved include one other high school, two junior high schools and five elementary schools. Each system has the capacity of four audio channels and one video channel plus auxiliary inputs. All channels are available through dial access. Obviously, with so few receiving stations and program channels, the real educational fulfillment is limited. However, one of the very important lessons that was learned in Phase I was the great need for lead time by the faculty. Through this satellite system, the faculty in these eight schools will have the opportunity to experiment with both hardware and software as it relates to their particular grade levels and curriculum areas.

Phase III

Phase III is currently under construction. With the cooperation of The Southern New England Telephone Company, the nine schools involved in the first two phases will be tied into one network. The original control center for Phase I will serve as a program bank. The source hardware that was added to each school in Phase II will be housed in the control center. At that time there will be nine videorecorders, ten audio tape decks plus the film and off-the-air capabilities. The Southern New England Telephone Company is providing modulation and cabling for eight to twelve video channels and 40 audio channels, rated at varying sound quality grades. In addition to the program lines, they are providing appropriate control lines that will make possible the remote dial control of the various pieces of hardware from each receiving station in the outlying schools. The user of any of the fifty-six receiving stations in any one of the nine schools involved, will have equal access to the program channels by simply dialing a three-digit number. Certainly, many more questions will be answered in this phase relative to compatibility of various grade levels and curriculum areas from a single program center. From this then will come answers that will be extremely significant, not only in the installation in the New Hall High School, but in the planning of regional expansion of dial access.

Technical Personnel

Not only has the development of this type of technology challenged the flexibility and imagination of school administrators and faculty, but it has issued the same challenge to technical personnel as well. At present there is a scarcity of competent technical personnel in this field. The requirements not only demand technical competence, but also the ability to work with and understand faculty and students. The work runs the gamut from routine maintenance, to production techniques, to supervising students. The television repair man, the video specialist, the audio specialist, recording engineer, crossbar switching specialist, solid-state specialist, producer and director are all a part of the job requirements. However, the rewards are many. It is exciting, fringe benefits are usually excellent and the pay scale is in line with industry. It combines the serenity of campus life with the fast pace of industry. (And for those who are interested in such things, it should be noted that it is virtually impossible to program hundreds of pieces of software without absorbing some of the contents, so there is even some education by osmosis.) The ability to develop routine maintenance procedures is very necessary. To be familiar with correct methods of measurements as accepted by the broadcast industry are very important. The relationship between faculty and technical personnel is a strong factor and a lack of understanding or communication can be very damaging to a project.

Attitudes

Attitudes toward a project of the type described here are extremely important. These attitudes are usually a product of the success, or lack of it, personally experienced by the teacher in the classroom. In this respect, West Hartford once again has been very fortunate. Members of the faculty have been most helpful. They have not, collectively, accepted the concept on face value. In general, they are most willing to reach out for any bonafide teaching aid that holds real educational significance in the classroom. They have not been at all shy about questioning the validity of the concept. The probing, testing, rejection and then acceptance have all been on a very personal basis. Wholesale acceptance or rejection on the part of the faculty would have robbed the pilot project of its prime purpose. A History teacher is not at all impressed by what has been accomplished with dial access in the Science Department. An elementary school teacher will not accept the concept because of its value in the high schools. These are healthy attitudes, because out of these attitudes come two major ingredients, creative ability and imagination. Even with the small percentage of faculty in West Hartford that has had the opportunity to experiment with this innovation, the facilities and the time of the technical personnel, the two graphics specialists and the 4000-print film library are being taxed. Imagination and creative ability is not limited to faculty.

An idea, once born, must be implemented. To do so, the faculty must transmit the desired end products to the back-up personnel. They too must possess creative ability and imagination. They must provide suitable methods for the teacher, suggest possible alternate methods in order to assure the teacher that the desired end results will be obtained. This process harbors one of the pitfalls in the marriage of education and technology. Because of the close association of these now allied fields, there looms the very human temptation to step beyond the boundaries of one's

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Although sources are available by dialing, students at West Hartford initially load videotapes, film, etc., and man the master control.

Photo credit: Robert L. Nay

A microscope chain at West Hartford.

Photo credit: Robert L. Nay

field of specialization. There are many cliches that apply to this pitfall. "The grass is always greener . . .," "A little bit of knowledge . . .," etc. This is one of the areas in which the experience of Dr. Ira Singer, assistant superintendent and chief administrator for the dial select project has been most evident. One of the first visible signs of the maturity of the West Hartford project has been the mutual respect that educators and technical personnel hold for one another. Administrators and teachers no longer attempt to become directors and producers as a result of a one day seminar or a summer workshop. Technical personnel do not become educators by virtue of the fact that they are housed in an educational institution. Instead, both groups use their experience better to understand the needs and problems associated with the other areas of responsibility.

The Future

The citizens of West Hartford, by virtue of their approval of a $250,000 referendum have guaranteed that the dial select project will go into the New William Hall High School. The new facilities have been physically planned to encourage student participation. Through the design, constant adult supervision will be maintained with limited personnel. The Program Center, Control Room, Production Studios, Editing Room, Repair Area, Graphics Studio, Production Conference Room and Office are all in close proximity so complete control can be exercised at all times. These facilities are designed to make local production as convenient as possible for the faculty. A production conference can be called on short notice. Technical, graphic and research assistance is immediately available and answers can be provided quickly.

The new high school will provide 150 receiving locations for student and faculty. One hundred study carrels will be installed and 50 large group monitors will be located throughout the building. Twenty video channels and 100 audio channels will be available. These channels will be equally available to the eight schools that were included in the first three phases. Other schools in the area are making inquires toward tying into this media center. Public institutions of all types are making similar inquires. A teacher Training Center, now located in one of the West Hartford Schools, is tied into the network. This gives the faculty not only dial selection, but also a complete multimedia installation that includes dry carrels. Telelecture, rear screen projection, etc. Currently, plans are being made to produce individual school orientation and instructional tapes in the use of various types of hardware. A teacher may dial an instructional tape on threading a particular projector or on the use of an office duplicator. New students will have access to orientation tapes that will acquaint them with their new surroundings and policies. An "Information Channel" of the Weathercast type is now being designed to provide immediate information relative to programming and availability. Now being considered is the practicality of permitting students from all of these schools to program their weekly school calendar on audio tape. This, hopefully, would promote familiarity with the hardware by encouraging students to dial the appropriate number and be informed as to what is happening in their particular school that week. Plans are now underway for the production of short taped modules to be used singly or tied together in various combinations to provide reinforcement for faculty and student. Cooperative programs with other dial access throughout the country, promise new success for the program. The exchange of ideas with counterparts from other schools has been most helpful.

—Material submitted by **Wayne Crawford**,
Technical Director, Media Facilities,
Wm. Hall High School, West Hartford, Connecticut

BURNT HILLS-BALSTON LAKE

"Special objectives (of TV equipment) include: . . . implement more effective approaches to the emotional, social and educational needs of the individual student, . . . provide for a noticeable increase of materials for use with team teaching, . . . supply resources for more effective teaching."

BURNT HILLS-BALSTON LAKE JR. HIGH SCHOOL of the Central School District (located about 25 mi north of Albany, New York) is installing a system that permits the student to select a portion of a videotape. The original specifications called for a complete audio-audio/video dial retrieval system of 10 student carrels located in the library. These carrels (see photo), contain a 9-in. monitor, a student control module with a standard telephone dial, microphone on-off switch and volume level control. To the left of the control panel are two earphone-mic jacks enabling two students to occupy each carrel, if desired. All material, with the exception of the monitors, booths and cabinetry, is of Chester Electronic Labs manufacture.

The monitor controls are pre-set and unavailable to a student's prying fingers.

Program sources from the central library are, one 2 × 2 slide projector with multiplexer, one 16mm

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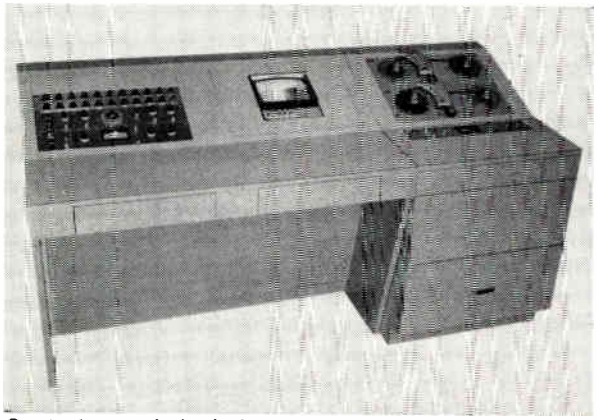
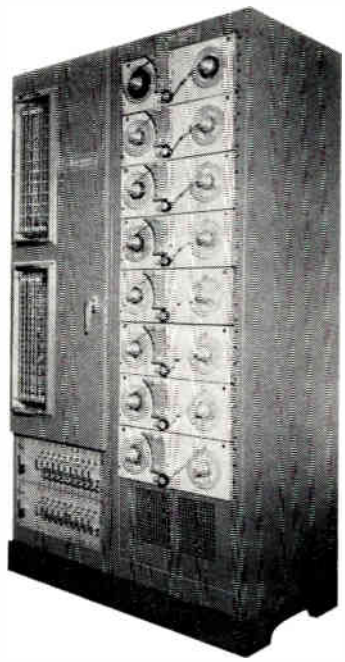
Carrel with dial retrievel system which can select a portion of a videotape at Burnt Hills.



Control console include a channel distribution panel and student switch panels.



Cross bar switching assembly includes video distribution amplifier and tape machine.

motion picture projector with uniplexer, two helical scan Westinghouse videotape recorders, one uhf/vhf off-air tuner and one studio camera with 5-in. viewfinder.

The two VTRs have been incorporated into Chester's unique SIDAC (Serial Information Dial Access Control) system. SIDAC enables a student to dial from a carrel position, gain access to a VTR and rapidly locate a segment of information stored on videotape to play back for reference. SIDAC can also be controlled from the central library should the instructor wish to feed segments of taped information out to the carrels on an assigned basis.

The VTR, when used in conjunction with SIDAC, becomes capable of rapid search and play back of up to 30 segments of information from a single reel of tape. Program capacity thus is increased. This feature requires a VTR that is solenoid operated.

The control console includes an audio and dubber facility. The panels on the left from bottom up are, intercom vu panel, channel distribution panel and student switch panels. The center bay contains a 9-in. preview monitor. The dubber, located on the right of the console, has two tape machines and the necessary electronics for the preparation of the 4-track audio program material. It also is used as an additional source for audio programs.

The dial system uses crossbar switching assemblies. The interior of the cabinet contains the solid-state logic and linefinders which were designed, engineered and built by Chester Electronic Labs.

The base of the switching cabinet houses new plug-in solid-state video distribution amplifiers and power supplies. The video gain controls and test points are easily accessible from the front of the plug-in modules. The cabinet to the right of the switching system contains eight 4-track program tape machines (32 programs) and is immediately expandable to 64 programs by the addition of 8 more tape machines on the opposite side of this cabinet.

With the present switching system, the school can add many more video and audio programs by just increasing source equipment. However, by adding more switching, the system is virtually unlimited.

The supplier's approach, following the award for the system, was to manufacture and assemble the equipment at the factory. After performance and checkout, the system was dismantled on a modular basis and reassembled on site at Burnt Hills-Balston Lake Jr. High School.

Burnt Hill-Balston Lake Jr. High School does not intend to do much local programming. It will draw its videotape from the New York State Education Department. (Since the State Education Dept. dubs all videotapes sent to schools, videotape recorders must be compatible. To solve this problem, Westinghouse gave a machine to the State Education Dept.) The facility, called the Environmental Learning Center, was made possible by a Title III grant under the Elementary and Secondary Education Act. The objective is to extend an already outstanding library program.

GRAND VALLEY

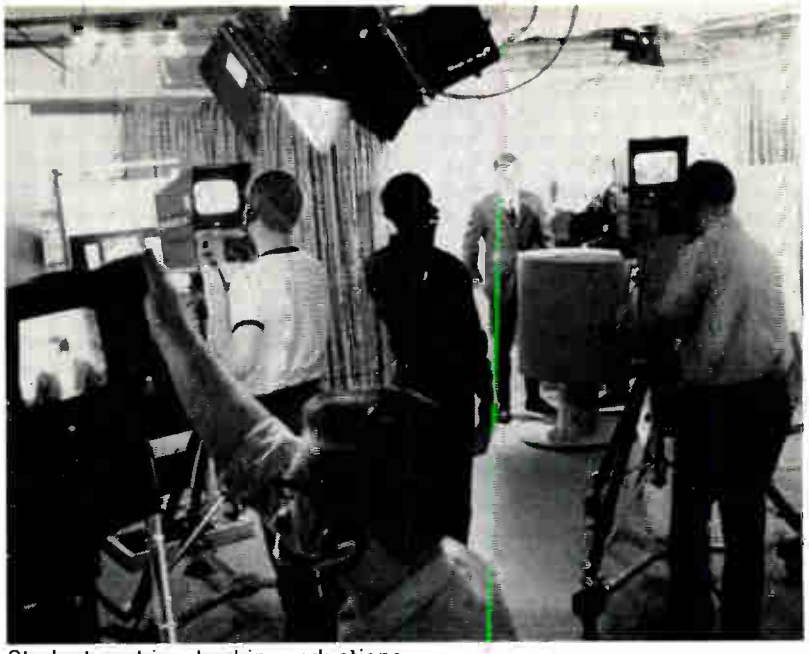
"Grand Valley State College has not simply adapted, but planned from the drawing board up to make integrated use of the new A-V media."

HOUSED IN THE LIBRARY AREA of Lake Superior Hall of Grand Valley State College is a dial access integrated audio-video system which employes 256 carrels. One hundred and thirty-one of these carrels are equipped for reception of television—both closed and off-the-air—using monitors checked out at the library desk. The remaining carrels have dial access to audio program sources. The dial-access equipment was built by Chester Electronics Labs.

Eight TV channels are available for distribution of live, videotaped, filmed, or off-air programming to carrels, classrooms and lecture halls. A film chain, helical-scan videotape recorders, and live camera

World Radio History

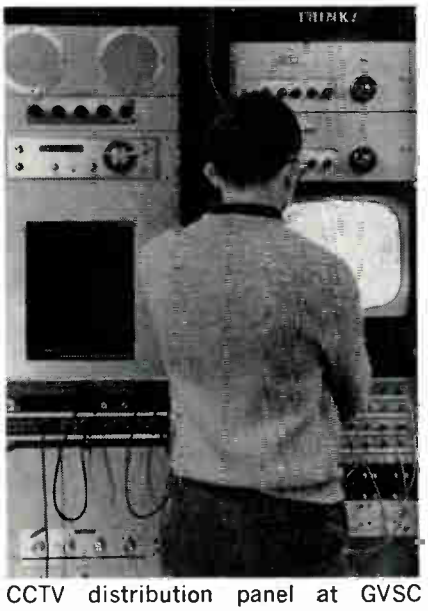
Portable audio video control consoles



Students get involved in productions

VTR and portable audio video control console in VW Microbus

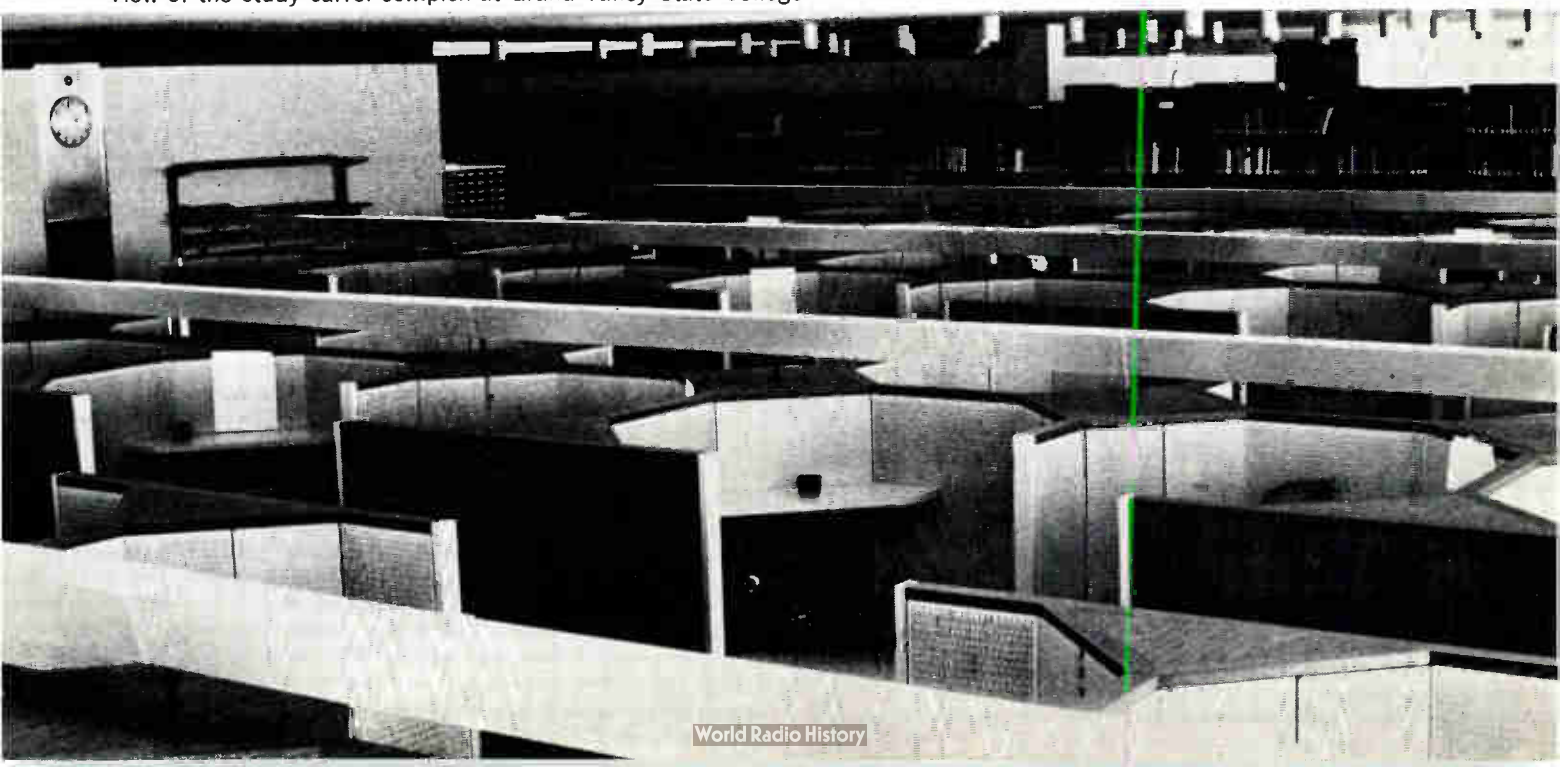
Student using CCTV in a study carrel



CCTV distribution panel at GVSC

Student answering a call on on carrel indicator board

View of the study carrel complex at Grand Valley State College



World Radio History

provide most of the video feeds.

The studio was well on its way to being finished two years ago, complete with draperies, Century scoops and spots for lighting, various set pieces, a film chain, Blonder-Tongue vidicon cameras mounted on Hercules dollies and equipped with Canon Zoom lenses.

Television productions often involved the use of great numbers of cue sheets and GVSC solved the problem with inexpensive, homemade "Teleprompters," using commercial Teleprompter paper rolls and a manually operated winding device.

Two audio-video control consoles are used—one primarily for smooth broadcasting of videotaped materials to classrooms and the carrels—the other for studio production control. The latter was designed by the engineering staff for portability—the two units can be removed for use in the field for remote TV productions and videotaping. Basketball games, student-teachers conferences, college functions and the like have been videotaped and/or simulcast using this remote gear. Three videotape recorders are used—two Ampex 1500s and one Ampex 660B.

In addition to the studio and remote recordings, most classrooms and lecture halls on campus can serve as origination points for TV programs. All academic buildings on campus are linked by rf and video cable into an electronic network, providing classrooms with access to videotaped programs on a scheduled basis as well as serving as points of origination.

The Blonder-Tongue cameras were custom-modified at the request of GVSC Chief Engineer David Doebel to accommodate industrial sync, two-to-one interlace, and EIA broadcast sync. The modification proved so successful that Blonder-Tongue now offers these as a package on its new equipment. New vidicon tubes were introduced into the cameras to give higher resolution from 700 to 850 lines providing higher quality pictures.

Trained student crews under the direction of the professional staff handle many of the actual production chores. All pre-production planning and liaison are carried out by the staff—a producer, art director, and two engineers. Videotaped productions of any description, are tightly scheduled so that they may be sandwiched into a host of other services performed by the staff—including the operation and programming of the dial access audio retrieval system; operation of the CCTV distribution system and language laboratories, graphics and consulting support, related engineering services, and standard A-V equipment distribution and operation.

To date, virtually all subject areas taught at GVSC have at one time or another used the services of the CCTV production facilities. These have included:

Anthropology—Stone Tool Making
Biology and Ecology
English—The Canterbury Tales
Language—Student Dramas; Conversational Vignettes; Scientific German dialogues
Library—Orientation
Conferences—Erasmus Cinque Centennial
Philosophy—Drills in Use of Logic
Physics—Oscillatory Motions & Simple Wave Motions
Political Science—Student Debate & Student Programs
Psychology—Pupillarmetrics Experiment; Student Lectures; Polygraph Demonstrations
Teacher Preparation—Evaluation of Student Performance

These programs have been tailor-made usually at the request of the professor for use in specific courses taught on the campus. As a result, cooperation and full support of the faculty member involved was realized during the production, and, later, for subsequent and regular airings of the program.

Attempts at programming entire courses for use on TV proved frustrating. Lack of released time for professors and frequent changes in course content in a young developing college worked against such efforts. As the college continues to grow, however, larger class sizes will make extensive CCTV use more appealing since it will generate more economies and, presumably, released time will be available along with more stabilized course offerings.

—Material submitted by Ray Wisniewski,
Associate Director,
Audio-Video Services

MILLER COMPOSITE

"Miller Composite High School has the most complete and sophisticated range of audio-visual technical equipment available in Canada today (including) a completely self-contained closed circuit TV system. The rationale behind the large expenditure ($200,000) lies in the value of the equipment providing more individualized instruction and the opportunities it provides to the individual student to do his own research, to learn independent thinking and to acquire self-motivating study habits."

AT MILLER COMPOSITE HIGH SCHOOL, a $200,000 closed circuit investment includes a radio and television arts studio which is both the keystone of the networks and a laboratory for senior students taking a course in radio and television production.

The television equipment has eight channels, two of which are reserved at present as spares, to be put into operation as the need arises. Of the operating six, two are used exclusively for videotape material played on Ampex 660 VTRs, two broadcast live from one or the other of the system's two cameras, and two handle film material. (One can take 16mm films; the other handles either 16mm material or 35mm slides or filmstrips.)

Live Broadcasting

Within the school, live telecasts originate in the studio, with the teacher bringing his materials there and broadcasting through its facilities. However, if the apparatus required for the lesson is too cumbersome to move to the studio, the telecast may be made from one of two chemistry laboratories or from one of two physics laboratories. These lessons may be broadcast live or they may be videotaped for use in the future (or may be simultaneously broadcast and recorded on videotape).

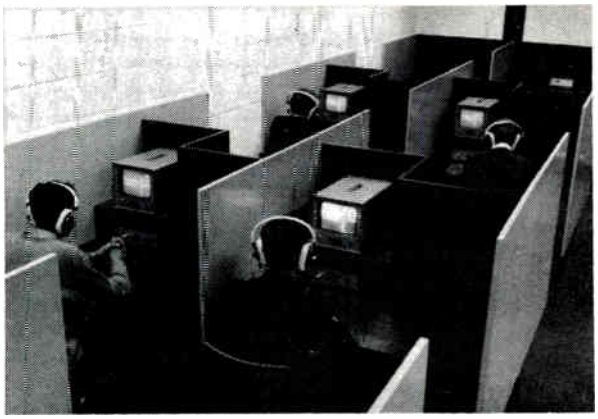
Broadcasts from either of Regina's television stations, CKCK or CHRE, may be picked up and rebroadcast within the school, or they may be put on videotape for use in the future. The system as yet has no facilities for originating programs outside the school, since all the necessary wiring is within the building.

Monitors are located in each classroom and in all other instructional areas, such as the cafeteria and the seminar rooms. In the resources centre itself, ten of the 32 study carrels are equipped with small monitors so that students working on their own may have access to the video recorded material.

Visual material is booked through the resources centre, and classroom teachers have priority in its use. For the staff, material is available on a first-come, first-served basis.

As the system gets running smoothly, there are plans to make the carrels at Miller Composite available after school hours to students from the four

World Radio History



Eight TV channels are available on these screens at Miller.

View of master control room and studio at Miller.

other separate high schools in the city.

The television and radio technical co-ordinator for the school, Mr. Fred Wagman, encourages teachers to keep film presentations under 20 min in length, since this is the optimum time for maintaining student interest. It also allows teachers to use the same track or channel for two different subjects during each 40-min period, one using the first 20 min and the other the second.

Equipment was supplied by RCA Victor; most of it is custom built.

ORAL ROBERTS U

"It is a space-age university . . . (containing) some of the most modern electronic evaluation equipment in the world. The electronic medias include closed circuit television in classrooms and study areas, films, recordings, slides and computerized audio-video information storage and retrieval systems, and the most modern visual teaching techniques."

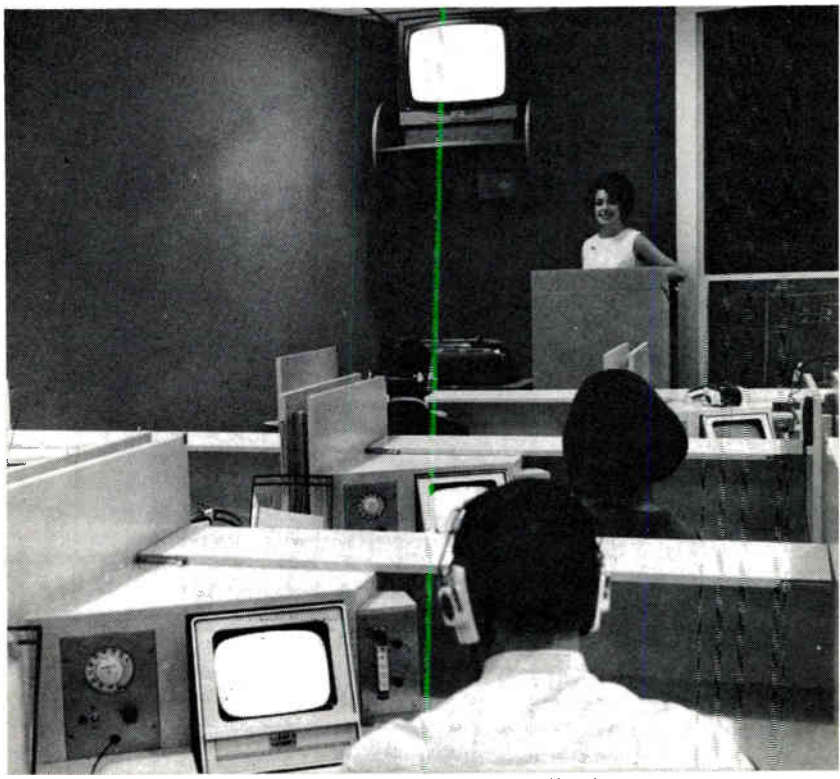
THE LEARNING RESOURCES CENTER of Oral Roberts University was described as "one of the two most creative facilities on the American campus today" by Harold B. Gores, president of the Educational Facilities Laboratories, Inc. of the Ford Foundation. It is filled with electronics.

A professor can stand at a desk in any of the bright classrooms, push a button and have projected, by audio or video, anything he has programmed into a computer. Each teaching desk has a slide projector, a transparency projector and a tape recorder.

The center includes its own fm radio station and studios, and a closed circuit television production studio.

On the fourth floor are 130 electronic study carrels. This data information retrieval system allows the student to dial the computer and have served to him on a viewing screen and/or through earphones, supplemental material or lectures he might have missed.

Oral Roberts University has a total capability of 63 program sources at any given time. At the present time, only four are on videotape. Virtually all of these are available by random remote access. When a student dials a program, the computer recognizes the original code and, according to its program pattern, directs the call through a switching matrix to the awaiting source. Since the computer operates at a fast speed, one or one hundred could dial simultaneously with virtually no waiting. If more than one person calls for the same source, he enters the source at the point at which the program is at that moment. Pro-

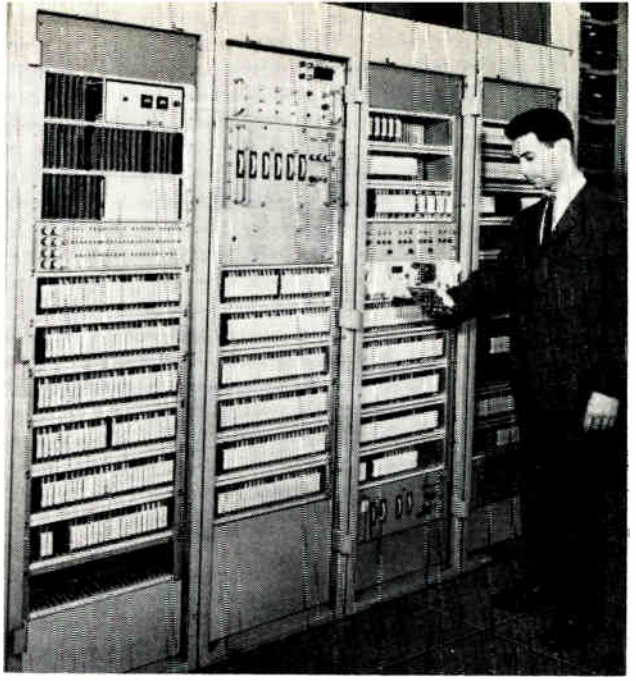


In the Learning Laboratory, lectures or individualized study can take place. Each of 24 carrels have audio-video dial access retrieval.

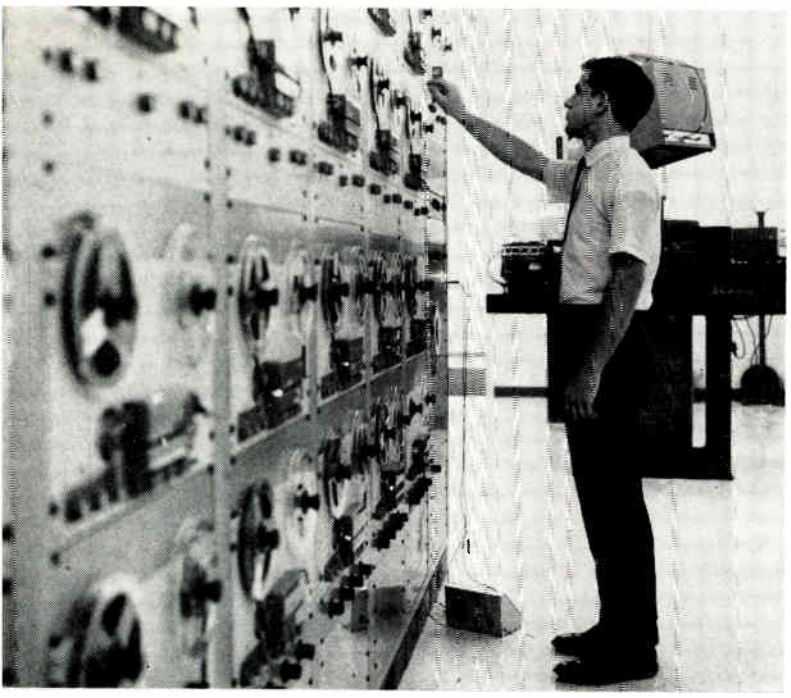
Individual study carrels are located in the library

World Radio History

Video control console in the computer control center.



Computer (processor) built by North Electric uses cross bar method and ferrite memory storage.



Audio source machines in the computer control center. It is controlled by dial access.

Instructional material center at work.

duction facilities are comparable to those found in a television station for the video production component and similar to those used in the radio station for the audio production component.

Three quadruplex VTRs are used, six film chains, four live cameras and two TV tuners.

A special frequency-controlled programmer has been built to control slides, film and videotape clips. These components can then be programmed with lectures or other presentations. Such programmed sequences will automatically recycle at a dial request controlled by the tuned-frequency pulse code signal. Thus an audio-video program can be presented without affecting the TV production studio facilities.

The initial installation cost for the computerized dial access audio-video system and TV equipment was $615,000. The prime contractor was RCA.

ORU also has an Instructional Materials Center which prepares arts, graphics and photography components for use either directly in the classroom or through the video portion of the system.

The staff consists of a production director who administers the production facility, an engineer, and a production team. In the Instructional Materials Center there is a director, an art assistant and a photographer. Secretarial help and many students make up the remainder of the operation. For instance, in the Instructional Materials Center and in the control center where the distribution equipment the computer and the source machines are located, there are about fifteen students who work ten hours each per week.

ORU is investigating self-teaching, and is creating its own prototypes of self-instruction equipment including a group tutor system with individualized capabilities. In the group mode, individualized multiple responses are available from each student, which are correlated and instantaneously tabulated for each student at the instructor's console as a printed record on one sheet. Presentation modes available to the group include rear screen projection facilities, group video and several audio and/or video individualized materials by dial access. The program is now just in the building stage.

—Material supplied by **Paul I. McClendon**, Ph. D.
Director Learning Resources
Oral Roberts University
Photo by M.C. Forrester.

World Radio History

Part 3 CATV

WMNR, an ETV station in Marquette, Michigan, is the only member of NET that has no broadcasting facilities. Yet it serves 32 communities. How? Solely through 17 CATV systems. CATV has been a boon for many ETV stations as the case histories below show.

UPPER PENINSULA

MICHIGAN'S UPPER PENINSULA is 16,538 mi²—as big as Connecticut, Massachusetts, Rhode Island and Delaware combined, and larger than either Belgium or Switzerland. One of the most unique television stations in the country is centrally located there in the City of Marquette, Michigan on the Campus of Northern Michigan University—WNMR-TV. It is the only member of NET which has no broadcasting station yet serves thirty-two communities because seventeen CATV systems have agreed to set aside one channel of its facilities for the transmission and distribution of WNMR's programs and control at all times. Northern relays their programs to the CATV system by rented microwave lines. There are 17 drops.

The CATV companies of the Upper Peninsula also transmit and distribute the programs originating from Northern Michigan University studio to all of its customers with no additional charge to the customers for this service. The CATV operators have, at their own expense, brought this cable television system into both public and parochial schools located within their service areas whenever requested by school authorities and provide one connection service and maintenance without charge to the schools. Many agencies such as Public Health Service, Police, Medical Associations and K.I. Sawyer Air Force Base are able to utilize a communication system of this nature.

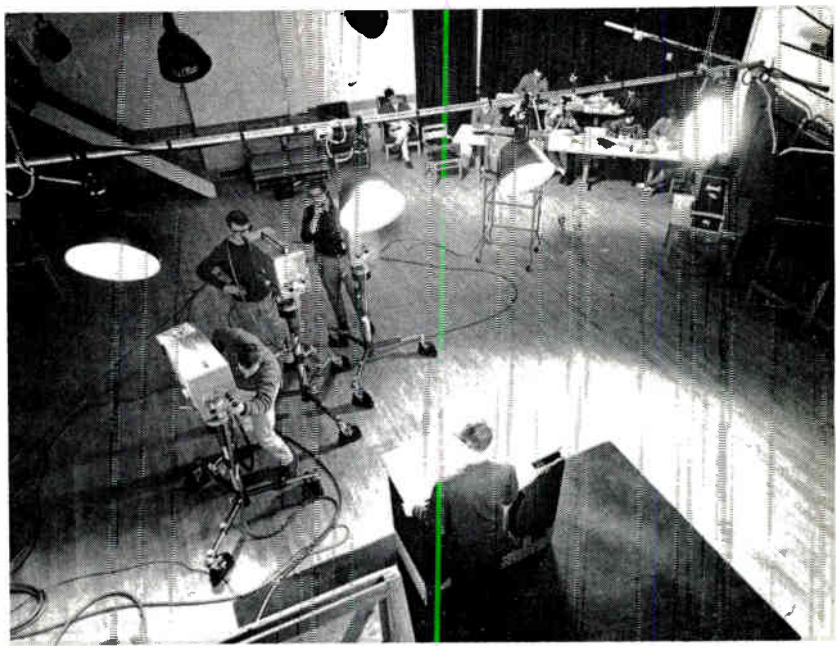
WNMR-TV operates seven different channels of instructional information to classes of 4500 students on Campus. It also receives the three commercial networks, ABC, NBC, and CBS, provided by Iron Range Cable Corporation. On June 15, a ground breaking ceremony was held for a Learning Resources Center costing $5,500,000 which will house the new television and radio facilities, library, etc. of WNMR-TV.

Richard R. Bur, manager, Iron Range Cable Corporation, reports that to the extent that additional channels are available, CATV companies of the Upper Peninsula will carry the additional channels produced by Northern Michigan University.

MOAB VALLEY

MoabValley, Utah, is surrounded by mountains, desert and rugged countryside. Ninety-four percent of the county's population live in its valley, 240 mi southeast of Salt Lake City, well isolated from the major population center of the state. Town Television, a division of Wentronics, Inc., is the cable system in Moab. Town Television has always carried the University of Utah educational station in addition to the three Salt Lake City network stations, and two fm stations via microwave.

From its beginning, Town Television had a local weather public service channel with taped background music. Ed Drake, Town Television's manager, had been doing some school programming through its



WMNR-TV produces seven channels of instructional TV; it's distributed by CATV companies.

facility but it became apparent the Grand County school system could use a local origination facility of its own. School officials had been using KUED in about 50 percent of the classrooms and were television oriented. But it was apparent more supplemental or enrichment programs in languages, science, social studies and other studies were needed. Drake helped the school plan equipment needs and $19,000 was budgeted for local origination equipment. A remote switcher was built so that the local origination signal could be inserted into the head-end modulator in place of the microwave feed of the ETV station. The local independent telephone company donated wires for switching and Town Television donated the 600 ft of coax to reach the end end.

On September 13, 1965 the first locally originated ETV program was switched into cable system and used in the junior and senior high schools. Several school programs such as the French course have been tuned in by housewives and the community was enthusiastic.

However the schools felt a "private" channel would also be desirable. Town Television would have been happy to furnish this channel if it had a spare one, but, being a low band system, all channels were in use. (already the educational and Town Television's channels were being time shared and KBYU—Brigham Young University—was switched on Saturdays when KUEU went off the air.)

To solve this problem a most unique agreement between a school district and CATV has been negotiated.

Town Television is to build a new aluminum cable and Jerrold Starline trunk system from its head-end to the four Moab schools. These schools, fortunately, are located on the three major legs of the present system. The school district will then reimburse Town Television $12,000 for 18,000 ft

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of new system, and they will use at least one of the high-band channels as a "private channel." Town Television will feed its existing low-band system from the new all-band trunk, but the low-band equipment will trap the high channels into subscribers' homes.

At such time as Town Television decides to high band its entire system, the school has agreed to obtain a midchannel modulator and converters in each school, at a subchannel 7 frequency in order to retain privacy. The school-financial cable remains Town Television's to use without limitation, and they ultimately would have their own channel 3, their own subchannel 7, channel 7 from KUED (Univ. of Utah) and possibly one other ETV station.

Moab High School and Town Television (CATV) share equipment for local origination.

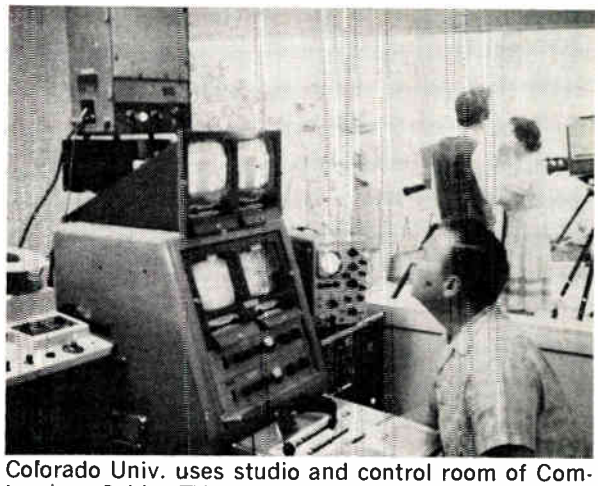
As a result of modest success with local productions, Moab High School is offering a limited course in practical TV production to selected seniors. Scriptwriting, production, camera technique, and videotaping experience are offered in this course. Senior students receive credit, and provide a source of manpower for cameramen, remote productions, etc.

Such close cooperation requires a CATV operator to take the initiative. Ed Drake takes justifiable pride in showing this initiative. He has helped set up similar schedules in Casper, Wyoming, and one in Abilene, Texas. In the latter situation he gives credit to Gene and Richard Schneider of GenCoE for their pioneering work.

GRAND JUNCTION

In preparing this article, *BM/E* found Drake at Grand Junction, Colorado, helping ComTronics Cable TV—another division of Wentronics, Inc.—work with its local school district and local junior college.

At Grand Junction, a 132-mi plant has just been constructed with 80 more planned to serve 7000 subscribers. ComTronics is offering its distribution facility for a local ETV outlet. A 25- × 40-ft studio plus two 8- × 8-ft control rooms were built in conjunction with the business office. The facility will be used jointly by the cable company for public service and by the schools for local ETV. The school district in June approved a participation in Federal funds whereby $27,500 will be spent on cameras, tape



Colorado Univ. uses studio and control room of Comtronics Cable TV, Grand Junction, Colorado, for teacher training courses.

recorders, film chain, etc. ComTronics hopes to supplement this by investment in some equipment, so a complete production facility can be used by both ComTronics and the school district. The system contemplates carrying a local ETV and a local public service channel, in addition to full-time carriage of KRMA-TV from Denver.

The school district is looking forward to use of a private channel (between 120 and 174 MHz) for in-service training, teacher and administrative conferences, etc. ComTronics also recommended wiring the individual schools in such a way that a tape playdeck and rf modulator can be easily switched in to feed that school instead of the cable signal, if desired.

It is almost common practice for CATV systems to carry ETV stations. A recent NCTA survey showed that 719 CATV systems located in 45 states and distributed by signal of 94 ETV stations. (*BM/E* July p. 12).

ACROSS THE USA

Frequently the CATV system wires an outlet into every classroom. Progressive systems have done this on their own initative. Because of this practice new town ordinances call for this service a part of a franchise.

Decatur Cable TV Inc., Decatur, Alabama, B.K. Johnson, manager, is one of those progressives who has volunteered to connect schools. By the next school term every classroom in the 14 city schools will be wired. Decatur Cable now has a closed circuit truck running from each school and from the city's ETV studio to its head end. Programs can originate in the school or at the ETV station. Decatur cable has allocated three channels to ETV. One channel is full time state ETV, the other two are at the disposal of the city's ETV program director.

In Bristol, Tennessee, on the Tennessee/Virginia state line, Bristol Cable TV, Co. allocates one channel to Tennessee and one to Virginia for their separate programs. Five schools have been connected to the cable but this fall all of the schools on the Tennessee side will be connected.

Other typical examples of CATV providing labor, wire, and equipment without charge to the district are BKP Television System Inc., Sunbury, Pa. (which has also wired a parochial school) and Clar-O-View Corp., Bangor, Pa. •

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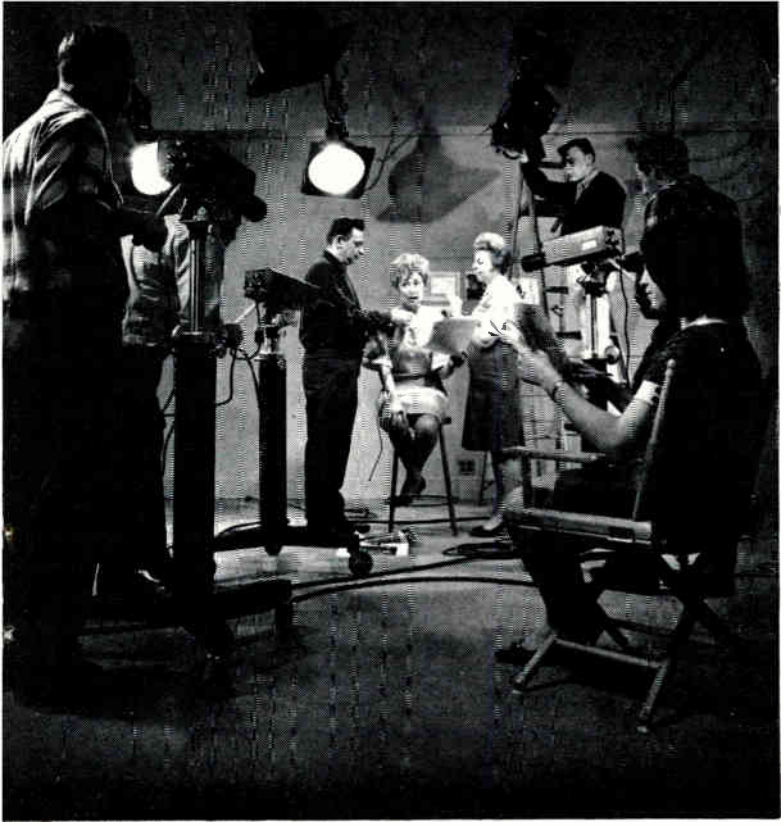

WAVE GOODBYE TO TV "CONFUSION COMMITTEES"

The unique WAVE System multi-media instruction center and Audio-Visual Recorder, both exclusively new from Westinghouse, quite literally comprise a one-man (or woman) television studio that eliminates the "gang scenes" previously necessary for TV teaching.

The unmatched simplicity of this completely integrated, closed-circuit system allows the teacher to concentrate on *teaching* rather than *operation*. Thus, a single instructor can combine live instruction with videotaped lessons, films, filmstrips, slides, transparencies, charts, and even dimensional objects.

The resulting program can be transmitted "live" throughout the school — and between schools via microwave — or, using the Westinghouse Audio-Visual Recorder, permanently recorded on videotape for later showing.

Designed to accommodate practically all audio-visual resource materials in a single console-sized unit, the WAVE System is still within the reach and budget of every school system.

For complete information on enriching the teaching program in your school, contact Mr. Martin A. Lappin, General Manager, CIP Division, Westinghouse Electric Corporation, U.S. Highway 27, Metuchen, New Jersey 08840. Dept. L-9.

WAVE SYSTEM Westinghouse Audio-Visual Equipment

You can be sure if it's Westinghouse

Circle 15 on Reader Service Card

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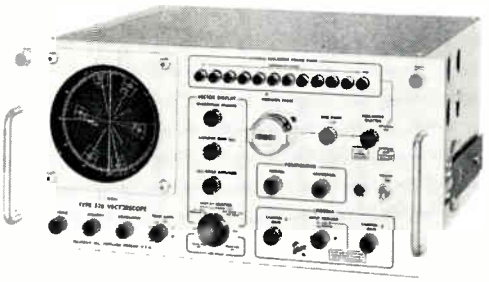
Tektronix Television Instruments

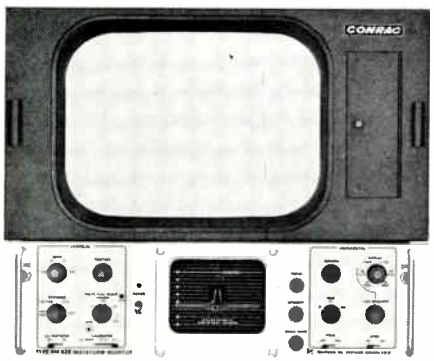
Type 526 Vectorscope for Chroma-Signal Displays

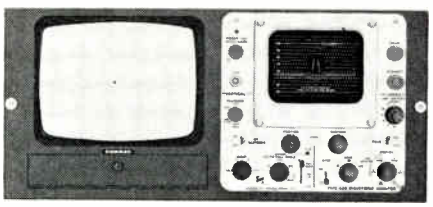
color encoder adjustments
differential phase measurements
differential gain measurements
vertical-interval-test-signal (VITS) displays
video tape-recorder setup

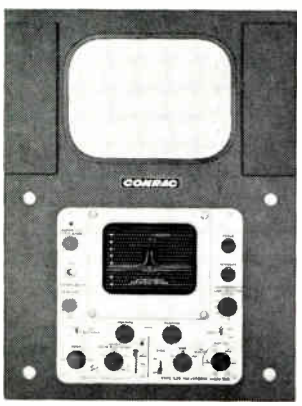


Measuring amplitude changes and phase shifts can be done accurately, conveniently, and independently with the Vectorscope. The Vectorscope presents relative phase and amplitude displays (of chrominance information in the N.T.S.C. color signal). Dual-trace capability permits simultaneous display of two 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.



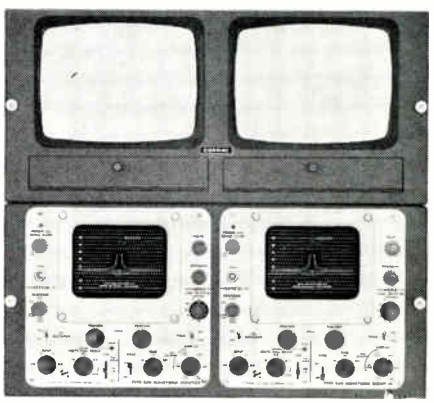


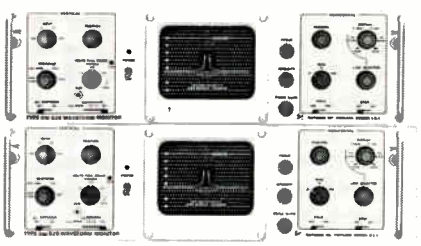


Type 529/RM529 for Waveform Monitoring

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.

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MANAGEMENT
ROUNDTABLE

Order Takers Don't Sell

Needs and Wants — Radio's Advertising Strength

By Si Willing

THE FACTS that we are going to discuss here are known by most salesmen. But, just as a bottle of medicine should be thoroughly shaken up to get the proper mixture, so should sediment that has settled in your store of knowledge about salesmanship be stirred aound. Most of us have a tendency to let important facts of knowledge and information remain dormant so long they become crystallized and inactive. We become order takers instead of salesmen. We short circuit the sale between the sponsor and the station we represent and neglect the two most important things there are about selling broadcast advertising: *knowing your product* and *knowing your market.*

Without a complete understanding of both of these elements, you cannot be a successful salesman. Has it ever occurred to you what your market really is? In my book it's people! Who can deny that if broadcasting stations had no audiences, they would have no market. Yet, how many of us really study the makeup of people? Take time to observe people on the street, bus, plane, train. Most of them are harried, hurried and worried. Many are dejected, rejected or, in short, alienated. If they are enjoying themselves, they resent any intrusion on their time. These are the same people who set up an invisible barrier which you must penetrate if you expect to get your sponsor's messages through. Now that's a simple fact of life which we must live with and understand and do something about.

Know Needs & Wants To Get Through

Next question that pops into your mind is "what is this guy trying to to tell us; must we change the make-up of people everywhere?" The answer is no, because that is impossible. We can't hope to change people to the point where they will cheerfully look forward to a barrage of commercials on radio or television. *But,* we can improve our product so that it will have a chance to make a favorable and (hopefully) a lasting impression upon these people. "But," you say, "you just got through telling us that people resent any intrusion on their leisure time. They don't want to be bothered with commercials when they tune into their favorite programs." That is true, but here's the answer! *If* you know your market in terms of *needs* and *wants,* you can make a good enough case for the product advertised so that the message will penetrate the wall of resistance put up by the listener.

Doesn't it frighten you when you consider that the average spot announcement must sum up a convincing sales story in sixty seconds or less? This message must move people to merchandise or services! When you stop to think about it, that's a mighty big and tough job!

Here's where we separate the salesmen from the order takers. An order taker will suggest that maybe it's a good idea to run a small weekend schedule "just to keep the sponsor's name in front of the public." And maybe the sponsor will think this is a good idea and give the order taker a scribbled list of weekend specials. The order taker will write an alleged piece of copy. The word alleged is used because generally, the copy is merely a listing of items for sale that weekend at that sponsor's store. How many salesmen will say "amen" to the fact that radio *is not a listing medium!* Circulars and newspapers are listing mediums, but radio is not.

A real salesman will find out all there is to know about his sponsor's merchandise and service. He'll capture the flavor of the

Si Willing is president and general manager of KMAR, Winnsboro, La.

Si Willing has a recorded talk entitled "Salesman or Order Taker" now in the portfolio of the Businessmen's Record Club. There are many fine talks on salesmanship in this record of the month club, recorded by the top-flight salesmen of our times. Owners of stations may wish to subscribe to this service. There is no membership fee; you just pay for the records that you want to buy, none of which is over $5.95. You can get a membership card by writing to National Communications Corporation, 350 North Clark Street, Chicago, Illinois. Willing says, "Realize that no salesman, no matter how successful he may be, can always motivate himself or generate enough enthusiasm to get results all by himself. He needs other men's successful ideas, atttiudes and opinions to guide him. We must depend upon each other in order to perpetuate that wonderful profession of salesmanship."

World Radio History

store in his copy and communicate it to his radio audience. Let's face it, a can of Campbell's beans on the shelf of Smith's Grocery Store is the same as it is on the shelf of Jone's Grocery Store. The price may vary by a penny or two in some instances, but that's not enough ammunition to use a real sales campaign.

A real salesman will tape a well-prepared commercial or two and let his prospective sponsor hear that tape. The real salesman knows that if his client doesn't invite people to buy, his client's competitor certainly will! And people generally go where they know they are welcome. Competition creates quality and when several competitors have equal quality, you've got to look for additional reasons to make people shop at the sponsor's store. One of the best reasons is to let the customer know that he is welcome! You must invite the customer to buy! But, the customer won't know where to shop unless he is told where the merchandise is for sale, what it can do for the customer, and how much it will cost.

Radio advertising must actually convince the public that they need things and that they want things. As an illustration, let's take electric knives. Before these were on the market, dad would cuss the turkey on Sunday because he couldn't get it carved the way he wanted it to be carved. Someone in the family would wind up with a part of the turkey's thigh still attached to the drumstick and a complaint would be registered by the fellow who wanted the entire thigh. Dad would mutter "why doesn't somebody invent a knife that will cut this bird the way it should be cut?" You see, he needed a better knife and he wanted a better knife. Advertising tells him he can satisfy both the need and the want with an electric carving knife!

How many salesmen reading this article honestly are aware of the fact that you must sell both the need and the want? Market research in action is finding the need and the want. The salesman who does it is a real salesman and not an order taker.

The Small Radio Market Problem

Let's focus our attention upon the broadcast salesman in a small radio market. There are over 3100 small town stations; and that's a pretty big part of our industry. New sponsors don't move into small towns every day. Radio time salesmen in small markets are dealing with the same sponsors who are selling the same merchandise to the same sponsors who are selling the same people who are listening to the same radio station. So why should anyone buy radio to advertise anything since changes take place so slowly and everybody knows everybody else? There's a loaded question that should frighten the socks off of any salesman. The answer is this: Simply knowing your sponsor is not enough! Know what he is doing! For example, the sponsor tells you that he's been doing business at the same stand for the past fifty years and his same customers have been trading with him for that long. Small market salesmen will agree that this is a very familiar story and quite a static situation. It can be devastating if you accept those excuses. You will end up settling for the small weekend special ad just to keep the sponsor's name in front of the public.

A real salesman will understand that most small town merchants are victims of their own inertia. They had some capital, went into business because they liked the town, knew the people and the people knew them. They went into business because they hoped to make "a comfortable living." So, they opened their shop, put signs in the window, show-cards on the merchandise, then called their friends and neighbors to come and shop at the store. Yet these same merchants will tell an order-taking sales representative that they don't believe in advertising! Now, just what do you call putting up signs, labels and show cards; just what do you call letting people know that you're in business and you want them to trade with you? Most of these merchants don't understand what advertising really is and what it can accomplish. They don't really understand that advertising is not only needed but also wanted!

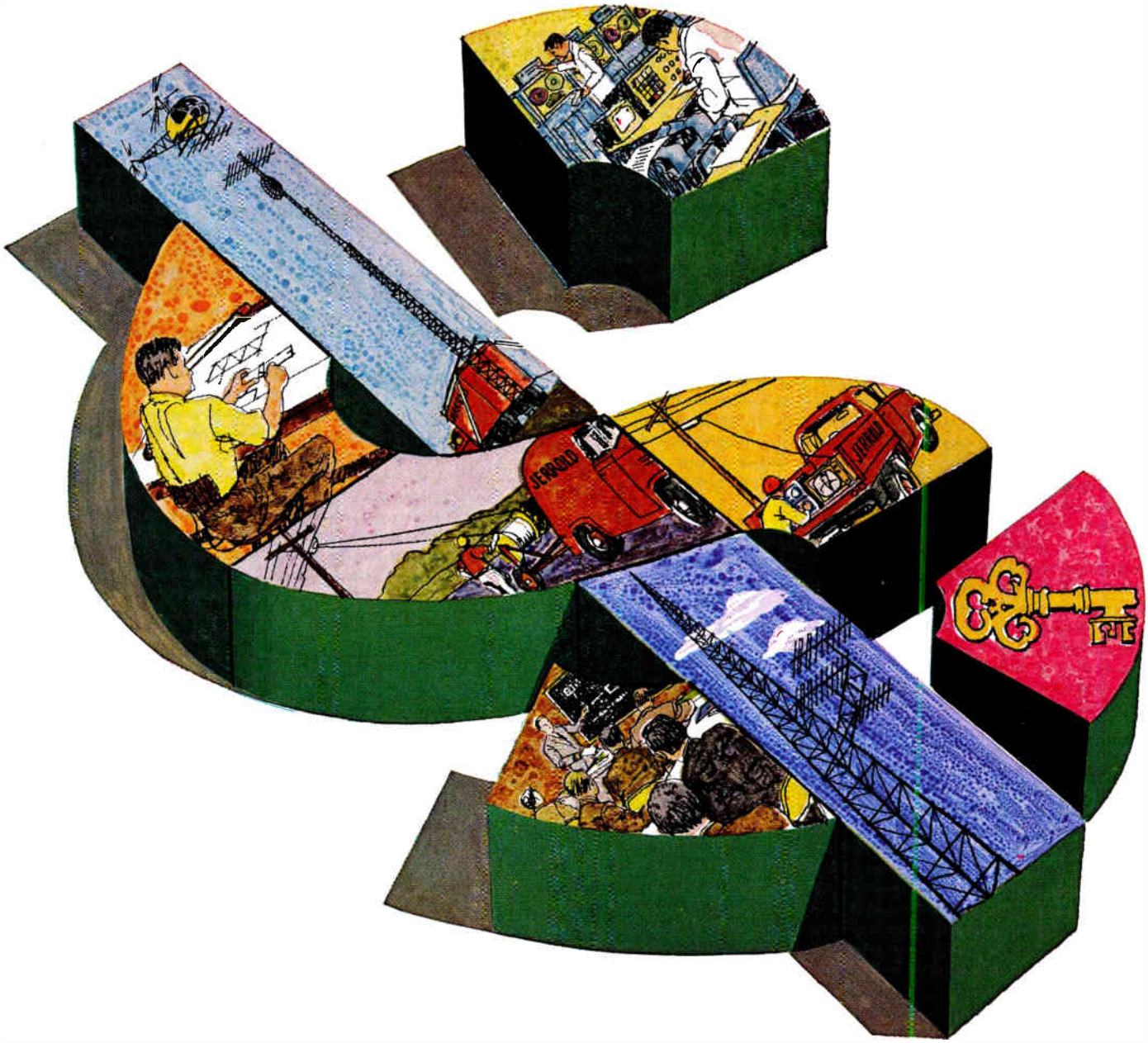
A real salesman will realize that you can't take customers for granted. Now it makes sense that if a merchant isn't in the market to sell merchandise, he should sell or close his shop. So a merchant not only wants but also needs radio advertising to invite people to buy from him.

People will go where they know they are welcome. A simple observation such as that has resulted in thousands of dollars worth of advertising sales for the author. Again, this writer reminds you that he knows you are aware of all this. But, tell the truth, do you really use these sales tools to make sales?

There is lots more to selling. Do you keep appointments on time? Do you make promises you don't keep? Do you repel people by having dirty fingernails, a sloppy shave, crumpled clothing, halitosis, a dirty handkerchief, etc. Do you sell on a buddy-buddy basis or do you have sponsors buy on the merit of the product that you sell? If you are still floating around from station to station because you simply couldn't earn a living at the last station, you ought to know the answer. A good small market radio salesman will know that he's doing a good job because he's earning good money and the owner and the sponsors are happy with the man.

Some more advice: Please notice that the first person pronoun "I" hasn't appeared anywhere in this article. Whenever you feel the urge to talk about yourself, stop right there and switch to the word *you*. *Keep the word "I" out of your sales talk.* A thesis could be written about the many techniques of selling radio advertising in a small market. A handbook can be written about what it takes to sell in a big market for both radio and television. Actually though, if you understand your market and your product, if you can determine the wants and the needs of your sponsor and his customers, if you are able to sell on the basis of quality product and not friendship alone or obligation that someone may feel toward you, then you can not only sell radio and television time, but you can sell most anything. And, you'll know that you have arrived when you get the satisfaction that comes from a customer buying from you and not you selling to him. ●

World Radio History



How to assemble a profitable CATV system ...without going to pieces

Let Jerrold start you out with a trouble-free, profit-making CATV system. Let us show you how to keep it profitable—year after year

When Jerrold offers Total Turnkey CATV, we mean *total. Total CATV services* . . . from the initial request for information to delivery of an operating system complete with subscribers. Computerized surveys. Marketing feasibility studies. Advice on financing and franchise application. Complete installation of the system. Training of operating personnel. In short, we wear all the hats to get you started.

If you have a sincere interest in what Jerrold Total Turnkey CATV services offer, our representative will give you a detailed presentation. Write or telephone Mr. Frank Martin, CATV Systems Division, Jerrold Electronics Corporation, 401 Walnut St., Philadelphia, Pa. 19105. Phone: 215-925-9870.

JERROLD

FIRST IN CATV—the nation's largest, most experienced manufacturer/supplier of CATV equipment and services.

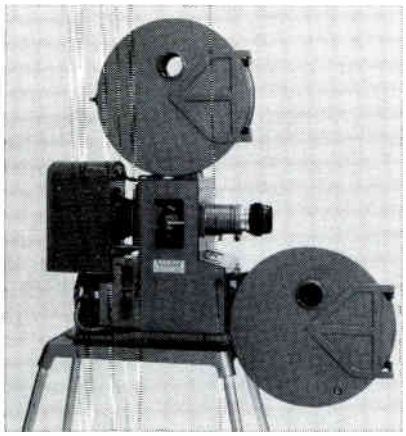
Circle 17 on Reader Service Card

World Radio History

BROADCAST EQUIPMENT

All-Purpose 35mm Projector Weighs 40 Lb

Recently-developed 35mm projector, made by Holmes 35mm Projector Co. of Long Island City, N.Y., ac-

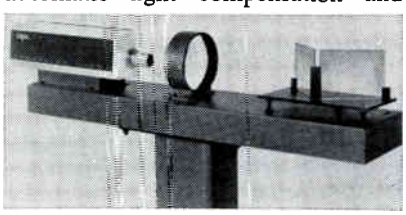


commodates standard, wide-screen, vista-vision and cinemascope formats with simple change of aperture plates. Series II lens mount holds any available type of lens. Projector is available with high-speed telecine movement which has only two moving parts. Modular construction throughout permits servicing to be accomplished with two screwdrivers and three Allen wrenches. Optical sound reproducer (supplied with projector) has frequency range of 50 to 10,000 Hz. Geneva mechanism is sealed in one-lb reservoir of synthetic grease. Illumination source is standard 2000-W pre-focused lamp having estimated life in projector of 40 hr. Finish is baked silicone-enamel. Basic standard projector is priced at $2200; TV version, $200 higher.

Circle 100 on Reader Service Card

Film Chain Camera Has 1000-Line Resolution

Model Precision 1000, made by General Precision, Pleasantville, N. Y., provides up to 1000-line horizontal resolution for reproduction of 16 and 35mm film, 2- x 2-in. slides and 35mm film strips. System has automatic light compensation and



adjustable noncomposite video output and polarity reversal.

Circle 101 on Reader Service Card

Hand/Stand Mic Has Magnetic Switch

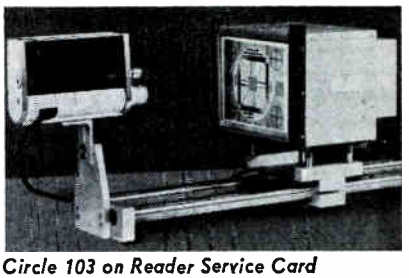
Model 631 "hand and stand" entertainer's mic, made by Electro-Voice of Buchanan, Mich., is an omnidirectional dynamic featuring a Uniseal switch with a snap-on switch actuator. A magnet in the removable actuator closes or opens switch contacts when moved forward or back on case. When actuator is removed, switch contacts remain in ON position. Four-stage filter is designed to trap dirt and magnetic particles before they reach element and also provides blast and pop protection. Frequency range is 100 to 13,000 Hz, with response shaped for presence, and control of feedback and rumble. 631 is rated at -55 dB output. Stand clamp (Model 310) is

provided with mic. Model 631 is priced at $60 and is available in variety of finishes.

Circle 102 on Reader Service Card

CCTV Camera Light Box And Alignment Jig

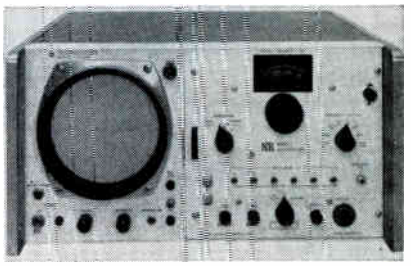
Model 200 T.V. Camera Uniform Light Source is designed for use with 8- x 10-in. transparencies. Uniformity of illumination is held to ±5 percent over surface. Built-in hot air exhaust fan changes air within unit more than 250 times/min. Model 300 A Universal Test Stand accommodates Model 200 or other light sources on lockable sliding platform. Fully equipped and economy versions of light source and test stand are available.



Circle 103 on Reader Service Card

CATV Spectrum Analyzer

Mark I CATV analyzer, made by Nelson-Ross Electronics of Hicksville, N.Y., incorporates a Hewlett-Packard 1404/141A oscilloscope which, in a matter of minutes, converts to a spectrum analyzer for monitoring and maintenance of head-end as well as field or line



equipment. Mark I covers frequency range of 1 to 30 MHz. Calibrated dispersions of 0 to 180 MHz are provided as well as full scan of 300 MHz. Analyzer is a receiver in 0-dispersion position, displaying video (horizontal and vertical sync pulses). Other specifications include sensitivity of -90 dBm or approximately –40 dBmV; 40 dB i-f gain. Mark I analyzer is priced at $1500.

Circle 104 on Reader Service Card

Automatic Transmitter Logger

Autolog AL-400, made by Rust Corp. of Everett, Mass., displays a 24-hr logging segment with front-panel parameter notation. Unit features chart roll that lasts for 62 days,

pointer calibration and all solid-state circuitry. Unit measures 3½ in. high x 19 in. wide. Power supply is self-contained. Basic price is under $800.

Circle 105 on Reader Service Card

Circle 18 on Reader Service Card ➔

World Radio History

ABC Studio 1313 converted to color by F & M Systems Co.

Let F&M help you convert your facilities to color

It's easier than you think . . . especially if you work with F & M Systems Co. Whether you want a complete studio conversion like the one shown above, or a mobile color TV van, or some less elaborate modernization work, we can help you save time and money.

We can save you time because we already have men and manufacturing facilities specifically oriented toward this work. We also have tested studio designs and field-proved van layouts to draw on when preparing your designs.

We can save you money because we can adapt your facilities to color with minimum architectural changes. Since we are not in the equipment business, we buy the brands of equipment you prefer . . . and we avoid unnecessary purchases.

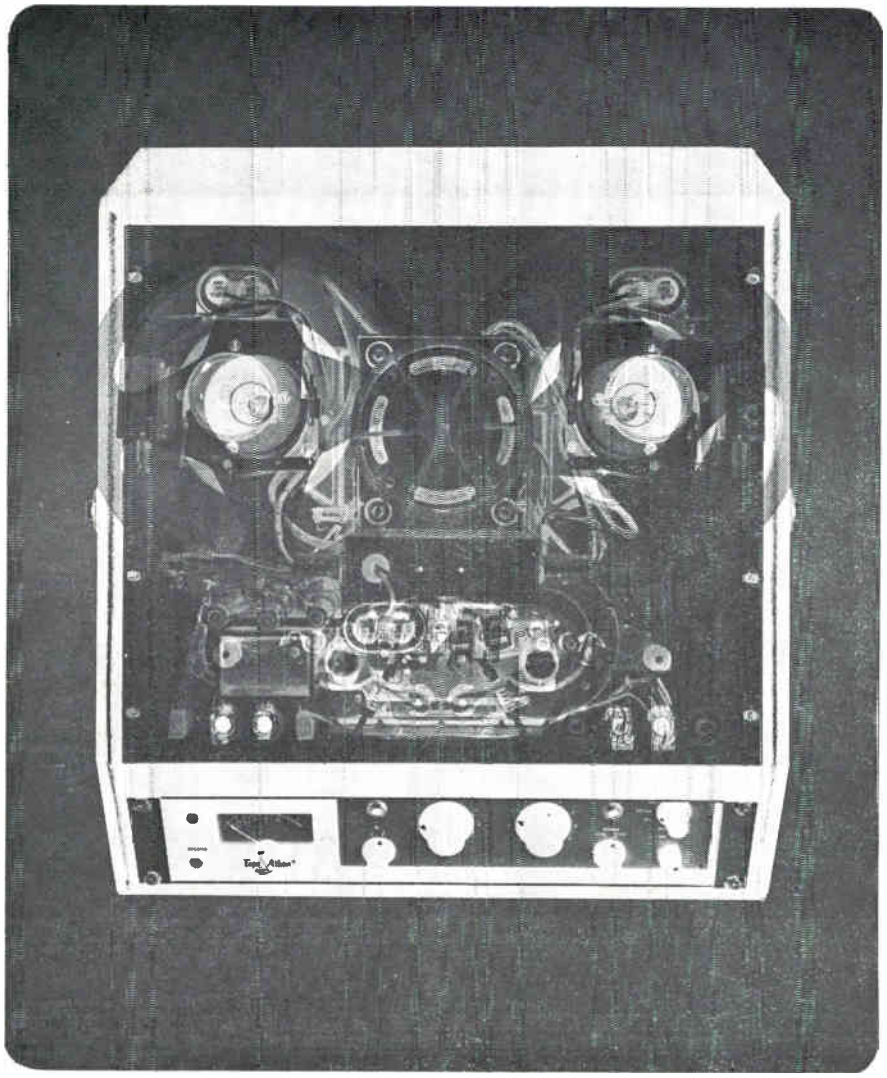
Even if you're not converting to color now . . . if you're planning a UHF station . . . or an educational TV system . . . or a mobile unit . . . or if you just want to modernize some obsolete facilities, we can help you, too. Write for literature describing our services, or call us today!

F&M SYSTEMS CO.

A DIVISION OF FISCHBACH AND MOORE, INCORPORATED

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

World Radio History



900

PERFORMANCE IS MORE THAN SKIN DEEP

Behind the tape reels and the head covers of a Tape-Athon 900 Recorder/Reproducer, are the electronics and mechanics that make the difference between the 900 and any other professional recorder in the world. Its superior operational design can be seen in all the features it offers:

- Dual Capstans that provide instant starting and stopping.
- All solid state electronics for top reliability, compact packaging and minimal heat generation.
- Controls that permit tape speed selection, reel size option, an editing mode, and even remote control.
- Tape-Athon reel locks are positive acting, and like no other we know of, removable with one hand.
- A "human engineered" design that eliminates control hunting, protruding switches, and operator fatigue.

The 900 Catalog shows all these features, and more, in detail. Write for a copy.

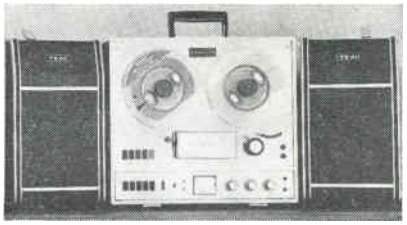
Tape-Athon Corp.

523 South Hindry, Inglewood, California 90307
Tel. (213) 678-5445

Circle 19 on Reader Service Card

Stereo Tape Recorder

Model A-1600 solid-state tape recorder, made by TEAC of Santa Monica, Calif., features automatic reverse, pushbutton operation and use of 3 motors and 4 heads. Recorder meets professional standards on wow/flutter, speed accuracy, frequency response and signal-to-noise ratio (50 dB). A-1600 is capable of effects such as add recording and stereo echo. Control panel contains



dual vu meters. Specifications include 0.12-percent wow/flutter and frequency response of 30 to 20,000 Hz (–3dB, 50 to 15,000 Hz) at 7½ in./s. Crosstalk is 50 dB down at 1000 Hz (interchannel); 40 dB down at 100 Hz (intertrack). Recorder weighs 48 lb.

Circle 106 on Reader Service Card

Video Signal Multiplexer

Mark 81 Video Signal Multiplexer, made by Ball Brothers Research Corp. of Boulder, Colo.. is designed to add EIA TV sync pulses to the output of video sweep oscillators. Use of multiplexer permits measurements to be made without clamp

circuits being disabled. Absorption markers are provided at output of unit. Operating controls are: video gain, sync amplitude, and set-up. Frequency response is ±0.5 dB to 20 MHz with less than 3-db attenuation at 50 MHz and no peaks.

Circle 107 on Reader Service Card

Accurate Rf Wattmeter Handles 100 W

Model 4340, made by Bird Electronic Corp. of Cleveland, Ohio, measures up to 100 W of rf power with a claimed accuracy of ±3 percent at 25 frequencies and at each of 10 cardinal scale divisions. Without charts, uncertainty of measurement does not exceed ±3 percent of full scale. Meter contains five 100-W, plug-in, temperature-com-

World Radio History

We've got it made.

You put it together.

It's a new idea in custom consoles. We furnish just about everything: the basic cabinet and hardware (drilled, punched, and beautifully finished), plus your choice of solid-state pre/line/booster/program and monitor/cueing amplifiers; attenuators in any configuration; high and low pass filters; rotary or straight line controls; mixer networks; VU meter range extenders; matching networks; stereo pan pots; program equalizers; motion picture and turntable faders; slating and talkback keys; jack fields for any function; matching transformers; and any keys and switches you may need.

The big idea is this: This new Altec 9200A control console is completely modular. You select and install Altec amplifiers, controls, and accessories to meet your specific needs. The result is a custom console at a fraction of former costs, both in time and money.

Modification to meet changing needs is easy too. The basic cabinet accommodates up to 27 swing-out strip modules of 1¾" and 3½" widths. Each module accepts a variety of pots, equalizers, keys, mixers. Up to 23 solid-state Altec plug-in amplifiers fit inside the cabinet.

Instrument panel holds up to four VU meters for program, four in a "stack" for echo send channels, plus graphic equalizer and jack panel. And, you may assemble the consoles in multiples if you have the need.

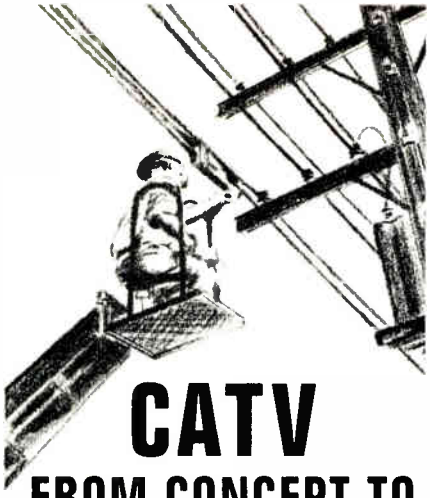
We've made it so you could put it together, simply, inexpensively and just as you like it. And that's always a good idea. You'll get more ideas by calling your Altec Distributor, or for a very complete technical kit on the console, write Dept. Dept. **BM/E-8.**

ALTEC LANSING

A Division of LTV *Ling Altec, Inc.*, Anaheim, Calif.

Circle 20 on Reader Service Card

World Radio History



CATV
FROM CONCEPT TO COMPLETION NATIONWIDE

Pick any portion. Or an entire turnkey job! Pick any spot in the nation. Robert G. Owens, Inc. can step in to design, build, and manage all or any portion of your CATV project . . . whether it is one mile or a thousand.

Use this checklist to measure your needs with our capabilities:

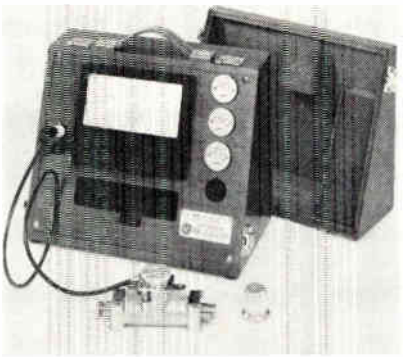
1. Evaluate potential for franchise
2. Signal survey to locate antenna site
3. Negotiations with phone and power companies for pole attachment agreements
4. Strand layout
5. Complete design and engineering
6. Construction or rebuild and alignment of entire system
7. Installation of service to home users
8. Management for your system (billing, maintenance, etc.)

As an independent contractor, we provide you with the finest materials and components engineered to fit your individual needs. And you benefit from the latest construction techniques for installing overhead cables, direct buried lines or underground conduit.

Specialists since 1957 in CATV construction and telephone contracting.

ROBERT G. OWENS, INC.
150 Washington Boulevard, Laurel, Maryland
(301) 776-6011
1698 East 25th Street, Signal Hill, California
(213) 426-7041
in California contact:
CAL-TEL CONSTRUCTION CO., INC.

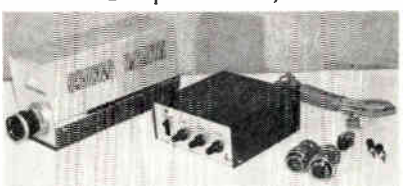
Circle 21 on Reader Service Card



pensated elements covering frequency range of 2 to 1000 MHz. Model 4340 is priced at $895.
Circle 108 on Reader Service Card

High-Sensitivity Vidicon Camera

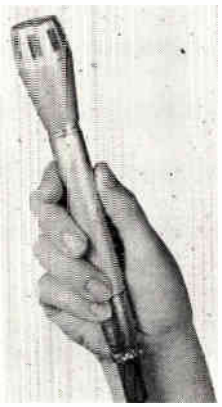
Model TC 100 solid-state vidicon camera, made by Television Systems Co. of New Hartford, N.Y., has a claimed sensitivity of 5 to 10 times that of comparable cameras. This permits camera to produce usable picture in light levels as low as 0.1 ft candles. Off-camera controls, located in a separate box, allow ad-



justment of beam target and vidicon focus. Control box includes power supply, allowing the camera to measure only 3½ x 5¼ x 9½ in. and weigh less than 6 lb. TC 100 utilizes automatic light compensation for use under varying light conditions. Price is $800.
Circle 109 on Reader Service Card

Omnidirectional Dynamic Mic

Model SM60 omnidirectional dynamic mic, made by Shure Bros. of Evanston, Ill., has slightly tailored frequency response from 45 to 15,000 Hz. Wind and pop filter is ac-



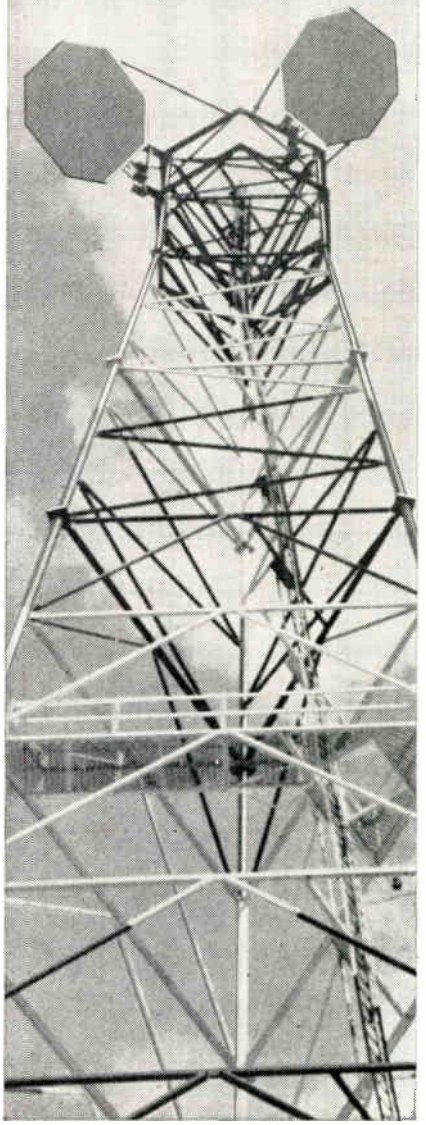
Towers designed to meet your needs

Advanced tower designs meet or exceed all standards and specifications of the industry, but most important, they are specifically designed to serve the purpose for which you intend to use them . . . AM-FM-MICROWAVE-CATV-UHF-VHF. All superior in quality and design, competitive in price. What's more, Advance offers the unique service of providing a "turn-key" package . . . Towers, Antennas, and pre-assembled aluminum buildings . . . completely installed by our own crews on your site.

For complete information, contact:

Advance Industries

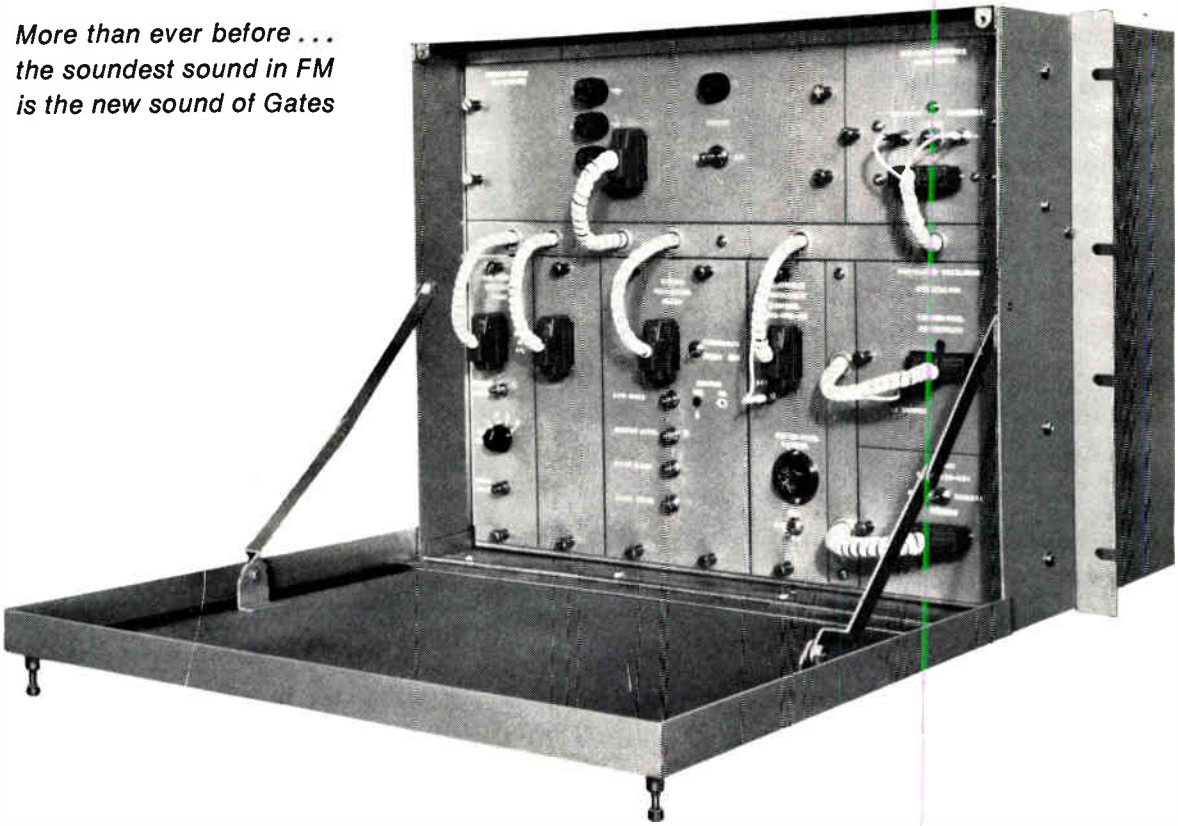
Dept. BM
705 Douglas St. Sioux City, Iowa
712-252-4475
TWX 712-991-1893



Circle 22 on Reader Service Card

World Radio History

More than ever before . . . the soundest sound in FM is the new sound of Gates



FM-250H
250 watts

FM-1H
1KW

FM-3H
3 KW

FM-5H
5 KW

FM-7.5H
7.5 KW

FM-10H
10 KW

FM-20H
20 KW

FM-40H
40 KW

FM BROADCASTING BREAKTHROUGH:

"DCFM" (direct carrier frequency modulation) in a new 100% solid-state 10-watt exciter

One-tube, 1KW; two-tube, 3KW; two-tube 5KW; two-tube, 10KW and three-tube, 20KW transmitters! Eight brand-new FM transmitters, all made possible through a Gates engineering breakthrough — a solid-state exciter employing "DCFM" (direct carrier frequency modulation) where modulation occurs at carrier frequency.

The new Gates exciter is self-contained, of modular construction. It is the heart of all new Gates "H" Series FM transmitters.

All "H" models are FCC-type accepted, and available for prompt delivery.

For complete descriptive brochure, write today.

GATES
HARRIS INTERTYPE CORPORATION

GATES RADIO COMPANY
QUINCY, ILLINOIS 62301, U.S.A.
A subsidiary of Harris-Intertype Corporation

Circle 23 on Reader Service Card

World Radio History

24 HOURS CONTINUOUS RECORDINGS

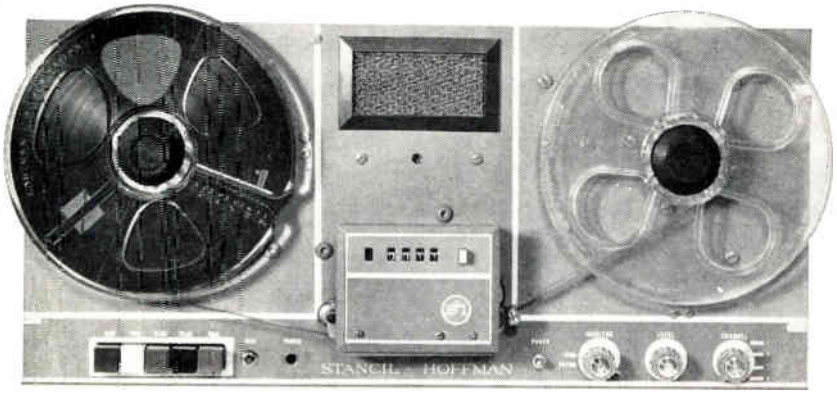
Up to 4 separate channels recorded simultaneously, without interruption, on one 7" reel of standard ¼" tape!

UNDER $800.*

First heavy duty professional communications logger priced under $800.00! The R-70 utilizes most advanced solid state circuitry, all silicon transistor plug-in amplifiers, achieving remarkable fidelity at very low tape speeds. Full line of accessories: AGC on each channel, recall facilities, full remote or automatic control, stereo, fail-safe, synchronous time injection, cabinet or carrying case.

FOR LOGGING ALL COMMUNICATIONS, INCLUDING 2-WAY RADIO, BROADCASTING, TELEPHONE AND SECURITY SURVEILLANCE

Now used by police, fire, airlines, armed forces, network radio and TV, security, telephone industry.



*prices from $775.00 (32 lbs., 8¾"x 19"x 11½" deep)

WRITE FOR SPECIFICATIONS AND PRICE LIST

STANCIL-HOFFMAN CORP.

921 NORTH HIGHLAND. HOLLYWOOD. CALIFORNIA 90038

Circle 24 on Reader Service Card

TULITO®

SAFETY CLAMP

patented, other patents pending

A Lifesaver for workmen on . . . POLES/TOWERS/ TANKS/STACKS/DERRICKS

Locks instantly— absolute safety assured. Fully approved by industrial commissioners and safety engineers.

Write for complete information—

MEYER MACHINE, INC.

P.O. Box 114 • Red Wing, Minn.

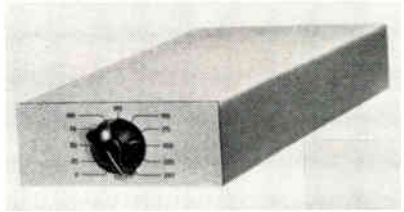
Circle 25 on Reader Service Card

cessible for cleaning by removing mic front end. SM60 is equipped with 20-ft, 2-conductor shielded cable. Impedance is 150 ohms. Mic is designed for rugged and versatile use and weighs 6 oz.

Circle 110 on Reader Service Card

Device Electrically Simulates 250 Ft of Cable

Super-n (KR-250) Simulator, made by Kappa Networks of Carteret, N.J., simulates electrical characteristics of video cable in lengths of 25 to 250 ft in decade steps. Amplitude response is flat within ±5 dB to 12 MHz; ripple, ±0.05 dB; group delay, ±0.5 percent to 12 MHz. Other characteristics include: delay, 360 ns



(250 ft); resolution, 36 ns (250 ft); impedance, 75 ohms; and insertion loss, 3 dB at all settings. Price is $350. A four-unit model (KR-250-A) capable of simulating 1000 ft of cable is priced at $1100.

Circle 111 on Reader Service Card

Variable Pulse Delay

Model VPD-100, made by MCG Electronics of Bay Shore, N.Y., accepts a +2- to 5-V input pulse and delays it for time range of 50 ns to 3 μs with time resolution of less than 1 ns. Calibration is in increments of 1 ns. Output pulse has

minimum amplitude of +2.5 V and approximate rise/fall time of 15 ns. At 3-μs setting, pulse time delay variation is less than 50 ns over temperature range of +25 to 75°.

Circle 112 on Reader Service Card

Dual-Cycloid Fm Antenna

Model Dual-Cycloid, developed by Gates Radio of Quincy, Ill., features

World Radio History

COMPARE THE FEATURES OF TOWNSEND ASSOCIATES U.H.F. TRANSMITTERS WITH OTHER MANUFACTURER'S TRANSMITTERS

MANUFACTURING ENGINEERS FOR KLYSTRON TRANSMISSION SYSTEMS

	T.A.	G.E.	R.C.A.
1. Video and audio modulators	Transistorized	Tube	Tube
2. Emergency amplifier operation at all power levels	Multiplex-aural or visual	No	No
3. Number of beam power supplies normally supplied with transmitter	2	1	1
4. Year first transmitter with new type klystrons was placed into commercial operation	1962	1963	1964
5. Sideband filtering	Low Level	Low Level	High level
6. Driver R.F. circuits	Transistorized	Tube	Tube
7. Heat exchangers	Unitized	Random Arrangement	Random Arrangement
8. Control of amplifier beam power	Vacuum switch	Mechanical Adjustment	Mechanical Adjustment
9. **Built in** test and monitoring equipment	Frequency monitor, sideband analyzer, picture monitor, oscilloscope, demodulator, audio oscillator	None	None
10. Amplifier coolant operating temperature	130°	130°	212°

While some manufacturers have some of the features found in T.A. transmitters, no manufacturer has all the features which make T.A. transmitters the only truly modern U.H.F. transmitters.

Townsend Associates transmitters are F.C.C. type accepted at all common power levels.

For more information write today to:

TOWNSEND ASSOCIATES INC.

HOME OFFICE
P. O. Box 215
Feeding Hills, Massachusetts 01030
(413) 733-2284

LOS ANGELES OFFICE
8846 Delco Avenue
Canoga Park, California 91306
(213) 882-0732

Circle 26 on Reader Service Card

World Radio History

BROADCAST COMMUNICATIONS COMPONENTS AND CAPABILITY

STYROFLEX* COAXIAL CABLE Leads the line of PDE semiflexible air dielectric cables. Available in 50, 70, 75, 100 ohm impedances; ½", ⅞", 1⅝", 3⅛", 6⅛" diameters.

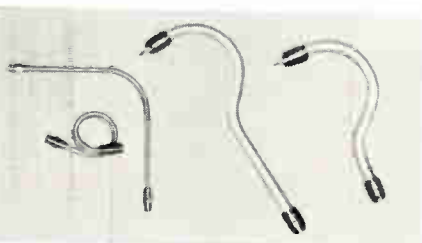
SPIRAFIL* II COAXIAL CABLE A significant design breakthrough! Solid polyethylene helix completely covers copper center conductor. Write for complete data.

FOAMFLEX COAXIAL CABLE Lightweight, low-loss cable created for all general applications including Broadcast, CATV, Military and Aerospace Requirements and RF transmission applications. 50, 70, 75, 100 ohms; ¼", ⅜", .412", ½", ⅞", 1⅝".

RIGID LINE Latest development provides extremely low loss, high power capability and excellent VSWR. 50 and 75 ohms; ⅞", 1⅝", 3⅛", 6⅛".

COAXIAL CABLE DELAY LINES coaxal cables shaped into custom configurations have outstanding performance. Tolerance of delay accuracy is within ±.02 nanoseconds. Frequencies from 60 cps to 12 KMC, impedances of 50, 70, 75, 100.

RIGID LINE COMPONENTS Produced to the highest standards of precision by Communication Products Company, Division of Phelps Dodge Electronics. A wide variety is available off-the-shelf.



CABLE ASSEMBLIES In addition to furnishing coaxial cables in 1000-foot lengths or cut to length, bending cables, into sophisticated configurations to allow termination-to-termination use is an exclusive capability. Radii as tight as 3 diameters, no minimum straight length between bends, and certified electrical performance offers a custom assembly to fit the tightest specifications.

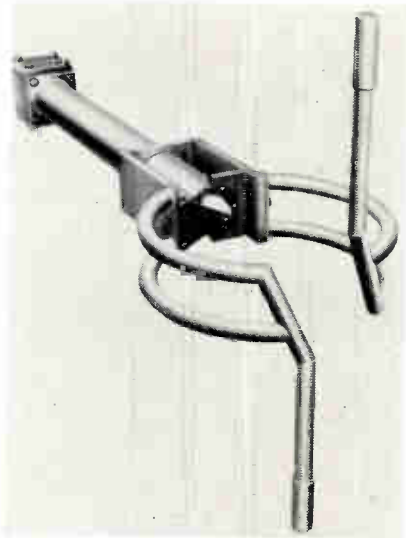
CONNECTORS Splices, adapters (UHF, N, HN, TNC, BNC, C, LC, LT, GR, EIA), transitions, short circuit terminations, end seals, waveguide transitions and panel mounts are off-the-shelf PDE connectors.

ACCESSORIES Pressure gages, valves, locating caps, plugs, tees, hangers and tools are performance-matched to PDE coaxial cables.

TOTAL CAPABILITY *The entire broadcasting frequency spectrum is serviced by PDE with cables, connectors, rigid lines, and all necessary accessories for installation and maintenance of coaxial cable installations.* **Request new Bulletin BR-1.**

PHELPS DODGE ELECTRONIC PRODUCTS NORTH HAVEN, CONNECTICUT

Circle 27 on Reader Service Card

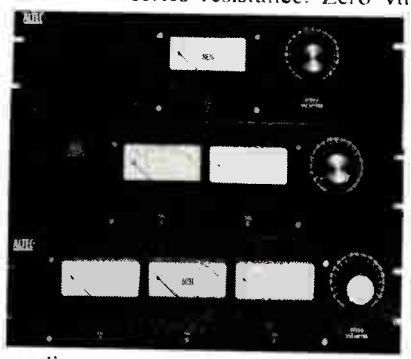


low vswr over its 200-kHz bandwidth. Antenna eliminates need for separate radiating bays and power divider by combining horizontal and vertical elements into one circularly-polarized signal. Maximum power input per bay is 10 kW; arrays will handle up to 40 kW. Arrays may be assembled with up to 16 bays.

Circle 113 on Reader Service Card

Precision Vu Meter Panels

Vu-meter panels 9708A, 9709A and 9710A, made by Altec Lansing of Anaheim, Calif., contain one, two, and three meters, respectively, for mono, stereo, and triple-track applications. Meters are calibrated to show zero (100 percent) with 1.228 V applied to meter terminal and 3600-ohm series resistance. Zero vu



reading represents volume level which is 4 dB above 1 mW in 600 ohms. Meters are designed to operate normally in presence of relatively strong magnetic fields.

Circle 114 on Reader Service Card

High Power Coax

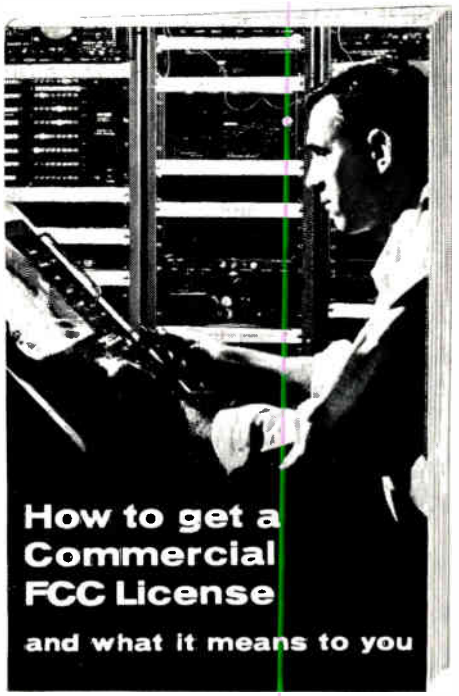
Type FH8-50A coaxial cable, made by Andrew Corp., Chicago, Ill., has an average power rating of 18 kW at 100 MHz with 0.2 db/100 ft.

World Radio History

Want a permanent career in broadcasting?

This free book may change your life

It takes the mystery out of getting the FCC License you need for security and success



NO WONDER you're interested in a career in broadcasting. It puts you right "where the action is"—behind the scenes of show business, news reporting, politics. You meet famous people. You're the first to know the big news about fires, riots, plane crashes. You get to hear wonderful music. You feel in contact with an audience of thousands.

And one of the most secure high-pay jobs in the field is that of the licensed Broadcast Engineer. He's the key man required on the job by the United States Government

New job opportunities are opening up constantly for qualified license-holders. Many more will be needed to operate and maintain the countless new UHF-TV stations expected to begin operation, now that all new TV sets can receive UHF.

So if you dream of making broadcasting your life work, you need that Government FCC License.

But how do you go about getting it? Where do you apply, and when? How do you get ready for it?

To help you, we have published a 24-page booklet, "How to Get a Commercial FCC License." It tells you exactly which types of licenses and permits are issued by the Federal Communications Commission, and what kinds of electronic equipment each type allows you to operate and maintain.

You will learn which subjects must be mastered for each kind of license. Thirty typical exam questions will give you an idea of the level of training required. You'll be told where and how often the exams are held, and how to find out about the exams held nearest your home.

Frankly, the FCC exams are rough if you're unprepared. Two out of three applicants fail to pass. Some fail seven or eight times.

But with the right preparation, it's easier than you would imagine. Better than 9 out of 10 CIE-trained men pass the exam with no difficulty. Our record is so good that we are able to promise every student in writing: *after completing your CIE course, you'll be able to pass your FCC exam, or CIE will refund your tuition in full.*

We'll send you a free copy of our school catalog in addition to your free FCC booklet. Then you can see for yourself how thorough our home study courses and teaching methods are. No obligation, of course.

To receive both books free, just mail coupon below. If coupon is missing, write to Cleveland Institute of Electronics, 1776 East 17th Street, Dept. BM-1, Cleveland, Ohio 44114. Do it right now—if you want a solid career in broadcasting, this could be the turning point in your life.

"I GIVE CLEVELAND INSTITUTE CREDIT FOR MY 1ST CLASS COMMERCIAL FCC LICENSE,"

says Matt Stuczynski, senior transmitter operator, Station WBOE. "Even though I had only six weeks of high school algebra, CIE's AUTO-PROGRAMMED™ lessons make electronics theory and fundamentals easy. After completing my CIE course, I took and passed the 1st Class FCC Exam. I now have a good job in studio operation, transmitting, proof of performance, equipment servicing. Believe me, CIE lives up to its promises. I really enjoy my work and I'm on my way up."

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All CIE courses are available under the new G.I. Bill. If you served on active duty since January 31, 1955, or are in service now, check box in coupon for G.I. Bill information.

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Please send me, without cost or obligation, your 24-page booklet, "How to Get a Commercial FCC License," together with your school catalog of license-preparation courses.

NAME _____ AGE _____
(Please Print)

ADDRESS _____

CITY _____ STATE _____ ZIP _____

☐ **ADVANCED COURSE FOR LICENSE HOLDERS.** Check box if you already have an FCC License and desire information about our Advanced Communications Engineering Course which has helped many broadcast engineers reach the top of their profession.

☐ **Check here for G.I. Bill information.**

Accredited Member National Home Study Council
A Leader in Electronics Training...Since 1934

BM-1

Circle 28 on Reader Service Card

World Radio History

The new one — the right one — for 3000-watters!

Bauer Model 603 FM Transmitter

It's the first new FM transmitter since the forties that's designed especially for 3000-watt operation . . . not just a scaled-down version of high-powered equipment.

Model 603 is economical and compact — made for the Class A station that wants to transmit full power, horizontal *and* vertical.

Compact? Just 30" wide, 25½" deep, 75" high.

Features direct FM exciter, easy tunability, and a very simple control system. Accessibility and maintenance are easy, too.

Low tube complement and investment, with power to spare, and straightforward, uncomplicated circuitry — no gimmicks.

Ready for stereo and SCA additions at any time, Model 603 is basically designed for 3-phase power supply but can be readily furnished with optional single-phase when 3-phase is not available or is too costly to bring in.

Model 603 is just one more advanced product in the fine line of radio transmitting and audio devices from Bauer. Write to us for full technical information on this exceptional 3000-watt transmitter.

Bauer
ELECTRONICS CORPORATION
1601 California Ave.
Palo Alto, California 94304

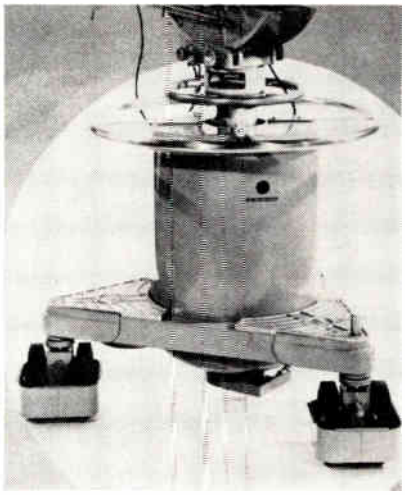
A Granger Associates COMPANY

Circle 29 on Reader Service Card

Peak power rating is 320 kW over frequency range of 0 to 1.5 GHz.
Circle 115 on Reader Service Card

Camera Dolly Has Pneumatic Balance

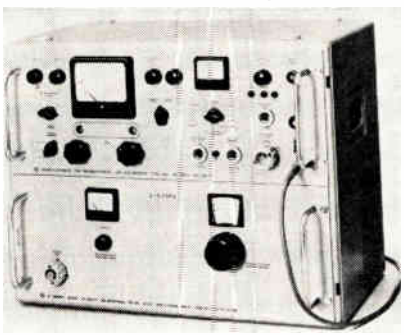
Series PN88 color dollies from Television Products of Los Angeles, Calif., features "floating-on-air" op-



eration, silent toothed-belt drive for upper steering mechanism and dual 8-in. wheels.
Circle 116 on Reader Service Card

Triple Plug-In Test Receiver Covers 2 To 12.1 GHz

Type USVC test receiver, made by Rohde & Schwarz of Passaic, N.J., has three plug-ins covering 2- to 12.1-GHz range. Unit features preselection, klystron oscillator, switch-selected i-f bandwidth and automatic phase control. Instrument may be used as broadband monitoring receiver, with i-f output for pm and fm signals and with phones and



video output for a-m signals; narrow-band laboratory receiver, with an i-f output for accessory units and an output for recording field strength; and a sensitive voltmeter, with a built-in 70-dB variable precision attenuator and speed indication for relative voltage measurements and null detection. Instrument becomes field strength meter when used with a parabolic antenna and

PROTECT your broadcast equipment against lightning surges with WILKINSON AC LINE SURGE PROTECTORS

Excessive voltage surges caused by lightning, transformer arcing and induced transients are everyday occurances that cause heavy damage to valuable broadcast equipment.

Now through the use of WILKINSON voltage sensitive Line Surge Protectors you can protect your equipment from line surges that may exceed even twenty times the normal line voltage.

A WILKINSON pulse compensated Line Surge Varister, is placed across a line of its rated voltage. Should a surge or increase of voltage occur, the resistance of the varister decreases at log scale as the voltage increases, thus acting as a momentary load or short circuit to the surge. WILKINSON Line Surge Protectors draw little or no current and are capacitor compensated for microsecond surges, thus damping all line disturbances as well as excessive voltage increase.

A small investment in WILKINSON Line Surge Protectors is your assurance that your valuable broadcast equipment will not be damaged due to line surges.

AVAILABLE IN 3 MODELS!		
Model S1A-1	120 V. single phase	$ 89.50
Model S1A-2	220 V. single phase	$169.50
Model S1A-3	220/240 V. three phase	$259.50

For complete details write to:

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1937 MacDADE BLVD. • WOODLYN, PA. 19094
• TELEPHONE (215) 874-5236 874-5237 •

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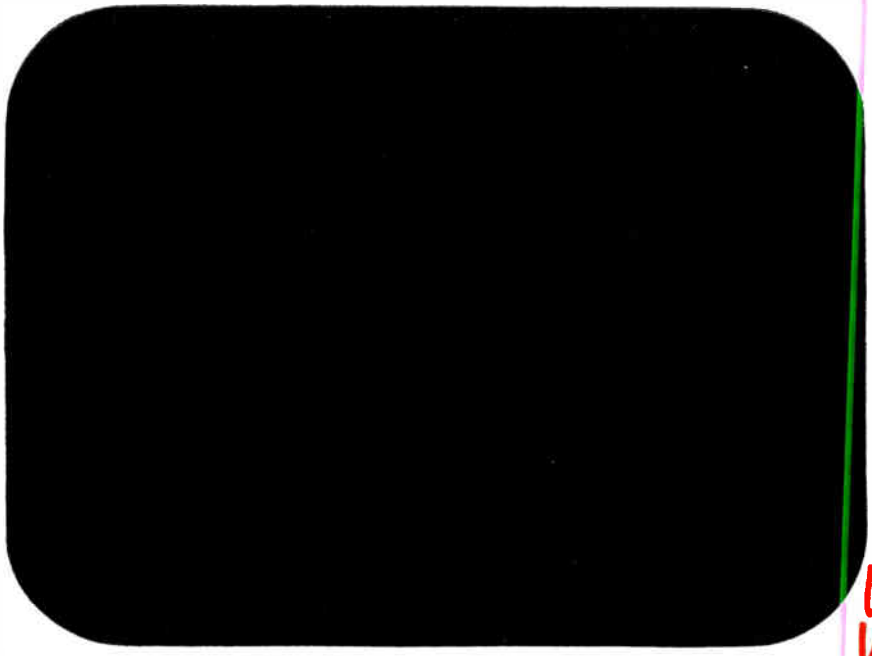
World Radio History



Cold camera

WE TOLD WBAL-TV 30 SECONDS— THEY NOW TELL US 3 SECONDS IS PLENTY!

on the air in 30 seconds at WBAL-TV.

3

The MTI Image Orth is a problem solver at WBAL-TV in Baltimore. Crash news programs can be on camera in seconds with a flick of the switch. No need to interrupt camera crews who might be in the middle of a taping session. Operational set-up is minimal too. Here's how WBAL-TV makes use of the MTI Image Orth.

Camera is aligned and locked in fixed position in a small announce booth studio. Few lights are used due to the excellent low-light capabilities of the camera. And as a result, no additional air conditioning facilities are required. While desk and chair are fixed furnishings, backdrop can be quickly changed to fit any presentation situation.

WBAL-TV engineers claim camera needs little maintenance, has good depth of focus and needs trimming only once per week. Low light levels do not affect picture quality.

You might have other uses for a camera of this size and quality. If so, give us a call. We'll have a sales engineer to see you quickly—but not as quickly as the MTI Image Orth warm-up period.

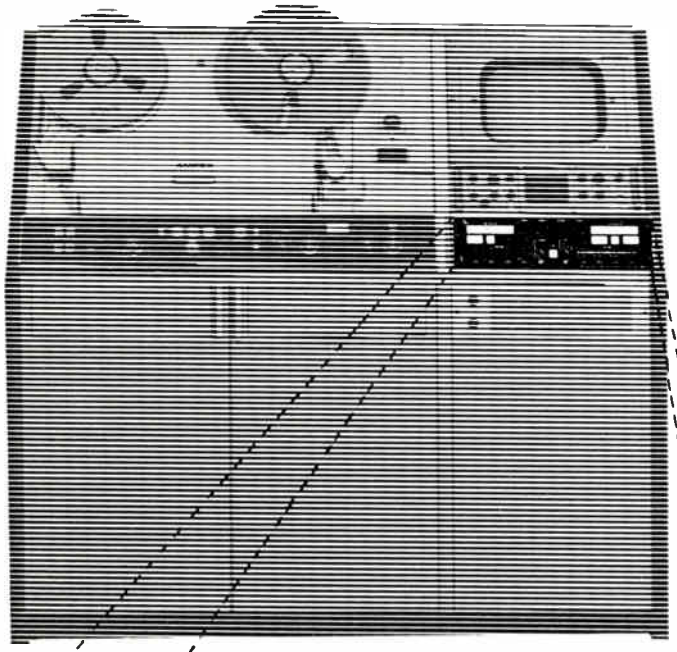
mti MARYLAND TELECOMMUNICATIONS, INC.

York & Video Roads, Cockeysville, Md. / 301-666-2727 / World's largest manufacturer of low light level television cameras.

Circle 31 on Reader Service Card

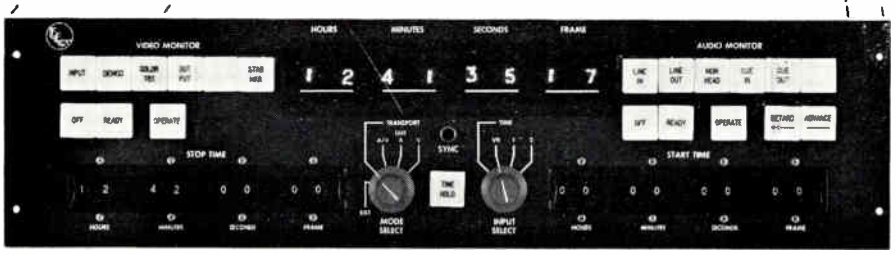
World Radio History

THIS NEW CHANGE IN YOUR TV RECORDER OFFERS FANTASTIC IMPROVEMENT IN TAPE EDITING AND CONTROL



ON TIME

Editing and Control Equipment for TV Tape Recorders



EECO's **ON TIME** SYSTEM records a time code on the cue track. With this precise control . . .

- SCENES are QUICKLY LOCATED.
- "ELECTRONIC" SPLICING is FAST and ACCURATE.
- The transport can be stopped and started AUTOMATICALLY

. . . at PRECISE, PRESET TIMES.

For more information or a DEMONSTRATION on your recorder, contact . . .

Electronic Engineering Company
of California
1601 East Chestnut Avenue (Box 58)
Santa Ana, California 92702

Circle 32 on Reader Service Card

a signal generator. Price is about $7500, depending on plug-in.
Circle 117 on Reader Service Card

Fm Transceiver Weighs 18 Oz

Model Pocket Mate, made by GE's Communication Products Dept., Lynchburg, Va., operates on the 148- to 174-MHz band on mercury or nickel cadmium batteries. Unit weighs 18 oz and measures 7 × ⅞ × 2⅜ in—said to be half the weight and one-third the size of many units

currently in use. Single- or double-frequencies are available with tone-squelch transmit, or selective calling. An optional single- or six-unit charger permits charging of batteries while in the radio or externally in a battery rack.
Circle 118 on Reader Service Card

Thick-Wall Heat-Shrinkable Tubing

Sigma Industries of Menlo Park, Calif., recently announced production of thick-wall tubing that shrinks in 3-to-1 ratio at 250°F. Tubing, now available in longer lengths, can be specified with inside diameter ranging from ½ to 2 in., and wall thicknesses from 0.060 to 0.150 in., depending on inside diameter. Tubing has tensile strength of 2400 lb/in².
Circle 119 on Reader Service Card

Cassettes Have 90-Min Tape

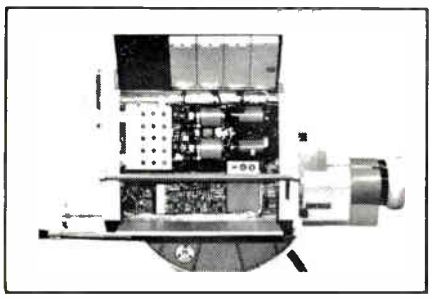
Model C-90 cassette, recently introduced by North American Phillips New York, N.Y., has 90-min of blank recording tape. Unit has same physical dimensions as 60-min type and is interchangeable on all mono and stereo cassette machines. Longer play time has been made possible principally through the use of .05-mil (polyester T) tape. Pricing of the 90-min cassettes provides more playing time at less cost per min.
Circle 120 on Reader Service Card

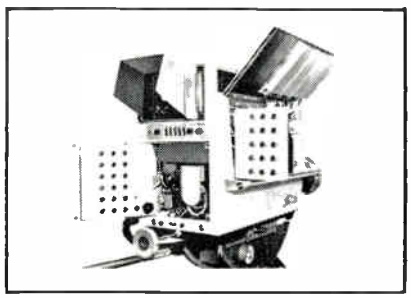
World Radio History

CAMERA HEAD:

12"X23"X18½"—110 lbs

Hard to believe a commercial TV color camera can be so compact?





Not hard at all . . . when it is Toshiba TV broadcast equipment! Besides being compact, the Model IK-37 camera chain provides improved compatibility and sharper pictures with wider grayscale on both types of receiver, color and black-and-white. A 3″ Toshiba image-orthicon tube for Y signal and three Toshiba SENSICON tubes for C signal, arranged for easy servicing in this camera head, give signals that are ideal for colorplexing and equal in quality to any straight monochrome signals.

- All solid-state circuits with high-grade Toshiba semiconductor elements throughout the chain.
- Lightweight and easy-to-pan camera.
- Plug-in units for simplified maintenance.
- SENSICON tubes with nearly 100% conversion efficiency and twice as high sensitivity as that of ordinary vidicons.
- Optical system and coil assemblies fixed rigidly and reliably in an anti-shock arrangement.
- No need of adjusting the picture in view finder as its input is fed back from the controller.
- Provisions for mounting servo-operated zoom lens and for d-c remote control (up to 40 yards) of the zoom.

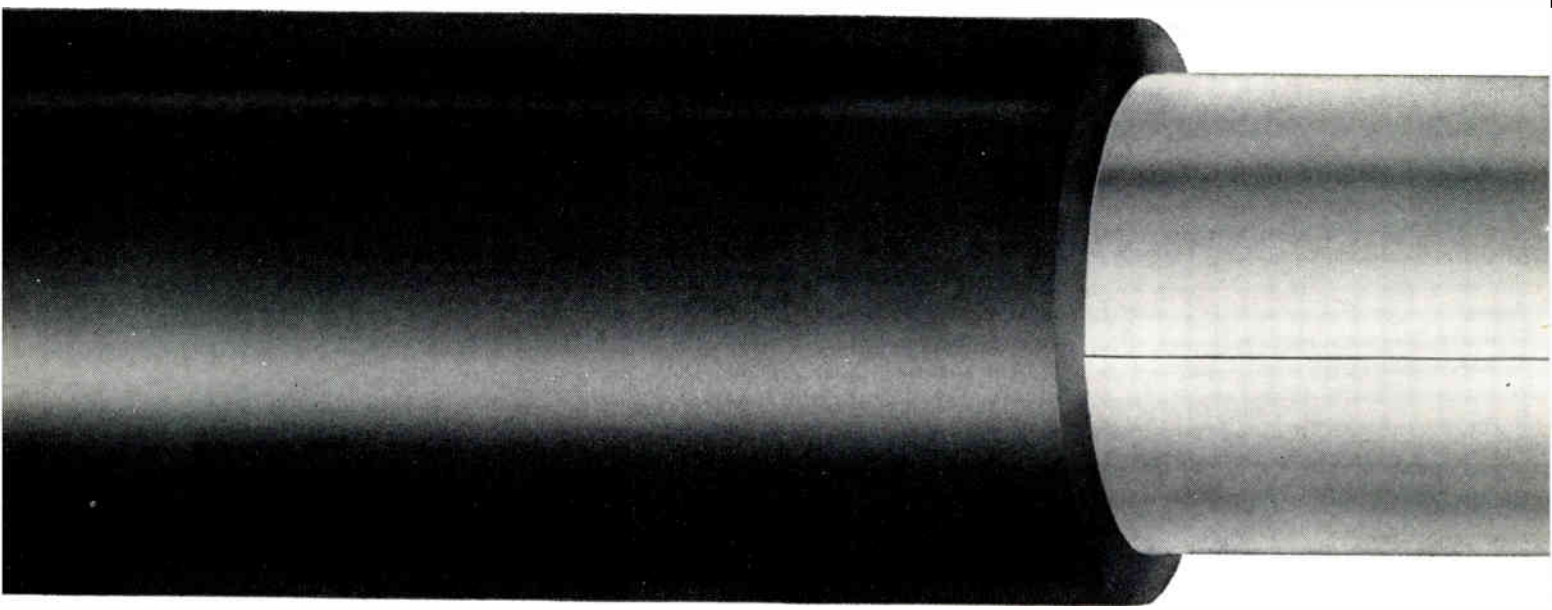
Tokyo Shibaura Electric Co., Ltd.
Producer Goods Export Division, Uchisaiwaicho, Tokyo, Japan
Toshiba America Inc.,
530 Ave, New York, NY 10036 Phone MU7-5471

Toshiba
QUALITY SINCE 1875

Circle 33 on Reader Service Card

World Radio History

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



World Radio History

Sealmetic's positive moisture barrier makes the big difference. The Sealmetic sheath is hermetically sealed at the shield overlap, and is bonded between the entire outer conductor and the polyethylene jacket to form a unitized sheath. Moisture or humidity can't get between the shield and the jacket nor enter the core. The core stays dry and maintains the electrical characteristics of the cable.

Sealmetic Coaxial is the flexible, moistureproof CATV cable—the cable that solves attenuation problems.

More flexible, easier to install than any other CATV cable. The bond at the shield overlap has been balanced against the bond between the entire outer conductor and jacket, resulting in a completely homogeneous composite sheath. This unique design allows easy bending without kinking, cracking or rupturing of the sheath. Sealmetic is less susceptible to installation damage; installation goes faster and costs less, and the cable will last once it's installed.

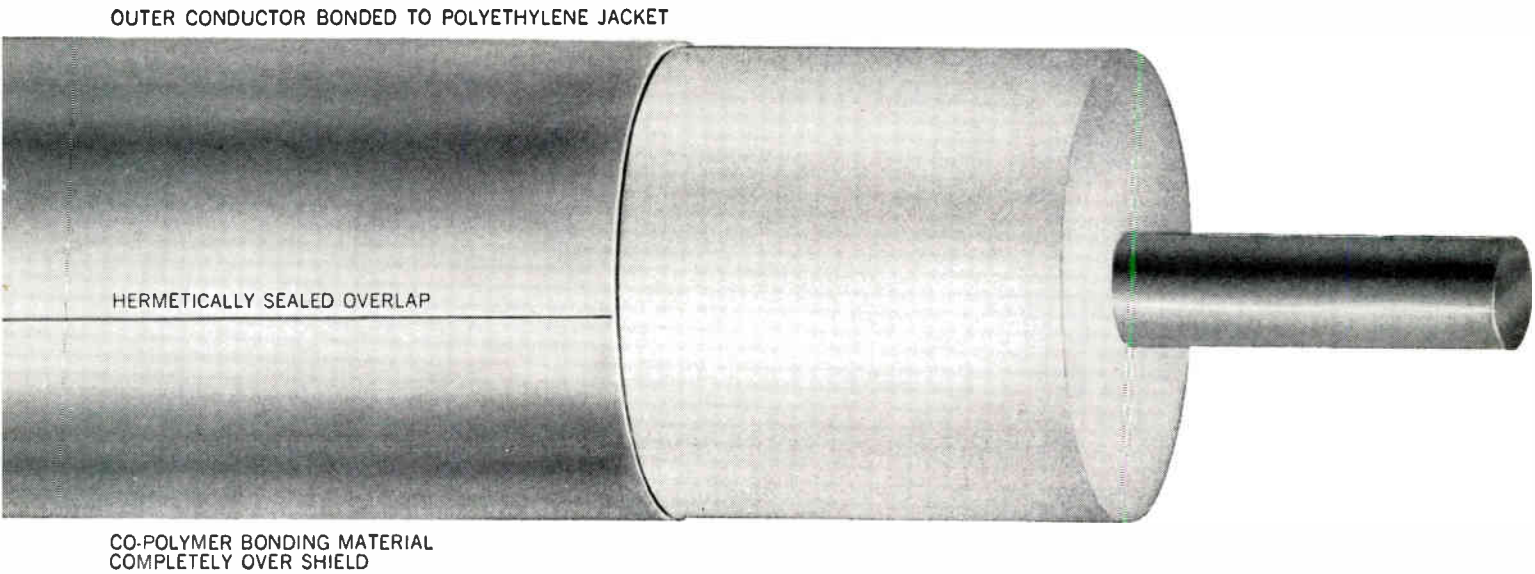
When you're considering CATV, you should know about Sealmetic Coaxial. For more information, contact your Anaconda man, or write to Anaconda Wire and Cable Company, 605 Third Avenue, New York, N. Y. 10016. 6522IR

ASK THE MAN FROM

ANACONDA®

ABOUT NEW SEALMETIC COAXIAL CABLE

®Registered Trademark Design Patents Applied For



Circle 34 on Reader Service Card

World Radio History

Broadcast Industry News

(Continued from page 10)

Speakers disagreed on how to best sell. Aaron used professional salesmen since he found college youth not "hungry" enough to get out and work. On the other hand, Glenn Scallorn, of GenCoE reported excellent results with high school and college youngsters during summer vacations. Scallorn found youth better at opening doors and in closings than older salesmen. Most speakers agreed with Eugene Geller of National Trans Video in that a formal training program is necessary. Tom Johnson, Daniels Managment Co., stressed being prepared. This doesn't mean coming up with a new installation "special" each week, price slashing, penny sales, or give aways, Johnson said, but a sound effective acceptable presentation.

A film presentation has been found best by Daniels Management Co. About twice as effective as flip charts, the "Sales Partner" film equipment helped salesmen close 40 to 45 percent of those who saw the presentation, Johnson said. Johnson offered the film package to other CATV operators.

Chairman of NCTA for coming year, Jack Crosby

Although door-to-door selling was deemed necessary, there should be no let up in promotion and public relations. Mrs. Sy Barash, Barash Advertising, illustrated the effectiveness of seasonal promotions.

S. M. Freeman, of TelePrompter Corp., urged CATV operators to organize a full year's promotion program ahead of time. Dave Brody, of Jerrold Corp., stressed the desirability of working closely with community leaders in business, education, local government, press, religion, and social service.

Chairman of the NCTA Public Relations Committee for 1967, Irving Kahn, said National Cable TV Week was highly successful and urged all operators to participate in 1968. Advertising and public relations support will come from national headquarters Kahn said. Kahn also urged the national NCTA board to undertake for 1968: preparation of a new industry film or videotape; a public relations program to construct bridges to others outside of the industry; a public opinion and marketing survey; and more publicity for the annual convention. Kahn also urged the establishment of a national archives and museum center.

Technical Papers Available

NCTA expects to publish a full proceeding of the convention. For this reason, *BM/E* will not attempt to revue the technical papers presented at the convention. Next month, a tour of the exhibits will be published.

Crosby Elected

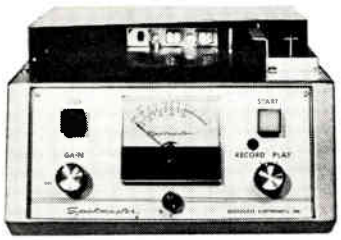
Jack R. Crosby, President of GenCoE Inc., Austin, Tex., has been elected Chairman of NCTA for the coming year.

Mr. Crosby, who will preside over the 1,000 member trade association for one year previously has served as Director, Secretary and Treasurer, and is just completing a term as National Vice Chairman. His company—GenCoe Inc.—is one of the nation's largest CATV group owners.

The Spotlight Is on

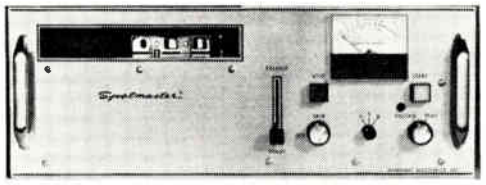
Spotmaster

Superior Tape Cartridge Recording and Playback Equipment



Model 500 Super B

Model 400-A



Model 500-BR

COMPACT 500 SUPER B SERIES—Completely solid state, handsome Super B equipment features functional styling and ease of operation, modular design, choice of 1, 2, or 3 automatic electronic cueing tones, separate record and play heads, A-B monitoring, biased cue recording, triple zener controlled power supply, transformer output . . . adding up to pushbutton broadcasting at its finest. Super B specs and performance equal or exceed NAB standards. Record-play and playback-only models are available.

RACK-MOUNTED SUPER B MODELS—The 500-BR rack models offer the same Super B design and performance features and are equipped with chassis slides ready to mount in your rack. Each unit slides out for easy head and capstan cleaning and other routine maintenance.

All Super B models carry iron-clad full-year guarantees.

ECONOMICAL 400-A SERIES—Now even the smallest stations can enjoy Spotmaster dependability with the low-cost, all solid state 400-A series, available in compact record-play and playback-only models. Performance and specifications are second only to the Super B series.

For complete details about these and other Spotmaster cartridge units (stereo, delayed-programming and multiple-cartridge models, too), write, wire or call today. *Remember, Broadcast Electronics is the No. 1 designer/producer of broadcast quality cartridge tape equipment . . . worldwide!*

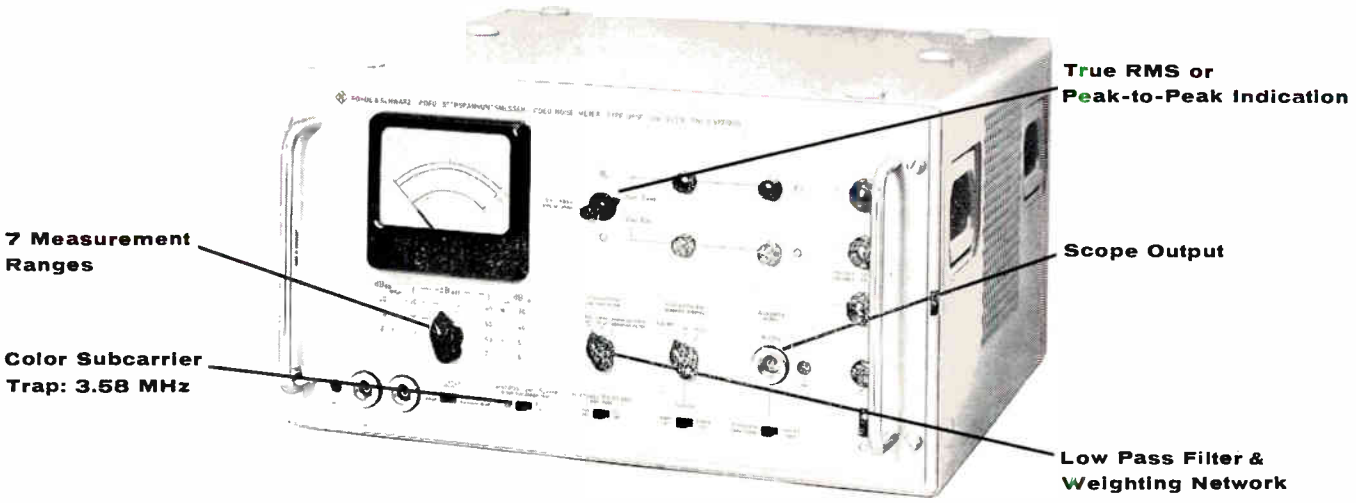
BROADCAST ELECTRONICS, INC.

8810 Brookville Road, Silver Spring, Maryland 20910; Area Code 301, 588-4983

Circle 35 on Reader Service Card

World Radio History

40 Hz to 10 MHz



TYPE UPSF

VIDEO NOISE METER

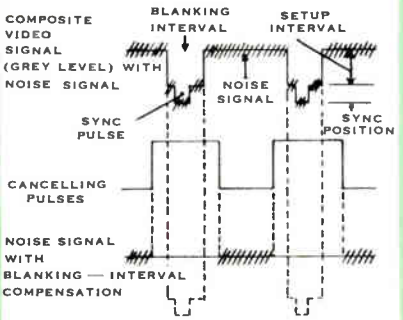
FEATURES

- Meets requirements of all U.S. black and white and NTS color systems
- Measures noise voltage in the presence of sync and blanking pulses
- 7 Measurement Ranges: 1/3/10/30/100/300/1000mV
- Input impedance: 1MΩ shunted by 30 pF, or 75Ω bridging

APPLICATIONS

MEASURE VIDEO NOISE VOLTAGE ON:

- TV Cameras
- Film Scanners
- Video Tape Recorders
- Radio Links
- Coaxial Lines
- TV Transmitters
- TV Receivers
- TV Transposers



Principle of noise-voltage measurement with H or V internal blanking

Type UPSF Video Noise Meter is designed to measure the unweighted and weighted noise voltages of TV transmission systems. It has the unique advantage of measuring low level components in the presence of high level horizontal or vertical sync and blanking pulses (see line drawing). The UPSF meets the requirements of all U.S.A. black and white and NTS color systems. A bandstop filter adjusted to the color subcarrier frequency (3.58MHz) prevents any residual color subcarrier in the test signal to be picked up. In addition to supplying true RMS value 0.3 mV to 0.3V (full scale deflection) it also can provide peak-to-peak value of 1 mVpp to 1Vpp (full scale deflection). The UPSF can also be used as a conventional broad band VTVM.

Get The Extra Capability, Greater Reliability, and Longer Useful Life Of . . .

ROHDE & SCHWARZ

111 LEXINGTON AVENUE, PASSAIC, N. J. 07055 • (201) 773-8010

Inquiries outside the U.S.A. should be directed to: Rohde & Schwarz, Muehldorfstrasse 15, Munchen 8, West Germany.

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World Radio History

Class II And III Stations Get Pre-Sunrise Sign-On

After 6 years of study and diplomatic negotiations with Canada, the FCC has adopted rules which make it legally possible for Class III standard broadcast stations and Class II stations on most Class I clear channels to operate their facilities from 6 A.M. onward. The rules will apply to full-time and daytime stations with the exception of full-time stations causing skywave interference on identical assigned channels. Bringing to an end the permissive system of operation in effect since 1941 (which allowed operation, if noninterfering, from 4 A.M.), the rules provide, generally, for operation on directional or nondirectional daytime antennas with power limited to 500 w—except in the case of some Class IIs. Full-time stations have the option of operating under the new rules or maintaining their nighttime operations.

Application for permission to operate under Pre-Sunrise Service Authority (PSA)—which goes into effect on August 15—should be made by August 31 in order that it may be processed by the time daylight savings time ends—Oct. 28.

A notice of proposed rule making has been adopted to take up the question of appropriate power levels for Class II daytime only and limited time stations located west of co-channel 1-A stations. These stations may continue, for the time being, to use full daytime facilities and need not file PSA requests. They must, however, sign-on no earlier than 6 A.M. local standard time, after Oct. 28, 1967.

ARROW'S HOWARD WINCH LOVES HIS WIFE...*but*

WHEN HE'S TALKING ABOUT

BROADCAST EQUIPMENT

. . . IF SHE CALLS HIM AT THE OFFICE ALL HE TALKS ABOUT IS

AS WELL AS OVER 267 ADDITIONAL LINES

WRITE FOR CATALOG.

ARROW ELECTRONICS INC.

516-694-6800

212-526-0300

900 RT. 110, FARMINGDALE, N. Y. 11735

TWX-510-224-6494

Circle 37 on Reader Service Card

Smoke Over Smoking Ads

Broadcasters and advertisers alike have been bombarding the FCC with protests since its ruling to WCBS-TV in early June that the fairness doctrine is applicable to cigarette advertising.

Protesting are NAB, NBC, ABC, Storer Broadcasting and 61 radio and TV stations filing in a single petition. Also protesting is the Association of National Advertisers.

Although the FCC said its ruling applied only to cigarettes ("We stress that our holding is limited to this product—cigarettes."), NAB attacked the ruling saying it was a broad swing that "not only covered cigarette advertising but also advertisement of other products." The ANA foresaw pressure on the FCC from other special interest groups, thus undermining editorial freedom.

CATV Permitted Look At TV Books

The FCC has granted a request by Multivision Northwest, Inc., operator of a CATV system in Dalton, Ga., to see copies of Annual Financial Reports (FCC Form 324) filed by stations WRCB-TV, channel 3, and WTVC, channel 9, Chattanooga, Tenn.

Multivision, seeking to add more stations to its service, stated it could not adequately determine the economic impact issue required by the FCC without access to the financial reports.

The Commission denied its request to inspect the reports for Alabama stations in Huntsville, Decatur and Florence.

Uhf Broadcast Equipment Sales Boom

Uhf broadcasting—once a laggard in TV growth—has become a rocketing business that can be

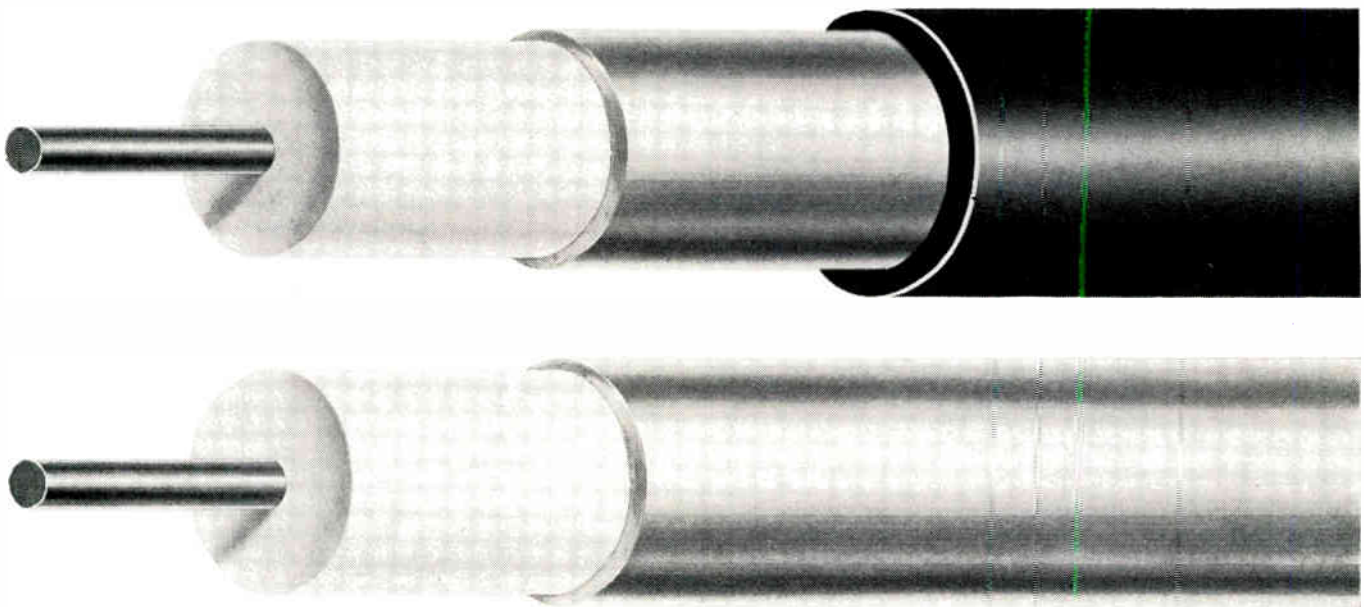
World Radio History

Superior E-X-T-E-N-D-E-D Spectrum Coaxials go all the way to 300 MHz...and beyond!

Now . . . a new 84 MHz segment available!

Controlled impedance uniformity over the extended range provides sufficient band width for up to 14 additional 6 MHz TV channels. You get 26 db minimum return loss (measured at a fixed 75 OHM termination) at any frequency. Both Coppergard and Alumagard feature Cell-O-Air® expanded polyethylene dielectric in aerial types. Coppergard features solid polyethylene dielectric in direct burial construction.

☐ CATV Systems ☐ ETV and ITV Programs ☐ CCTV for Business and Industry ☐ Data Transmission
☐ Remote Control Telemetering ☐ Alert and Alarm Systems ☐ Traffic and Highway Control Systems



Alumagard (seamless aluminum sheath)

Coppergard (corrugated copper shield)

Superior's Full Spectrum Coaxials — through 219 MHz — are also available in both aerial and direct burial types.

For detailed information and prices, write

SUPERIOR CABLE

SUPERIOR CABLE CORPORATION / HICKORY, NORTH CAROLINA 28601

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felt throughout the land, according to RCA.

Shipments of RCA transmitting equipment for uhf stations, for example, currently are double last year's volume rate.

In making this announcement, the RCA Broadcast and Communications Products Division said the strong market for transmitter-antenna systems indicates that approximately 50 new uhf stations will begin broadcasting this year. Last year, new uhf stations numbered 22.

Approximately ⅓ of the new uhf stations going on the air this year are educational, according to C. H. Colledge, division vice president and general manager.

Ball Brothers Research And Miratel Merge

Ball Brothers Research Corporation of Boulder, Colo., has acquired the assets of Miratel Electronics Co., according to a recent announcement in New York by Dr. R. C. Mercure, Jr., vice president of the boulder firm.

The broadcast television equipment division of Ball Brothers Research manufactures color-compatible special effects generators, distribution amplifiers, automatic gain control amplifiers, waveform monitors and television analog-to-digital converters. The firm's markets include broadcast, CCTV and CATV.

Miratel Electronics manufactures color and monochrome TV monitors for commercial, educational and cable television, and fully-transistorized, high-resolution data display devices for industrial, military and aerospace applications. The company is located in New Brighton, Minn., a suburb of St. Paul.

Complaints Increase

The Complaints and Compliance Div. of the FCC Broadcast Bureau reports that complaints received by the FCC from the public about programs and broadcasting practices, during the month of May, increased by more than 100 percent over the previous month. A total of 5358 complaints was received — 3698 more than in April.

General programming attracted the most public attention with 1362 complaints registered. Other major areas included such specific categories as crime and violence, misrepresentation, racial and religious discrimination and obscenity and sex. Program criticisms totalled 3342. Alleged rule violations drew 765 complaints, operating practices 486 and advertising 150. The Complaints and Compliance Div. makes inqury into all complaints appearing to involve statutes or Commission rules or policy.

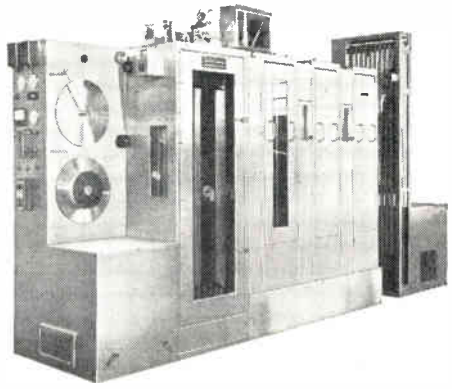
The FCC sent a total of 3517 letters in May in response to complaints, comments and inquiries.

Translator Invades Major Market in Baltimore

The FCC has granted a CP application for a translator station that will broadcast Washington channel 20 programs into the Baltimore area. Channel 20, Inc., licensee of WDCA-TV, Washington, D.C., has been authorized to construct the translator station at Towson, Md. It will operate on uhf channel 73.

This is the first time that a uhf TV licensee in one market has

FILMLINE Processors are DIFFERENT



They work continuously, without downtime, maintenance problems or lost film. Unmatched reliability and quality have been characteristic of all Filmline processors since 1947.

Filmlines exclusive Overdrive Film Transport System guarantees 100% performance.

CAN YOUR OPERATION AFFORD ANYTHING LESS?

There's a Sensibly Priced Filmline processor for every Need — Portable . . . Spray . . . Color. Here's a partial listing:

Model	Film Type	Process	Film Size	Speeds
R-15TC	Rev. & Neg/Pos.	B&W	16mm	15FPM
RTS	Rev. & Neg/Pos.	B&W	16mm	85-125FPM
R-36	Rev. & Neg/Pos.	B&W	16mm	36-72FPM
R-60S	Rev. & Neg/Pos.	B&W	16mm	60-100FPM
NP36	Neg/Pos.	B&W	16mm	90FPM
S-150	Neg/Pos.	B&W Spray	16/35	160FPM
FE-30	Ektachrome	Color	16mm	30FPM
FE-50	Ektachrome	Color	16mm	50FPM
FE-100	Ektachrome	Color	16 or 16/35	100FPM
FEC-100	Eastman Neg/Pos.	Color	16 or 16/35	100FPM
FEC-150	Eastman Neg/Pos.	Color	16 or 16/35	150FPM
FEC-200	Eastman Neg/Pos.	Color	16 or 16/35	200FPM
FEC-300	Eastman Neg/Pos.	Color	16 or 16/35	300FPM

Custom Units Built To Specification for Any Installation

PARTIAL LIST OF RECENT INSTALLATIONS:

Byron Motion Pictures, Capital Film Laboratories, Color Service Company, De Luxe Laboratories, General Film Laboratories, Guffanti Film Laboratories, Movielab, Pathe Laboratories, Precision Laboratories

For literature write: BMEA-67

Filmline CORPORATION MILFORD, CONNECTICUT

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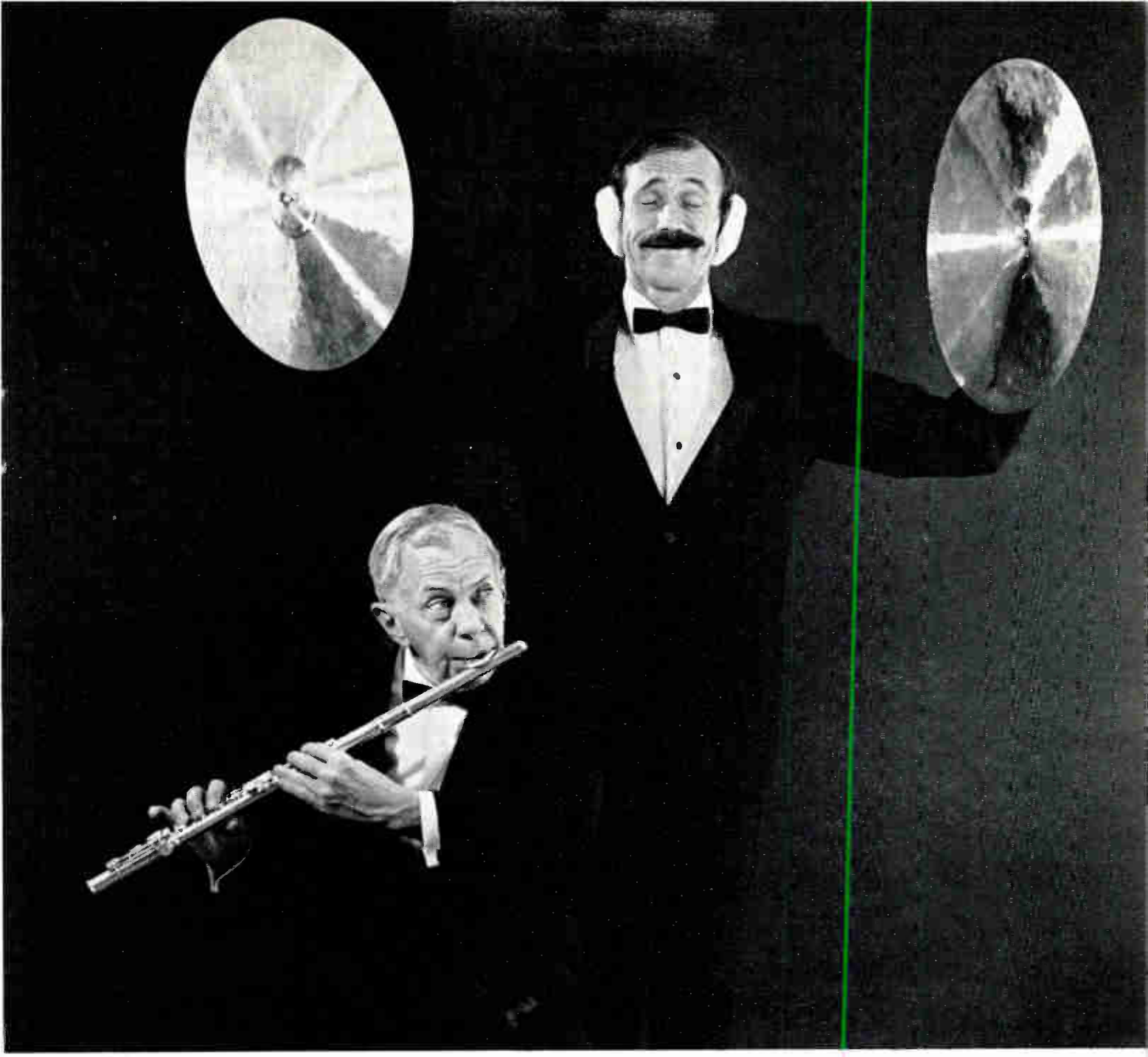

Our new low-noise tape...is all surprises!

From surprisingly soft to surprisingly loud—new Ampex 404 Series low-noise tape can capture more audio reality than low-noise tapes of the past.

Its new small-particle oxide meets or surpasses the most demanding low-noise specifications. Holds inherent tape noise ("hiss") far below the level of your most delicate musical passage. Yet from this same quiet tape comes *greater high frequency response* and *broader undistorted dynamic range* —qualities previously sacrificed in low-noise tapes. So the silence has more silence. The flute sounds sweeter. *And* the cymbals crash louder, without distortion — on Ampex 404 Series low-noise tape.

Buy the full range of Ampex professional tapes for extra quality: New Ampex 404 Series low-noise tapes for mastering and duplicating. 600 Series for general purpose professional recording. 681 Series lubricated tapes for endless loop cartridges. 291 Series tapes for a/v. Plus others. Send the coupon for up-to-date information.

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To: Ampex Corporation, Room 7-14A, Redwood City, California 94063

☐ Send me literature on the full line of Ampex professional tapes, including new 404 Series low-noise tape, for

- ☐ Professional
- ☐ Master
- ☐ Duplicating
- ☐ Other:_____

NAME_____

ORGANIZATION_____

ADDRESS_____

CITY/STATE/ZIP_____

Career opportunities? Write Box D, Redwood City, Calif. 94064.

AMPEX

World Radio History

sought a uhf translator in a neighboring major market. The 100-W translator will provide coverage in "shadow areas" in the Towson-North Baltimore area.

Those voting with the majority were Commissioners Hyde, Lee, Loevinger, and Wadsworth. Commissioners Bartley and Cox dissented with Commissioner Cox issuing a statement. Cox disagreed with the majority view which sought to stimulate more uhf viewing in Baltimore (which has 3 V's and one U) and to equalize WDCA-TV's competitive positions with the other four V's of Washington. Cox argued only the independent Washington V was viewed regularly in Baltimore and that the Baltimore stations were the ones to be protected, not the Washington V's. Cox also said U viewing would be better stimulated by the all-channel receiver law and good programming by the Baltimore U.

Performance Standards

RS-250-A, "Electrical Performance Standards for Television Relay Facilities"—a revision of RS-250—specifies the minimal electrical performance characteristics for transmission of NTSC color television signals from a studio to its associated television broadcast transmitter or for similar applications. Pertinent parameters are defined, and standards and methods of measurement are established for each where practical to do so. Standard is priced at $3.40 and is available from Engineering Department, EIA, 2001 Eye St., N.W., Washington, D.C. 20006.

NAB Board Asks For Dial Calibration Standards

The Radio Board of Directors of the NAB recently adopted a resolution urging that standards be set for manufacturers of radio receivers to calibrate radio dials accurately. The Board directed the NAB staff to seek adoption of the standards and to work with the Electronic Industries Association to obtain them.

NAB Appoints Engineering Committee Members

Vincent T. Wasilewski, president of the NAB, recently announced the appointment of 11 top broadcasting engineers as members of NAB's 67/68 Engineering Advisory Committee.

Malcolm M. Burleson, vice president for engineering, Metromedia, Inc., was named chairman of the group. Appointed to serve with him were: J. B. Epperson, vice president-engineering Scripps-Howard Broadcasting Co.; Clyde M. Hunt, vice president for engineering, Post-Newsweek Stations; Leslie S. Learned, vice president for engineering, Mutual Broadcasting System; Clure H. Owen, manager of allocations, American Broadcasting Co.; James D. Parker, director, transmission engineering, CBS Television Network; Russell B. Pope, director of engineering, Golden Empire Broadcasting Co.; Henry E. Rhea, director of engineering, Triangle Stations; Daniel H. Smith, vice president and director of engineering, Capital Cities Broadcasting Corp.; William H. Trevarthen, vice president, operations and engineering, National Broadcasting Co.; Eugene R. Hill, director of engineering, Kaiser Broadcasting Corp.

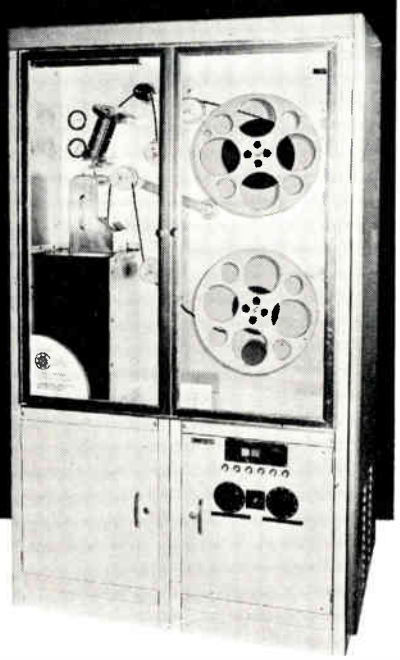
The committee held its first meeting at NAB headquarters on June 14.

CF2 ULTRASONIC CLEANER for MOTION PICTURE FILM

Presented The Academy of Motion Picture Arts and Sciences Award of Merit for Outstanding Technical Achievement.

Ultrasonic energy is the most effective and economical way to thoroughly and rapidly clean motion picture film without mechanical scrubbing and wiping. The cold boiling effect (cavitation) of ultrasonic energy performs the entire operation. Only the solvent touches the film and a forced air, flash dry-off removes all solvent and residue.

- Restores clarity and sound to maximum quality.
- Enhances the entertainment value of motion picture film and improves commercials.
- Assures static free film with color balance undisturbed.
- Cuts projector maintenance costs . . . no dirt or dust carried into gates and orifices . . . less breakdowns.
- Completely automatic . . . requires only loading and unloading.
- Costs only 1/20 of a penny per running foot to operate.
- Used by every major motion picture lab in the world.



DESCRIPTIVE BROCHURE WILL BE SENT ON REQUEST.

Patents

USA—2,967,119 Luxembourg—37,634
Belgium—582,469 Great Britain—909,421
France—1,238,523 Other World Pats. Pend.

LIPSNER-SMITH CORPORATION
7334 No. Clark St., Chicago, Ill. 60626
Telephone: 312—338-3040

7427

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Your RCA Industrial Tube Distributor Gives You

SUPPORT IN DEPTH

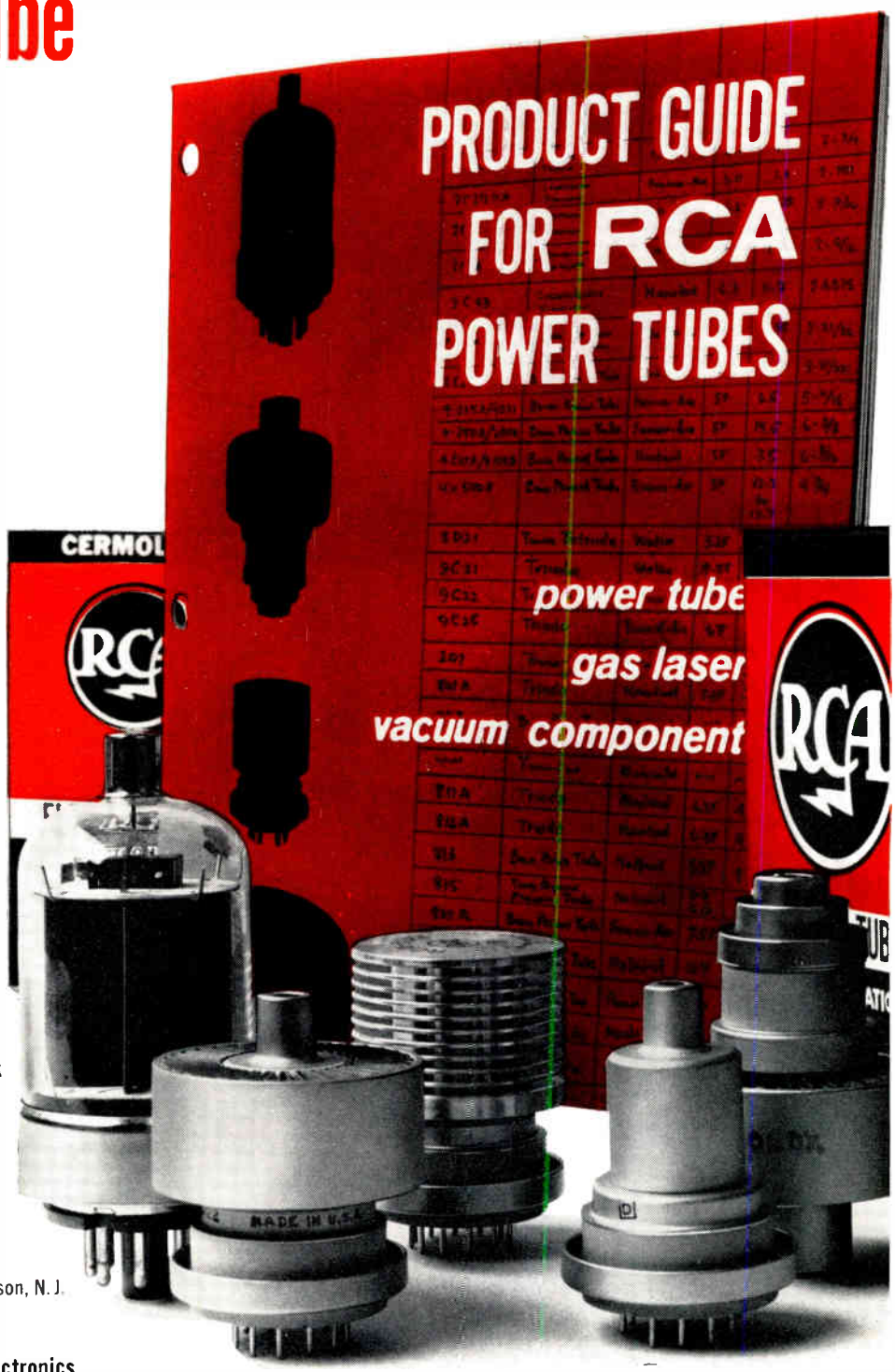
with the Power Tubes You Need for Industrial, Commercial, and Military Use

Power Tubes! For applications from industrial to commercial and military, your RCA Industrial Tube Distributor provides the tubes you need—when you need them. Just as important to you is the support he can provide to make your selection easier. Ask him for the latest technical literature—he has it. Ask for immediate product inventory and price information—he has it. In total... he offers **support in depth** to help you do your job better.

AVAILABLE FROM YOUR
RCA INDUSTRIAL TUBE DISTRIBUTOR

RCA Electronic Components and Devices, Harrison, N. J.

The Most Trusted Name in Electronics



A completely revised, 40-page edition of the "Product Guide for RCA Power Tubes." Booklet PWR-506B.

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Don't buy a QRK Professional Turntable...

Invest in one!

Ask any owner of a QRK Professional Turntable—the longer the better . . . they'll tell you they didn't buy . . . they invested. QRK's absolutely outstanding performance, sustained with practically NO maintenance are the dividends that keep paying off year after year. For a bonus you get ease of operation and turntable reproduction that stays dependable.

Begin your investment with a 5c stamp and write us Today for full information; or call us . . . or see your QRK dealer.

QRK ELECTRONIC PRODUCTS

2125 N. Barton, Fresno, Calif. 93703

Telephone: 209/255-8383 or 209/229-6128

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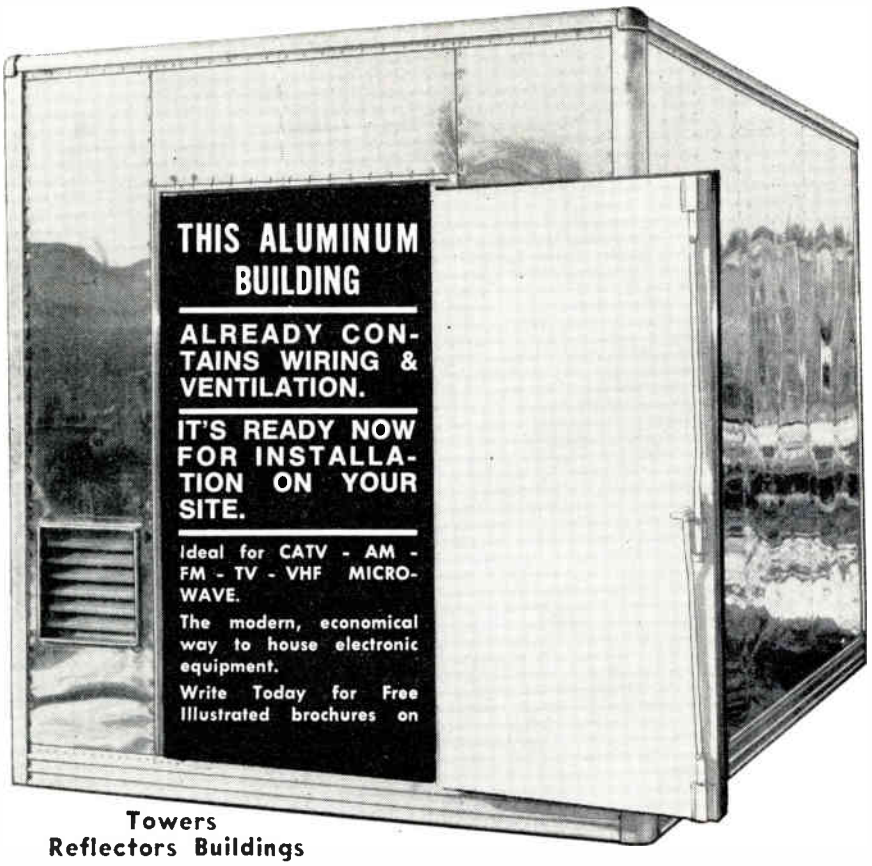

Towers
Reflectors Buildings

Advance Industries Dept. BM 867
705 Douglas St.—Sioux City, Iowa 51101

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Tower Rental Debut?

Tower rental service to anyone wanting to hang a reflector or antenna is now available in a number of southwestern locations and can be made available almost anywhere, according to John Andrews, general manager of Andrews Towers, Inc. of Ft. Worth,

Rental towers are available now in Kilgore, Ft. Worth, San Antonio, Vernon, Alice, Abilene, Comanche, Midland, Odessa, Wichita Falls, Pampa, Setphenville, Texas, and Hobbs, New Mexico. Andrews Towers will install a rental tower anywhere land is available and where there are at least four users ready to utilize the service. Towers can be installed up to 500 ft in height.

Chromium Dioxide Recording Tape

The Du Pont Co. announced recently that it will manufacture and market new, high-performance magnetic recording tapes incorporating chromium dioxide as the magnetic medium.

Chromium dioxides were developed as part of an extensive research program in magnetic materials and magnetism. Patents have been issued to Du Pont that cover the chromium dioxides, the processes by which they are made, and the magentic recording products containing them.

Trademarked "Crolyn," the new magnetic tapes have significant advantages over conventional iron oxide tapes in computer, instrumentation and video recording applications, according to Dr. Maurice L. Ward, magnetic tape manager of the Du Pont Photo Products Department.

Crolyn magnetic tapes have been tested extensively at Du Pont with results indicating that the new tapes accept more information per inch and record and reproduce high frequency signals with greater fidelity than present gamma iron oxide tapes.

Crolyn can be used interchangeably with iron oxide tapes in many applications, but greater performance benefits are usually obtained on recording equipment adapted for use with the new tapes.

Only limited quantities of the tapes are available at present, but Dr. Ward pointed out that their tape manufacturing facility has the potential to meet marketing needs for the near future.

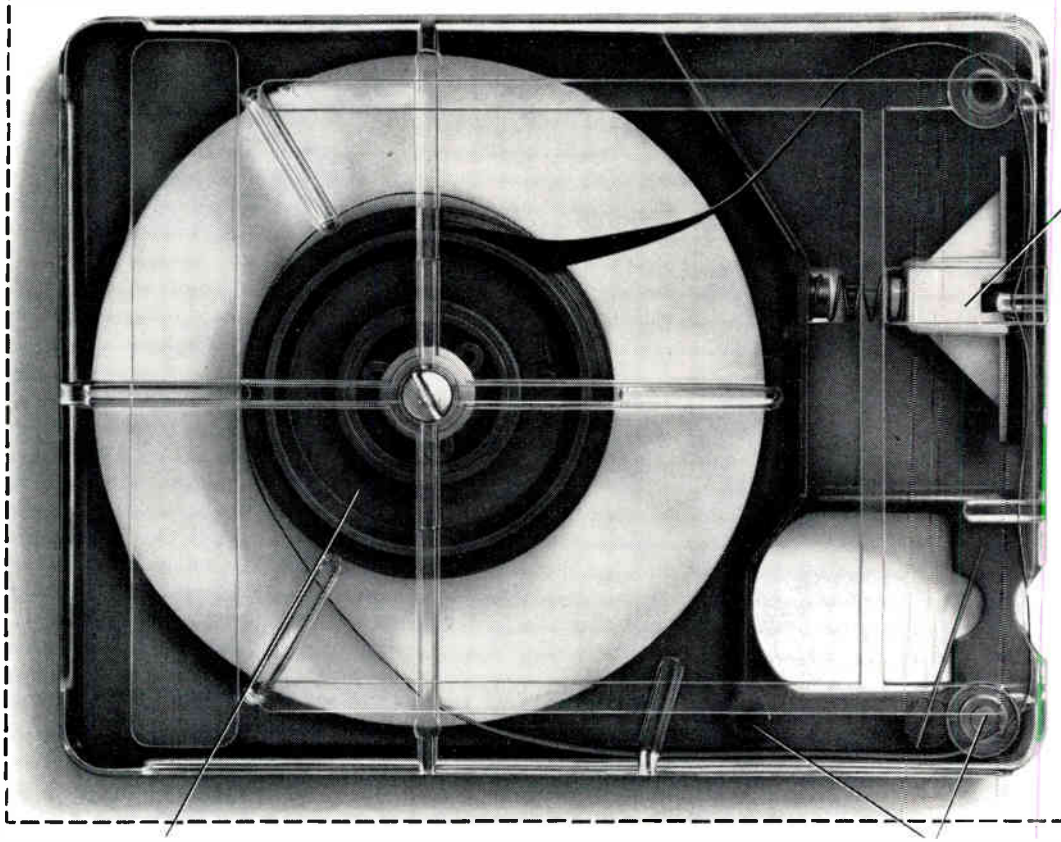
World Radio History

Ralph Carrano

Technical Supervisor,
WAVZ, New Haven, Conn.
"The pressure pads are the feature I like best. They do not require adjustment. Record, playback quality excellent."

I understand that Ralph likes Audiopak pressure pads. May I try them myself? Send a free Audiopak to:

Name_____ Title_____ Station_____
Address_____ City_____ State_____ Zip_____



Uni-tension felt pressure pads keep tape in constant, intimate head contact to assure steady output.

Warranty:
We are so sure that you will be satisfied with the results obtained with this tape cartridge that we will replace it free if defective in manufacture, labeling or packaging.

Patented free-floating hub increases tape life by freeing it from friction and drag; reduces internal- parts wear.

Conforms to standard NAB cartridge specifications.

Precision-molded guides control tape along path to true fidelity.

Audiopak™
Audio Devices, Inc.
235 E. 42 Street
N.Y. 10017

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"BNC"
CONNECTORS
FOR
BELDEN 8281
AND
W.E. 724
W.E. 728

"UNICUT"
3 PIECE ASSEMBLY

- EASIER TO ASSEMBLE
- POSITIVE CABLE CLAMP AND CAPTIVE CENTER CONTACT
- LOWER VSWR
- NO SPECIAL TOOLS REQUIRED
- CAN BE DISASSEMBLED AND REUSED
- AVAILABLE FOR MOST RG CABLES

also available — complete video patching and delegate switching equipment

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8936 Comanche Avenue
Chatsworth, California 91311
Tel. (213) 882-1020 / TWX: 910-494-1210

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NAMES IN THE NEWS

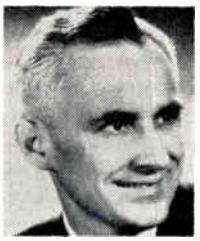
Richard R. Peterson has been named national sales manager, educational/industrial products, for Ampex corporation's Consumer and Educational Products Div., it was announced by John H. Trux, marketing manager.

Richard R. Peterson

Robert E. Dressler

Robert E. Dressler has been named director of the Ampex Video Institute — a CCTV school located at Elk Grove Village, Ill. John H. Trux, marketing manager made the announcement.

Richard G. Old



Kenneth K. Kaylor

Richard G. Old has been appointed regional sales manager, northwest region by A.L. Ginty, vice president of Anaconda Astrodata.

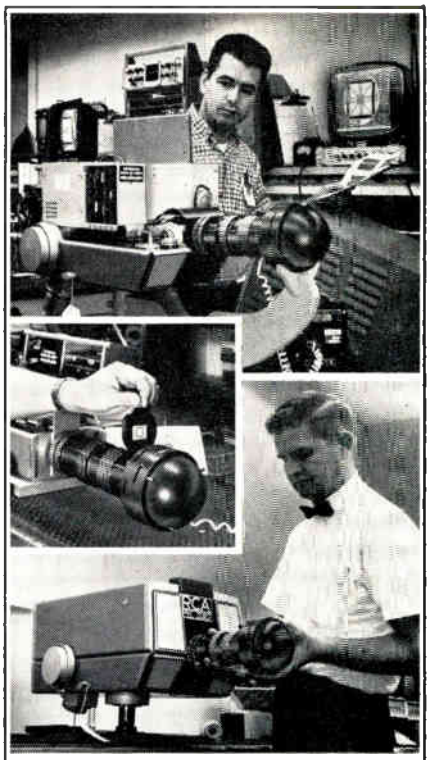
Kenneth K. Kaylor has been appointed western regional sales manager for Phillips Broadcast Equipment Corp.

M. B. Brady, Jr.

Caywood C. Cooley

M.B. "Bill" Brady, Jr. has joined International Good Music, Inc. in charge of sales of taped music services and broadcast audio equipment in Texas, Oklahoma, Louisiana, Arkansas and Mississippi.

Caywood C. Cooley has been named technical director of microwave and cable systems for the Jerrold Corp. Lee R. Zemnick, vice president, made the announcement.



The *SPECTRA*® TV Optoliner* locks in on accuracy

The SPECTRA TV OPTOLINER is a high resolution, precision TV camera tester that locks in on accuracy by enabling microscopic testing and alignment. This accuracy is accomplished by inserting slide mounted test patterns into the Optoliner and accurately aligning and focusing the image to the center of the camera lens (within 0.002") while a constant, adjustable light source monitored by a special meter indicates the exact illuminance and color temperature falling on the face of the image tube. Now being used by RCA in their Burbank production facility, the Optoliner is ideal for production line operations, quality control functions and standards labs. For specific applications, write or call:

*Trademark of Photo Research Corp.

Karl Freund, *President*

PHOTO RESEARCH corp.
"PHOTOMETRIC EQUIPMENT FOR SCIENCE AND INDUSTRY"
873 N. Cahuenga Blvd., Hollywood, Calif. 90038
Telephone: (213) 462-6673 • Cable: SPECTRA

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World Radio History

"Don't join too many gangs. Join few if any. ...and join the family..."

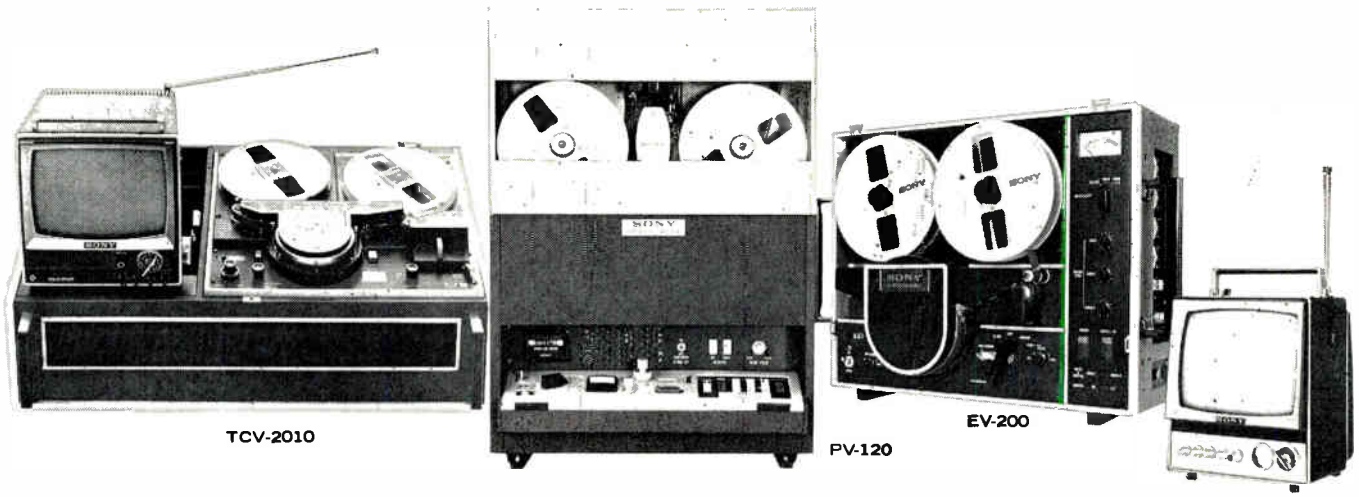
— **Robert Frost,** *Build Soil*

Good advice, Mr. Frost! And Sony's world famous first family of Videocorders® is the only one to join when you're thinking in terms of VTRs.

Sony's family tree is solidly planted. No matter what branch of video tape recording you want to swing from, Sony can satisfy your needs. This great family includes the CV-2000 Series for home entertainment, education, and certain commercial uses; the EV-200 for professional, educational, and training applications; and the "paterfamilias," the PV-120, for the most exacting broadcasting and scientific uses.

Sony features begin where those of other VTRs end. Ruggedness and reliability are built in; maintenance problems are virtually non-existent. All Sony tapes are guaranteed to be interchangeable between similar models. If you're thinking in living color, all Sony VTRs are color-compatible. And only Sony gives you electronic, slow- and full-stop motion, and exclusive on-line electronic editing.

So don't join just any old gang. Join the Sony family. We have the nicest relations.



TCV-2010 PV-120 EV-200

For complete technical specifications, fill out and mail this coupon, or circle the appropriate number on the inquiry card elsewhere in this magazine.

SONY®
RESEARCH MAKES THE DIFFERENCE
INDUSTRIAL DIVISION
516 W. Florence Ave.
Inglewood, California 90301

SONY CORPORATION OF AMERICA / INDUSTRIAL DIVISION

☐ Please send me complete specifications on the ☐ EV-200 ☐ PV-120 ☐ CV-2000

☐ I am interested in a complete Videocorder system

NAME _____ TITLE _____

COMPANY/SCHOOL _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

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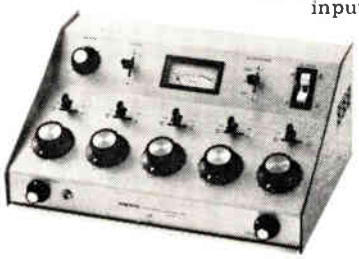
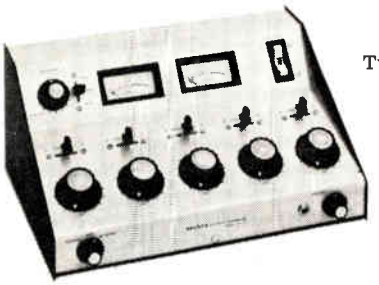
MEET THE SPARTA FAMILY OF AUDIO CONSOLES

For all your Remote mixing requirements here's "Mothers little helper"! The **RA-5** with 30 hour battery capability.

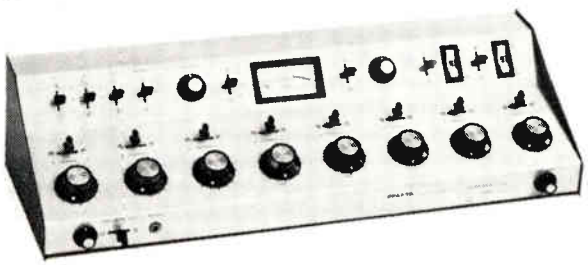
Husky big brother for use in the production studio and control room. It's the all new **A-15** with 14 audio inputs.





Twin sister for Stereo use, the **AS-30** offers selectable stereo/mono mode control & 9 stereo audio inputs.

Big daddy of them all, the **A-20** offers the broadcaster a full facility audio control center with 22 inputs.



For more information and prices on the Sparta Family of Audio Consoles, write or call your Spartaman today! Get full particulars on Sparta's solid state design with individual modular electronics. A strong family tradition for quality and service makes you friends of the family in a hurry.

SPARTA
ELECTRONIC CORPORATION
5851 FLORIN-PERKINS ROAD, SACRAMENTO, CALIF. 95828 • (916) 383-5353

Circle 48 on Reader Service Card

Kaiser Broadcasting announces the appointments of **Bruce C. Mayer** as regional sales manager of WKBD-TV; **Edward H. Herlihy** as chief engineer of WKBG-TV, WCAS and WJIB-FM; **Charles Briggs** as account executive at WKBD-TV; and **Iris Rosenzweig** as research analyst in the New York sales development office.

R. Prather

A. Keenan

Robert E. Prather has been appointed eastern region marketing manager for GT&E Communications, Inc.

A.T. Keenan has been appointed national sales manager for Jerrold Electronics Ltd of Canada.

Cascade Electronics announces with extreme regret the death of their former director of advertising, **Robert Ashby.**

J.C. Davis, assistant engineer, in charge television studio and control room operations at KXLY-TV, Spokane, Washington, passed away on June 13. He was well known in Washington and Montana radio and television and had worked at a-m stations. Davis spent the last 21 years at KXLY, 14 of which were in television.

Art Silver has been named director of engineering for the Nassau Broadcasting Co. by Herbert W. Hobler, president of the firm.

John P. Witherspoon, general manager of KEBS-FM-TV, San Diego, Calif., has been appointed to the Board of Directors of the NAEB.

The appointment of **Robert E. Allen** as vice president in charge of CATV operations of Telesis Corp. was announced recently by President Richard F. Shively.

Richard A. Quodomine recently was appointed manager of technical operations for WOR-TV was announced by Jerome Bess, vice president and general manager. The promotions of **Francis Garufy** and **Robert O. Norris** to new engineering positions at WOR was announced by Orville J. Sather, director of engineering.

World Radio History

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?

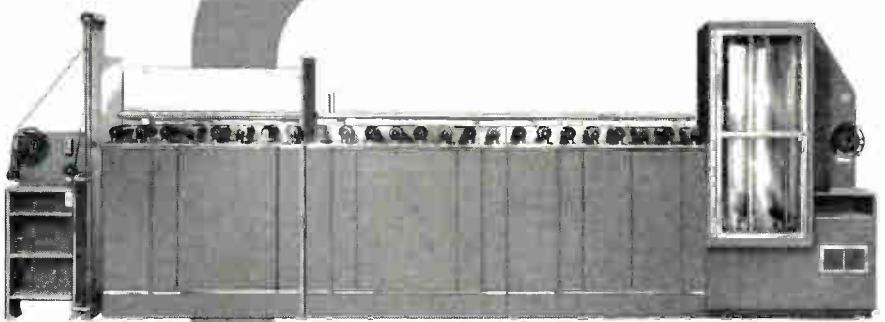
Treise Processors provide for 50% additional first-developer time to permit full utilization of the new EF Ektachrome film. (This feature is important when you consider that news work demands wide flexibility in film speeds to achieve optimum results under all shooting conditions.) To our knowledge,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

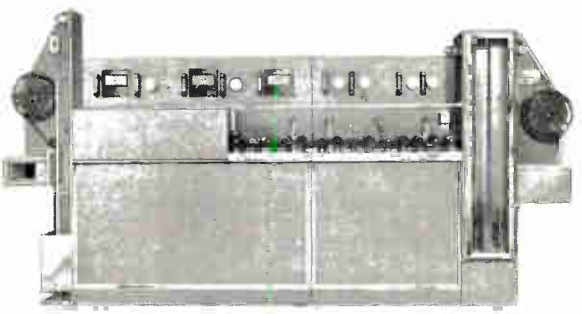
If your requirements call for exceptionally high volume in a short period of time (—and if you want to surpass any other station), we recommend the Treise MT-20 Color Processor. This model accommodates 16mm color reversal film at rates up to 60 fpm and is the finest TV color processor that money can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

1949 FIRST ST. • SAN FERNANDO, CALIF. • EMPIRE 5-3124 (213)

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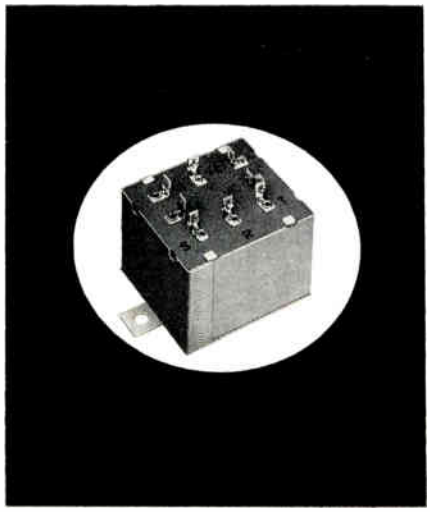
World Radio History



NEW

Interphone Amplifier

The new Daven 90C Transistorized Interphone Amplifier allows for an independently fixed or manually adjusted peak gain of 25 db, and fixed or adjustable sidetone ratio. With a maximum of 32 conference connected units, the 90C replaces the old 6-station induction coil. Operation is independent of the 24-volt "talk" bus polarity to protect against burnout. It's designed for use with a Western Electric 52 or 52A Telephone Headset.

Write, phone, or TWX for Bulletin No. AL-35.

DAVEN McGRAW EDISON

DIVISION OF THOMAS A. EDISON INDUSTRIES
GRENIER FIELD, MANCHESTER, N.H. 03103
(603) 669-0940 • TWX 603-623-4938

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BROADCASTERS SPEAK

Sirs:
My congratulations to your fine magazine for carrying the article "Understanding Color Videotape Recording" by Charles Anderson.

Because of problems encountered in the early days of color videotape recording, we felt information in this field should be published and took it upon ourselves to pursue and establish a set of standards acceptable to all facets of the television industry, and am very pleased to see that your magazine is continuing its involvement in furthering the understanding of color videotape recording.

Mel Sawelson
President
Acme Film And Videotape Laboratories, Inc.
Hollywood, Calif.

Sirs:
I read with great interest, a portion of an article entitled "Analyzing Video Performance Part II," by Harry A. Etkin. I would appreciate it very much if you could send me Part I and Part II of this most informative article.

Sol Goldstein
TV Maintenance Engineer
American Broadcasting Co.
New York, N.Y.

March and April/67 BM/E *on the way, S.G.*

Sirs:
Just a note to express my appreciation for making *BM/E* a truly fine publication. I find it most helpful.

Richard S. Kober
Manager
KGHL, Billings, Montana

Sirs:
This is just a quick note to tell you how much I appreciate getting your magazine each month. I am no longer associated with WKLS-FM, but am now a full time student at Georgia State College here in Atlanta. Here your magazine has helped me even more as I am majoring in Radio and Television Journalism. So, please don't quit sending *BM/E* to me.

Rick Neldon, WB4DXY
Atlanta, G. 30328

Keep up the good work, R.N. Glad you find us helpful in your studies.

Sirs:
For over a year I have had the distinct pleasure of receiving your very fine journal through my association with our local club-owned FM station, KFMT.

I will soon be returning to the states and will be starting college with the spring term at Michigan State

DRAMATIZE TV WEATHER

Show viewers impending weather . . . . . before it happens.

Orbiting weather satellites, such as ESSA II, are now transmitting pictures of daily weather conditions over your entire coverage area.

You can receive these pictures directly on Alden APT facsimile recording equipment—same type now in production for U.S.W.B., U.S.A.F., U.S.N. and others.

Viewers will see . . . storms . . . hurricanes . . . and other weather conditions . . . before they happen. TRULY DRAMATIC!

Be the first TV station in your market to capture the weather audience with APT (Automatic Picture Transmission) pictures recorded on your own Alden Facsimile Recorder. Same equipment can receive standard U.S. Weather charts, or any other type of graphic information, such as TV scripts of commercials sent via an Alden Facsimile Scanner over any existing communication link.

Systems from $10,819. Basic recorder only $5,171. Component units also available for use with existing electronics and antennas. Sale and lease plans. Write today for full details:

Irving R. Tatro, Mgr., Meteorological TV Systems, ALDEN ELECTRONIC & IMPULSE RECORDING EQUIPMENT CO., INC., Westboro, Mass. 01581, Dept. BB-8, Tel. 617-366-4467.

Circle 51 on Reader Service Card

Newest from Electrodyne

INTEGRATED CIRCUIT AUDIO EQUALIZER AMPLIFIER MODULE

Microphone preamplifier.
Low noise level (—127 DBM equivalent input)
Booster and echo amplifier
Four high frequency, two low frequency equalization points.
Isolated echo output
71DB gain overall
Simplifies console design.
Designer color panels for coding and color co-ordination

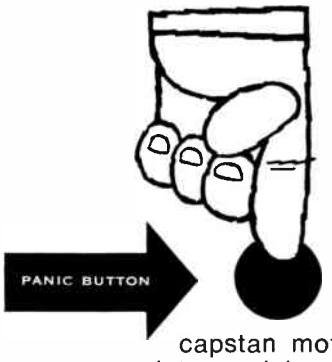
For complete literature write or phone:

ELECTRODYNE CORPORATION
10747 Chandler Blvd., North Hollywood, Calif. 91601
Telephone: area code 213/766-5602 or 213/877-3141
Cable Address: "ELECTRODYNE" North Hollywood, Calif.

Circle 52 on Reader Service Card

World Radio History

YOU WON'T FIND A PANIC BUTTON ON A MAGNECORD!

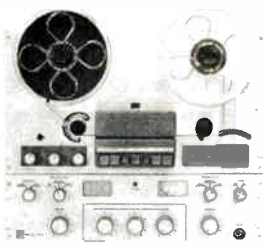


When Magnecord engineered a long list of safety factors into their professional line of tape recorder/reproducers . . . they engineered the emergencies out! A sturdy die-cast mainplate, supporting the transport in every model, insures precise location of internal parts under the roughest operating conditions. Rigid die-cast head mounts eliminate alignment problems. Professional quality hysteresis synchronous capstan motor and individual reel drive motors are heavy duty models, and the capstan shaft assembly is re-inforced for extra strength and longer life.

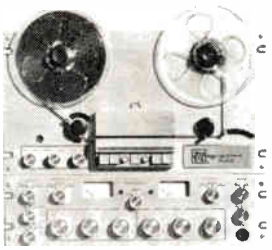
While you are taping, safe-guard operating features protect your thinnest tapes. With Magnecord you get top-notch performance and superb fidelity to keep your taping facility operating at maximum capacity, even after years of constant use. Ask a broadcaster who uses one . . . Magnecords are built to take it!

Write now for the full story on the complete line of durable quality Magnecord tape instruments.

Magnecord 8+ Reels now available from Audiotape®. See your local dealer.



MAGNECORD MODEL 1021
Fully transistorized professional tape recorder / reproducer for monaural operation. For use in main or production control room.



MAGNECORD MODEL 1022
Fully transistorized professional tape recorder / reproducer two channel (stereo) for use in main or production control room.

MAGNECORD MODEL 1028
Professional quality 2 channel (stereo) tape recorder / reproducer for recording master tapes. (10½" reel capacity) Available in ½- or ¼-track.

MAGNECORD MODEL 1048
Professional 2 channel (stereo) recorder/reproducer for use in main studio, production studio or conference recording. (10½" reel capacity) Model 1048 is available in ½- or ¼-track.

MAGNECORD
tape recorders
DIVISION OF THE TELEX CORPORATION
9600 ALDRICH AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55420

Circle 53 on Reader Service Card

World Radio History

Helpful Books on 10-Day FREE Trial!

CATV SYSTEM ENGINEERING, by Rheinfelder

JUST REVISED & ENLARGED EDITION of what is THE accepted technical standard of the CATV industry. Really covers everything involved in planning, designing & operating a CATV plant! Completely outdates the 1st Edition with new Chapters and data on all the latest equipment and concepts. 13 Ch.; 140 illus.; 240 pps.; 7-part Appendix.

Order TAB-98.....only $12.95

RADIO SALES PROMOTIONS

300 Merchandise-Moving Ideas! A compendium of more than 300 creative selling ideas designed exclusively for radio stations. Here are sales tools that work! A vast supply of ready-to-use ideas for producing sales in 43 categories, from air conditioners to washing machines. Here are powerful, positive ideas that will add $1000's of revenue to your billing. BIG 8½ x 11" size.

Order TAB-214.....only $10.00

Handbook of Radio Promotion and Publicity

Ideas that work! Here's a virtual encyclopedia of 175,000 words containing all the promotion and publicity ideas you'll ever need. What's more, it contains over 1500 on-air promo themes you can adapt. This GIANT handbook gives you hundreds of specific plans you can put to work for your station. A MUST book for every station wanting to attract more listeners, boost ratings, increase sales. 284 pps., BIG 8 x 13" size.

Order TAB-213.....only $25.00

CATV SYSTEM MAINTENANCE—NEW—1st and ONLY book on CATV maintenance. Completely covers all phases of the subject from antenna system thru troubleshooting. Incl. valuable data on auxiliary CATV services. 12 Ch.; 192 pps.

Order TAB-82.....only $12.95

TELEVISION FILM ENGINEERING—NEW; all about technical aspects of TV film programming. A ONE-SOURCE handbook for TV personnel involved in any phase of TV film programming. 507 pps.

Order TAB-215.....only $15.00

MICROWAVE SYSTEMS PLANNING—Comprehensive coverage of microwave planning, engineering & installation. 10 Ch.; 144 pps.

Order TAB-212.....only $8.00

COMMUNICATION SYSTEM ENGR. HANDBOOK—Mammoth 972-p. sourcebook that covers everything in comm's. 548 illus.

Order TAB-211.....only $28.50

FM RADIO OPERATIONS HANDBOOK
First guide to FM Eng. Opers. & Mgmt.
Order TAB-94.....only $9.95

INTERPRETING FCC RULES AND REGULATIONS
Brings you up-to-date on current FCC regs.
Order TAB-95.....only $5.95

CATV OPERATIONS & MANAGEMENT
Covers location, acquiring franchise, etc.
Order TAB-100.....only $12.95

BROADCAST ANTENNA SYSTEMS HANDBOOK
1st practical guide to all broadcast antennas.
Order TAB-44.....only $7.95

PUBLIC RELATIONS HANDBOOK
Indispensable 944-p. sourcebook on PR!
Order TAB-180.....only $19.50

RADIO ENGINEERING HANDBOOK
1775 pps. of valuable data for radio engrs!
Order TAB-199.....only $27.50

NAB ENGINEERING HANDBOOK
1728 pages of data! The book to have!
Order TAB-35.....only $29.50

ANTENNA ENGINEERING HANDBOOK
Fully covers the antenna art in 1013 pps.
Order TAB-40.....only $25.00

PLANNING THE LOCAL UHF-TV STATION
Brand-new guide on how to set up a "U".
Order TAB-43.....only $10.00

RADIO STATION MANAGEMENT
A wealth of stimulating ideas—in 338 pages!
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Please send me book(s) listed below.
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Circle 54 on Reader Service Card

University. After 16 years out of the classroom I hope to begin realizing my ambition to get into broadcasting professionally. I'll be majoring in Radio and Television Production with a minor in Journalism. My question is, will I still be eligible for a free subscription?

I find the magazine invaluable for keeping abreast of the industry. As a matter of fact, I read every issue from cover to cover. In my opinion you have the best in the field.

Regardless of your answer, may you continue to have much success.

Ronald E. Altman
Boon, Mich.

You'll receive a reader qualification card, R.A. Your answers will determine your eligibility for free subscription. Good luck at M.S.U.

Sirs:

Scheduled to start in September on channel 18, WCCB-TV, here in Charlotte is a 30-minute, live, in color show on Nascar Grand National stock car racing. We will be syndicating very shortly.

My name is Bill Dickey and I will be handling the commentary. I need *help, help* on set design post-haste! We will be using two cameras in a studio 40′ × 60′. The lighting in this facility does leave a lot to be desired.

If you can help or suggest where I can look for a different type set, theming stock car racing, I promise I'll get out on the street and sell your great magazine door to door.

Bill Dickey
WIST Radio
Charlotte, N.C.

Sorry, B.D. At this distance all we can think of is to suggest that you contact a local drama group. Can anybody think of a better way to help B.D. out of his predicament?

Sirs:

WBCI Radio is interested in some model floor plans for radio stations.

If you have run any features in the not too distant past, would you please send us a copy.

Many thanks for your cooperation.

Don Bentley
General Manager
WBCI, Williamsburg, Va.

We're sending you a Nov/66 BM/E, *D.B.*

Sirs:

I have just received the June copy of *BM/E* and was very disappointed that it didn't have part II of the article by Harry A. Etkin, on fm proof of performance, which the May issue said it would have.

What happened? And how could I get a copy of the intended article?

H.M. Caraway, C.E.
KSNM-FM, Santa Fe, N.M.

We did skip a month, H.C. Guess you saw Part II in July.

Why are 6 FAIRCHILD CONAX'S on top of the EMPIRE STATE BUILDING?

Several New York FM and TV stations, including WNEW-TV, WPIX-FM, WPIX-TV, WOR-FM, WOR-TV, and WQXR-FM, value their transmission location on top of the Empire State Building and they also value their audience. The FAIRCHILD CONAX allows these stations to maintain high average listening levels without danger of over-modulation caused by high frequency spikes and thereby increasing fringe area coverage. The super-fast attack and release times of the FAIRCHILD CONAX makes this instantaneous control inaudible to the listener's ear. ☐ The FAIRCHILD CONAX does not "muddy-up" the top in an effort to control it. Easily integrated into existing systems, the FAIRCHILD CONAX does not obsolete conventional compressors or limiters — it actually improves their performance. ☐ Only the FAIRCHILD CONAX is the world accepted solution for high frequency pre-emphasis problems. Join the "1000 Club"... the satisfied users of the FAIRCHILD CONAX in recording and broadcasting throughout the world. ☐ Write to FAIRCHILD — the pacemaker in professional audio products — for complete details.

FAIRCHILD
RECORDING EQUIPMENT CORPORATION
10-40 45th Ave., Long Island City 1, N.Y.

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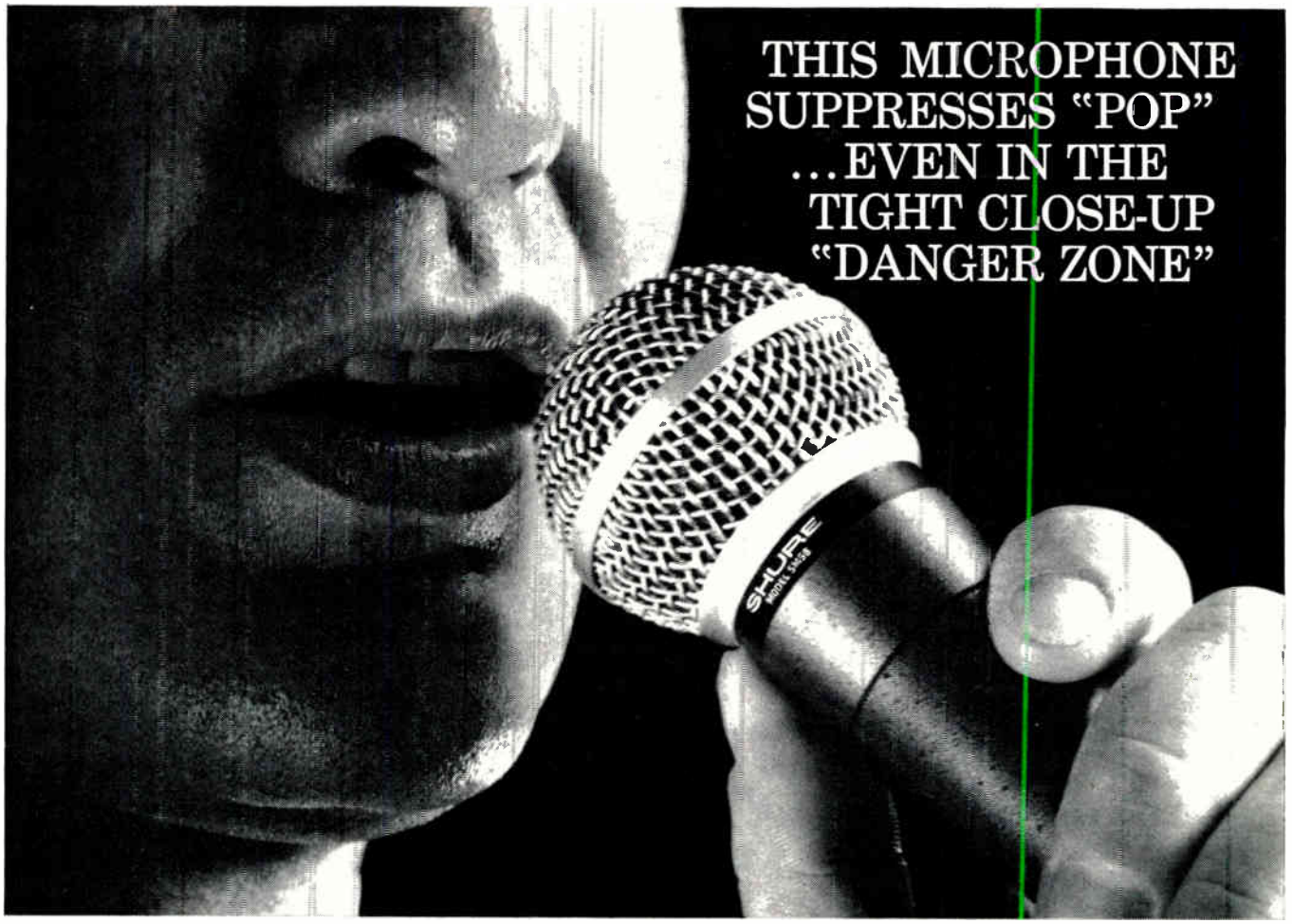
World Radio History



The Shure SM58 *self-windscreened* unidirectional microphone is ideal for broadcast uses such as remote news, sports, interview and vocal recordings because it eliminates or minimizes the irritating "pop" caused by explosive breath sounds. With the SM58 you will have the peace-of-mind assurance that you're delivering the quality audio that goes with pop-free pickup. It's great for studio announcing, too—or wherever the announcer or vocalist has the audio-degrading habit of "mouthing" the microphone. Of course, the same filters that eliminate pop also do away with the necessity for an add-on windscreen in outdoor uses.

On the other hand, the unusually effective unidirectional cardioid pickup pattern (uniform at *all* frequencies, in *all* planes) means that it is a real problem-solver where background noise is high or where the microphone must be operated at some distance from the performer. Incidentally, but very important, the SM58 tends to control the low frequency "boominess" that is usually accented by close-up microphones.

All in all, close up or at a distance, the Shure SM58 solves the kind of ever-present perplexing problems the audio engineer may have felt were necessary evils. The SM58 might well be the finest all-purpose hand-held microphone in manufacture today. And, all things considered, it is moderate in cost.

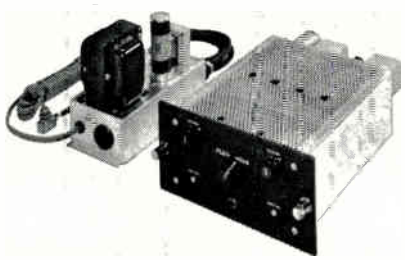
Other features: the complete pop-proof filter assembly is instantly replaceable in the field, without tools. Filters can be easily cleaned, too. Stand or hand operation. Detachable cable. Rubber-mounted cartridge minimizes handling noise. Special TV-tested non-glare finish.

For additional information, write directly to Mr. Robert Carr, Manager of Professional Products Division, Shure Brothers, Inc., 222 Hartrey Ave., Evanston, Illinois 60204.

SHURE SM58

SELF-WINDSCREENED UNIDIRECTIONAL DYNAMIC MICROPHONE

SHURE STATION-TESTED AUDIO CIRCUITRY EQUIPMENT



Shure stereo equalizer and preamplifiers are praised as MAJOR contributions to upgrading station quality by broadcasters.

SE-1 Stereo Transcription Preamplifier
Provides precise RIAA equalization from magnetic phono reproducers at line levels. Separate high and low frequency response trimmers. Lowest distortion, noise level, susceptibility to stray RF fields.

M66 Broadcast Stereo Equalizer
Passive equalizer compensates recorded frequency to three playback characteristics: RIAA, flat, roll-off. Provides precise equalization from magnetic pickup at microphone input level.

Circle 56 on Reader Service Card

World Radio History

LITERATURE of INTEREST

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

Antennas for CATV, MATV and ETV and tower structures are included in 4-page brochure from RF Systems. **150**

Microwave products short form catalog (12 pages) from American Electronic Laboratories includes antennas, microwave components, testers and instruments. **151**

Professional microphone products, tone arms, cartridges and audio accessories are included in 7-page catalog from Shure Bros. **152**

Color coding standards for tantalum capacitors and chassis wiring (RS 228-A and RS 336) are available from EIA for $5 and $1, respectively. Circle **153** to order capacitor codes; **154** for chassis wiring codes.

"Advance Manufacturing Methods for Complex Broadcast Equipment" is a 20-page technical paper from GE's Visual Communications Department describing quality control system implementation in the production of PE-250 color camera. **155**

8500 listings of all radio and television stations in the U.S., Mexico, Canada and the West Indies are contained in "North American Radio-TV Station Guide" (144 pages) from Howard W. Sams. Guide has increased its contents by 1000 listings over previous edition. Price is $2.50. **156**

"Taping Tips For Electronic Servicing" (32 pages) contains practical hints for proper use of electrical tapes. Booklet is available from 3M's Department of Communications. **157**

"Television: The Creative Experience," a survey of Anglo-American progess, collected from *Television Quarterly* and its British counterpart, the *Journal* of the Society of Film and Television Arts, has been published as a television anthology by Hasting House. Book is priced at $7.95 and has 328 pages. **158**

"Sound and Vibration Measurement Equipment" is the title and topic of 24-page catalog from General Radio. Sound-level meters and wave analyzers are among the gear described. **159**

"Step Recovery Diode Frequency Multiplier Design" (24 pages) from Hewlett Packard gives step-by-step procedures for designing an impulse generator and related circuits that multiply 2- to 10-GHz sinusoidal inputs by factors ranging from 5 to 10 and with output powers ranging from 180 mW to 5 W. **160**

Broadcast Equipment catalog from Denison Electronic Corp. contains 158 pages of equipment descriptions and prices. Catalog is priced at $.50. **161**

"A Microphone For Every Purpose" (8 pages) from Sonotone includes dynamic and ceramic types as well as microphone accessories. **162**

"Tech Topics" and "Business Booster"—broadsides from Ameco —present monthly topics of interest to CATVers. Latest editions (Issue 29) discuss surge protection and special June promotion. **163**

Heterodyne signal processor—model Channeleer—from Ameco is described in 2-page brochure. **164**

Plastic-cased reed relays—series 200 from General Reed Co.—are described in 4-page Catalog GR-8. **165**

Lighting Handbook (63 pages) has theatre, television and photographic lamp slide rule tucked in pocket on inside back cover. Handbook and slide rule are available free from Sylvania. **166**

Motion picture equipment rental catalog (46 pages) from FB/Ceco lists over 2600 professional film-making gear ranging from film splicers to 1500-A generator trucks. **167**

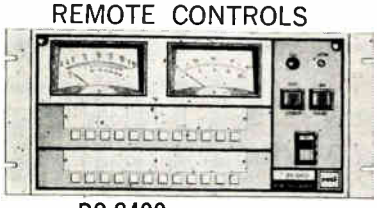
Universal camera mount is the topic of data sheet from Cohu. Sheet includes specifications and dimensional drawings. **168**

"Microwave attenuation measurements and standards" (NBS Mono. 97) is available for 25 cents from the Office of Technical Information and Publications, N.B.S., Washington, D.C. **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**

Errors in gain measurement of standard electromagnetic horns is the topic of NBS Technical Note 351. Publication contains 41 pages and is available for 30 cents from the Supt. of Documents. **171**

All New
REMOTE CONTROL
from the leader in
REMOTE CONTROLS



RC-2400
by **rust**®

Features:
- Operates over microwave, voice line, DC pairs
- Three models one for every requirement, TV, FM, AM
- Solid state design
- push button control
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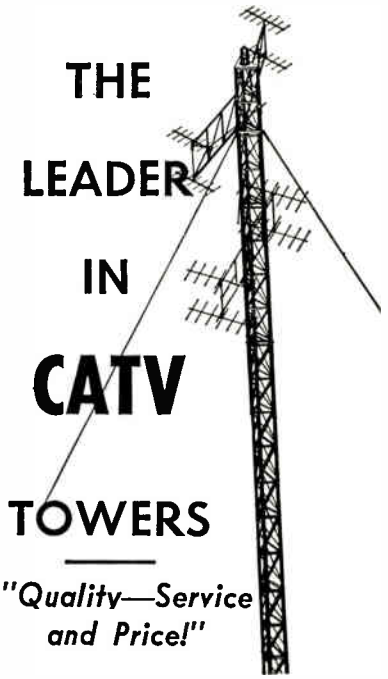

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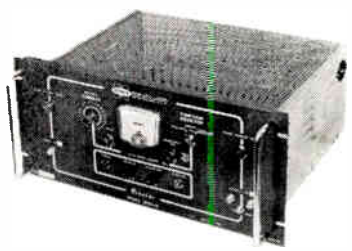

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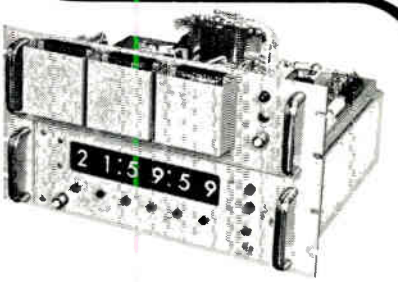

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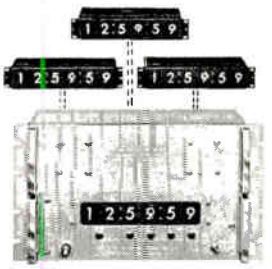

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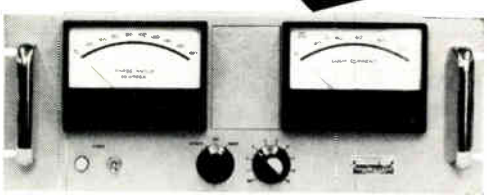

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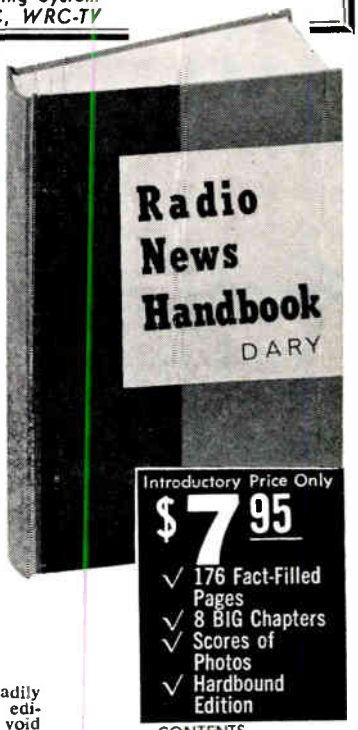

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For the beginning newsman, there is a solid grounding in radio news basics, mechanics, and style, plus necessary details on the workings of a radio newsroom. Students will find the book of great value as a source of information covering every phase of broadcast journalism. Announcers, salesmen, and even managers will find **Radio News Handbook** a helpful guide in understanding and working with their news department.

Based On Actual Experience
While writing the book, the author was radio news director at NBC-owned WRC, Washington, D.C., and he has drawn heavily on his experience with NBC as well as from other network reportorial work, plus his many years as a staff newsman. Here, in a single volume, you will find a wealth of theoretical and practical knowledge condensed into an easy-to-read work, illustrated by dozens of photos (some from network archives) and illustrations.

Beginning with a Chapter on the history of radio news, the volume describes the trials and tribulations of those early broadcast journalists: H. V. Kaltenborn, Bill Slocum, Graham McNamee, John Daniel, Phillips Carlin, Paul White, Abe Schechter, Floyd Gibbons, Robert Trout, Gabriel Heatter, Lowell Thomas, Elmer Davis, Clay Morgan, Leif Eid, Quincy Howe, and others. With proper appreciation for profession tradition, you'll be taken into the radio newsroom where personnel, facilities, and news gathering methods are introduced.

Covers Vital Subjects
An entire Chapter is devoted to the extremely vital subject of news sources, both local, and regional, as well as national and world-wide. You'll learn practical methods of covering a news beat, interviewing, and dealing with tipsters and stringers, plus how to develop the local angle and maintain a future file. From there, the author delves into radio news basics and on-air presentation, including in-depth sections on evaluating news, writing, style, and the fine points of newscast mechanics. To help develop a professional on-air delivery, the basics of voice and diction, microphone technique, and reading are fully treated. Then, so that a newsman may acquire a familiarity with on-the-scene reporting, there is a Chapter on mobile news units and their operation. Since the popularity of broadcast editorials is steadily increasing, the Chapter on editorializing fills a virtual void with what is perhaps the only existing set of basic guidelines on the subject. Described are editorial forms, how to editorialize, when to broadcast editorials, handling reaction and rebuttals, political editorials, editorial subjects, plus 18 sample editorials. Of particular value to newsmen who will cover court news — and most will at some time during their career is a Chapter dealing with law, courts, and radio news. Explained are privacy rights, privileged information, and an in-depth description of civil and criminal court procedure.

Exclusive Data on Editorials
Included for ready reference are glossaries of legal and news terms, the code of ethics of the Radio Television News Directors Assoc. news program standards of the National Association of Broadcasters. Truly, a newsman, regardless of professional status, or a newsroom should not be without a copy of this volume.

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FROM THE EDITOR

Competition From ITV

ITV or instructional television, as distinguished from ETV or educational television, which is becoming more adult and less student, has generally been ignored by those in broadcasting as closed circuit TV. It has been assumed that ITV uses local teacher talent and does not have aspirations to do professional broadcast quality work. This assumption should be dropped as we will point out in a moment.

ETV broadcasting has always been similar to commercial broadcasting. ETV operations have generally had more manpower than dollars and hence the mode of operation of some ETV stations has differed from commercial stations. However, when the ETV station isn't closely linked to a university, it faces the same problem as commercial stations—a shortage of trained technical help and never quite enough in funds to do what the staff would like to do. It appears that funds will become more available in the future for ETV as the Corporation for Public Broadcasting comes into being, making ETV stations more competitive than in the past. In fact, some ETV stations will be better heeled than some struggling independent commercial stations.

Thus, the competition of the public or quasi-public sector with the private sector will increase. Most new competition may very well come from elementary and secondary schools, both public and parochial. Some individual school systems are now producing several channels of information simultaneously. Six and seven channels are being distributed on a regional or intra-school basis by some. At this stage of development, one can't predict whether every individual system will do its own programming or whether a few central programming centers will evolve. If the latter occurs, it will mean less emphasis on ETV broadcasting and more on program production—for exhibition whenever a school needs it. Whatever the turn of events, there will be more competition for professionals. We hope the competition will be constructive and not destructive.

In another area of competition—cable versus on-air signal distribution—the forces at work appear more interested in destruction rather than healthy competition. (The meeting of broadcasters and CATV interests in Washington in mid-July is an exception.) At the recent NCTA convention, broadcasters were made out to be enemies of the public, rather than the sustaining placenta to which the giant coax umbilical must be connected. In fact, broadcasters weren't included in the petitions for blessings made by those delivering the daily invocations. Only once in three days was any favorable recognition given others in the communication industry and this came in the form of applause during Commissioner Loevinger's address when he congratulated the networks for a fine job in news reporting. There is too much "see you in court" thinking today to please us.

James A. Lippke

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The Year-'Round Lavalier

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So we developed a "nesting" principle of construction that is based on tolerances so tight that the internal element acts as a solid mass, reducing damage due to shock. And we use nothing but Acoustalloy® diaphragms . . . almost indestructible despite heat, humidity, dirt, or high intensity noise or shock.

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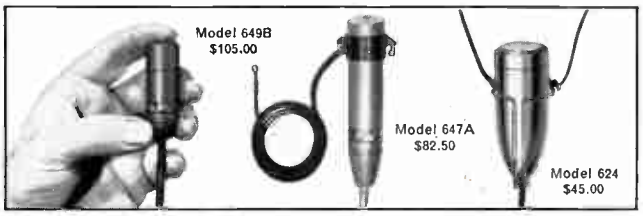

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