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BROADCAST MANAGEMENT/ENGINEERING

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The 212J-1 is completely solid-state. It offers four input channels for monophonic audio mixing, one output channel, monitor switch, cue mixing and speaker muting. Protective cover panels can be attached easily for transportability.

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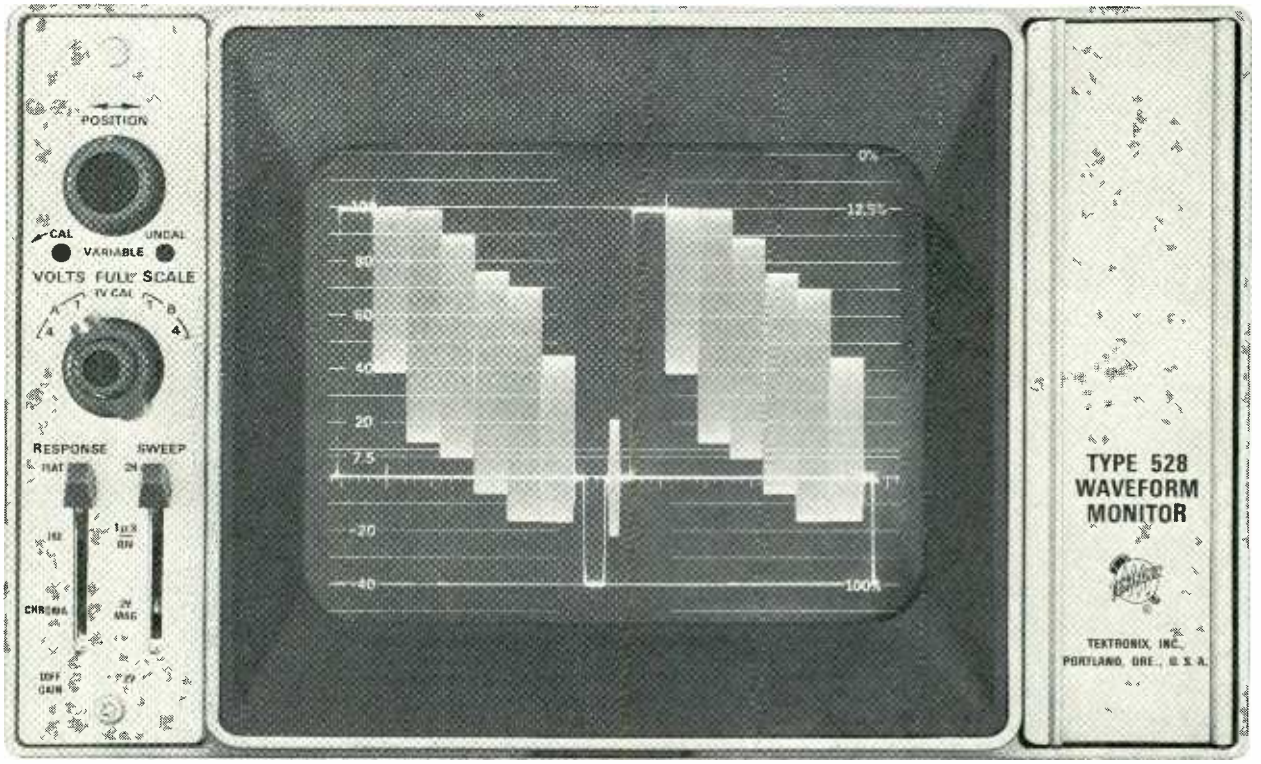
COLLINS

COMMUNICATION / COMPUTATION / CONTROL

Circle 100 on Reader Service Card

COMPACT, SOLID-STATE waveform monitor from TEKTRONIX®



3/4 Actual Size

general purpose video signal monitor

The Tektronix Type 528 solid-state Waveform Monitor is ideally suited for monitoring waveforms from camera outputs, video system output lines, transmitter video input lines, closed-circuit TV systems and educational TV systems. This compact instrument requires only 5 1/4-inches vertical and 8 1/2-inches horizontal mounting space.

Either of two video inputs, selectable from the front panel, may be viewed on the 8 x 10-cm screen. The video signal being displayed is provided at a rear-panel connector for viewing on a picture monitor.

Calibrated, 1-volt and 4-volt full scale deflection factors provide convenient displays of typical video and sync signal levels. A variable control provides uncalibrated full scale deflection factors from 0.25 volts to 4.0 volts. FLAT, IRE, CHROMA, and DIFF GAIN vertical amplifier response positions permit rapid observation and measurement of waveform characteristics. A slow-acting DC Restorer maintains a constant back porch level despite changes in signal amplitude, APL or color burst and may be turned off when not needed.

Sweep modes are: 2 V SWEEP (two field), 2 V MAG SWEEP (expanded two field), 2 H SWEEP (two line) and 1 μs/div SWEEP (calibrated sweep with accuracy within 3%). Internal or external sync is selectable. Provision is made for YRGB and RGB displays. Nominal 1-volt drive for picture monitor is provided on rear panel.

This lightweight waveform monitor converts to a portable unit for field service applications by simply adding an optional protective cabinet. An optional Rack Adapter permits side-by-side mounting of 2 Type 528's.

Your Tektronix Field Engineer will be happy to demonstrate this solid-state waveform monitor on your premises at your convenience. Please call him, or write: Tektronix, Inc., P.O. Box 500, Beaverton, Oregon 97005.

Type 528 Waveform Monitor	$890
Type 528 Mod 147B (with protective cabinet for out-of-rack applications)	$920
Rack Adapter for mounting 2 Type 528's side-by-side (016-0115-00)	$ 85

U.S. Sales Prices FOB Beaverton, Oregon

Tektronix, Inc.

committed to progress in waveform measurement

Circle 101 on Reader Service Card

JANUARY 1970/VOLUME 6/NUMBER 1

BM/E

BROADCAST MANAGEMENT/ ENGINEERING

This month's cover: Today's transmitters are so stable that virtually unsupervised operation is not only possible, it goes on all the time. That guy snoozing away when he should be keeping the log is symptomatic of the uselessness of keeping full-time engineers at the transmitter site. And hovering overhead is the omniscient presence of the FCC, trying to enforce outmoded rules in this cover design by Art Sudduth. For more on today's transmitters, see pages 31-43.

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BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities. These facilities include a-m, fm, and TV broadcast stations; CATV systems; ETV stations, networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others are: U.S., its possessions and Canada—$10.00 one year, $18.00 two years; elsewhere—$15.00 one year, $25.00 two years.

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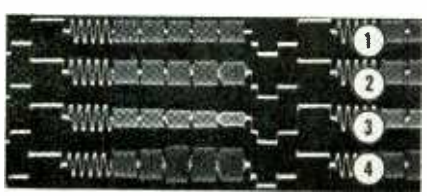
Proof that DYNA-TUNE can cure many of your head-end headaches.

Now you can have high-fidelity off-the-air color from your head-end. Utilizing completely new filtering and signal-restoration concepts, the DYNA-TUNE provides superior adjacent-channel color performance in either microwave-fed or demod-mod systems. These important developments allow the DYNA-TUNE to actually improve the color signals in many critical areas over that produced by the broadcast RF transmission system.

You can also forget the problems inherent in outdated tube-type tuners . . . the DYNA-TUNE uses a field-effect front end and the latest in integrated circuits to provide performance and reliability previously unattainable in this type of equipment. A completely new approach to off-the-air color . . . for only $1275 (fixed-tuned model $1350).

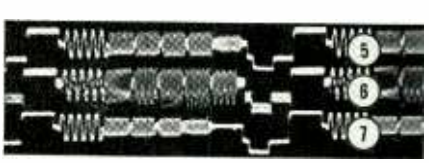


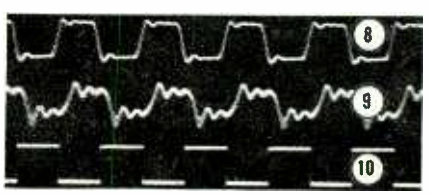
COMPARATIVE TESTS

The unique color compensation function of the DYNA-TUNE is evident in waveforms 1 through 4. The test set-up for these waveforms consisted of an off-the-shelf DYNA-MOD modulator supplying a modulated 4.2-MHz multiburst signal to the DYNA-TUNE. Waveform 1 is the output of the multiburst generator. Waveforms 2 through 4 are the demodulated outputs of the DYNA-TUNE with (*2*) proper compensation, (*3*) no compensation (note the inherent roll-off in the higher frequencies) and (*4*) overcompensation, such as might be desirable to compensate for remodulation. All waveform photographs were taken with the tuner oscillator set for maximum aural rejection.

Waveforms 5 through 7 show the results of a conventional CATV demodulator tuned for the best overall picture (note the roll-off in the color region). Waveform 6 was taken with the demodulator tuned for the best 4.2-MHz response (note overall distortion, including degradation of sync pedestal) and waveform 7 was taken with the demodulator tuned for best overall sync. Remodulation of this output would result in even further degradation.

Another significant indication of the superior overall frequency-response characteristics of the DYNA-TUNE can be seen in waveforms 8 through 10. In this test set-up, the multiburst signal was replaced with a 500-kHz squarewave. Waveform 8 was taken at the output of the DYNA-MOD/DYNA-TUNE combination and waveform 9 was taken at the output of a conventional CATV demodulator driven by the same DYNA-MOD. Waveform 10 is the squarewave source. (Note the overall improvement in ringing and overshoot in waveform 8.) No external envelope-delay correction equipment or filters were used when performing any of the above tests.





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BROADCAST INDUSTRY NEWS

Senate, NAB fume over cigarettes

The future of cigarette advertising on television and radio, a question that looked six months ago like it might be worked out among the numerous private and government groups involved, now may be decided by Congress alone; for the Senate has passed a bill to outlaw cigarette advertising on TV and radio after January 1, 1971.

The Senate bill, a revised version of what the House passed last June 18, would prohibit the FTC from requiring health warnings in print advertising until July 1, 1971, and would require all cigarette packages to have a new label: "Warning: Cigarette smoking is dangerous to your health." The final version of the bill hadn't been worked out yet by the joint Senate-House conference committee at press time.

The Senate Commerce Committee led the way for the mid-December Senate floor vote on the issue when it passed 10-9 last November a bill that ignored the broadcast industry's early November offer to phase out cigarette ads by September 1, 1971, (two years earlier than its original offer) and the tobacco industry's offer to withdraw broadcast advertising voluntarily by September 1, 1970, if it were granted antitrust immunity.

Aimed more at the pending FTC regulation which would require mandatory health warning in cigarette advertising than at the FCC proposal to bar cigarette advertising from the air, the House bill called for a six-year prohibition of any mandatory health warning. It would have changed the present label law, "Caution: Cigarette smoking may be hazardous to your health," to read: "Warning: The Surgeon General has determined that cigarette smoking is dangerous to your health and may cause lung cancer and other diseases." (See *BM/E*, July, 1969, p. 11.)

Soon after the House proposal, the NAB Boards agreed on a plan for cutting out cigarette advertising over a four-year period—by September 1, 1973. But it was soon scooped by the cigarette manufacturers' offer to cancel broadcast cigarette advertising by next September if Congress would exempt an agreement to do so from antitrust laws. (See *BM/E*, August, 1969, p. 6.)

Upon studying the original Senate bill, the NAB executive committee passed a resolution that opposed the bill as "discriminatory, inadvisable and unnecessary" and urged Congress to allow broadcasters to regulate themselves by removing broadcast cigarette advertising voluntarily by next September.

KEMO-TV becomes western power

With its recent installation of new transmitter and antenna equipment, KEMO-TV, San Francisco, has an effective radiated power of 5MW and is the highest powered TV station in the west.

Owned by U.S. Communications Corporation, KEMO-TV has a General Electric 110 kW transmitter (TT-62 A/B), the first in service anywhere, coupled with an RCA antenna (TFU-30JDAS). The antenna is directionalized, pointing the signals to the north, east and south.

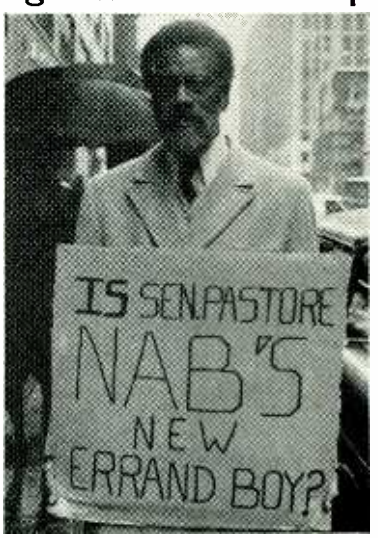
The other 5MW station in the U.S., WCCB-TV, Charlotte, uses a 100 kW transmitter with a higher antenna gain factor.

FCC clears up rule on educational fms

In response to a request by WBAI-FM, Inc., licensee of fm station WBAI, New York City, a noncommercial educational station operating on an unreserved or "commercial" channel, the FCC has ruled that such stations are subject to educational fm rules except for allocations and assignments and equipment performance measurement requirements.

As of September 30, there were

BEST takes its fight to NAB doorstep



On last December 1, while Senator John O. Pastore (D-R.I.) was refuting a black protest group's charge that the bill he introduced on license renewal, S.2004, is "a racist bill," some members of that organization called BEST—Black Efforts for Soul in Television (see *BM/E*, November, 1969, pp. 8, 11)—were picketing NAB code board offices in New York City and in Washington, D.C. During New York's first snowfall of the winter, New York BEST chapter chairman, independent TV and radio producer Emile Jones (above), passed out BEST's position paper along with two young women in front of the NAB's Madison Avenue office building. The paper referred to the "built-in racism in the television industry," and said that "black people have not been and are not today involved in the decision making apparatus of the broadcasting industry." The BEST position paper called the Pastore Bill "another Congressional charade that attempts to keep the industry safely in the grips of monopolistic and politically selfish white owners." Jones said that the New York picketers had been stood up by the networks, WPIX, WOR-TV and the Associated Press, and he accused them of what they had accused Vice President Agnew. "I didn't expect them to come, because I'm talking about them," said Jones. The networks said they knew nothing about it.

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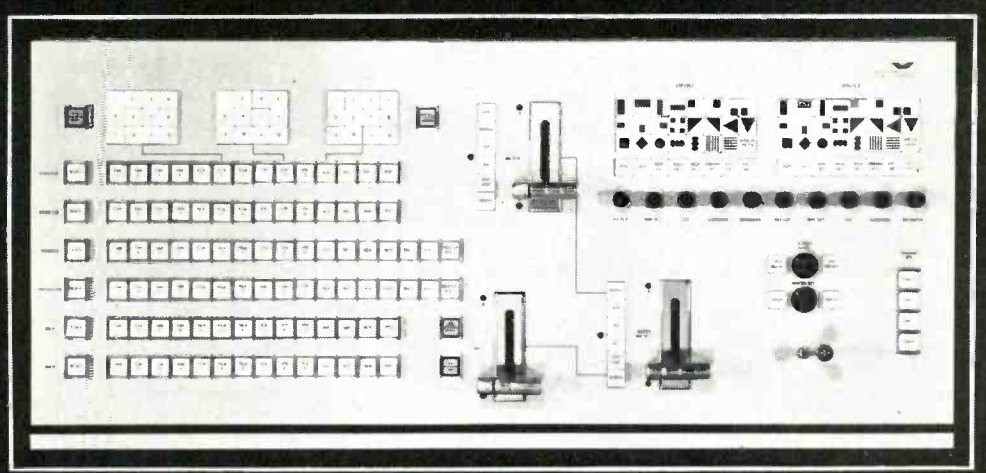
in video switching and effects systems is Vital



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The Vital VIX-108 vertical interval switching system uses the latest state of the art electronics and is production-oriented in design. All electronic components such as effects, mixers, delays, proc. amps., etc. are designed and manufactured by Vital Industries, Inc. for total system responsibility. We custom-build a switching system to reflect your station's personality rather than govern your production expressions by the limitation of the equipment.

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- Fade to monochrome, maintain color burst or choose to drop color burst. Only one reshaped burst and constant level sync during all dissolves.
- Custom built production or routing switching with the latest state of the art accessories designed as an integrated system are all furnished by Vital Industries, Inc.

OTHER VITAL PRODUCTS:

- VSE-2000 Special Effects
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2053 commercial fm stations and 385 educational fm stations on the air. Although Commission rules say that educational fm stations operate on certain reserved or "noncommercial" channels, 18 educational fm stations including WBAI operate on "commercial" channels.

The FCC said it wasn't applying the requirement, however, to 10-W educational fm stations because they are designed to be very inexpensive operations and "in view of the low power involved, it appears that continuing exemption from this requirement should be granted for them."

Interconnections abound in 1969

It looks like 1969 was the year for interconnections. For not only did the FCC then authorize a microwave network and encourage CATV interconnection; but towards the end of the year, it permitted the establishment of both a temporary and permanent college radio network and made way for an educational television network.

The Intercollegiate News Network was formed on a temporary basis last November by American University's WAMU(AM) and Georgetown University's WGTB-FM to feed coverage of the second Vietnam moratorium in Washington, D.C., to 150 college campuses. WAMU's fm sister originated its own programming through the a-m feed for Eastern Educational Radio Network, of which WAMU(AM) is a member.

A more permanent counterpart of this alliance is an "all-night radio network." Proposed by WFIB (AM), run by students at the Conservatory of Music of the University of Cincinnati, the campus network was okayed initially by the Commission to operate daily from 12 midnight to 8 a.m. during school terms, transmitting its programming via AT&T lines to about 60 other eastern and central college radio stations.

At the request of the Corporation for Public Broadcasting, the FCC ruled on interconnection rates for educational broadcasting in early November. While saying that public interest requires that free or reduced rate interconnection services be provided for public broadcasting, the Commission also said that any provision for interconnection that permits preemption or a lower priority for public broadcasting is contrary to the requirement that interconnection be comparable "in all material respects" with service furnished commercial users.

Following the Commission ruling, the CPB established the Public Broadcasting Service to manage programming time on existing TV interconnection. While discussing this at the NAEB Convention in November, educational broadcasters assured at least one interconnection for 1970—educational radio networking.

Happy birthday to you, you, you and you

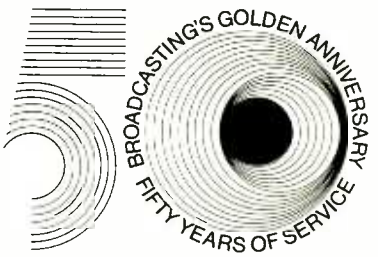
It's been 50 years since broadcasting began as wireless telephony, and for its year-long anniversary celebration, the NAB has had a special logotype designed. Unlike memorabilia that bear the inscription of the historic date or name, this has none. It can't, because at least four radio stations claim distinction as the first to broadcast on a regular schedule.

Vying for the title are: KQV and KDKA, Pittsburgh; CFCF, Montreal; and WWJ, Detroit. KDKA sets the date as November 2, 1920—four years after it started operating experimentally and the night it announced election results of the Harding-Cox contest. KQV is said to have begun operation in 1919.

Known then as XWA, CFCF places its inception as the fall of 1918 when test experiments were carried out from the Marconi Wireless Telegraph Company factory building, and records regular programs as starting December, 1919. WWJ says it started on a regular basis from August 31, 1920. Perhaps in a class by itself is KCBS, San Francisco, which claims it was just first on the air, as KGW, San Jose, on April 3, 1909.

CFCF has found a supporter in E. A. Weir, who wrote in *The Struggle for National Broadcasting in Canada* that "there seems no doubt that both stations [KDKA and WWJ] were antedated by XWA . . . Indeed, it would appear that CFCF is the oldest regularly operated broadcasting station in the world." During its celebration at the end of 1969, the station publicized itself as "the first radio station anywhere to reach a half-century of uninterrupted service in a single broadcast market."

Regardless of which claim is correct, station records probably concur on early programming composed of weather reports and phonograph records played on a wind-up Victrola. XWA, "merely a box of wireless telegraph equipment in the corner of the factory building," aired a small Swiss music box as one of its first musical sounds. By 1923, the station had tried remote broadcasting—it programmed the yacht races from Lake St. Louis via a portable, hand-cranked transmitter. Sound familiar?



For anyone interested in celebrating with the NAB's 50th Anniversary design, reproduction proofs and matrixes are available without charge from: Public Relations Service, National Association of Broadcasters, 1771 N St., N.W., Washington, D.C. 20036. Ask for Lewis Roberts' metallic gold, W-28249.

Europe, Africa could get satellite system

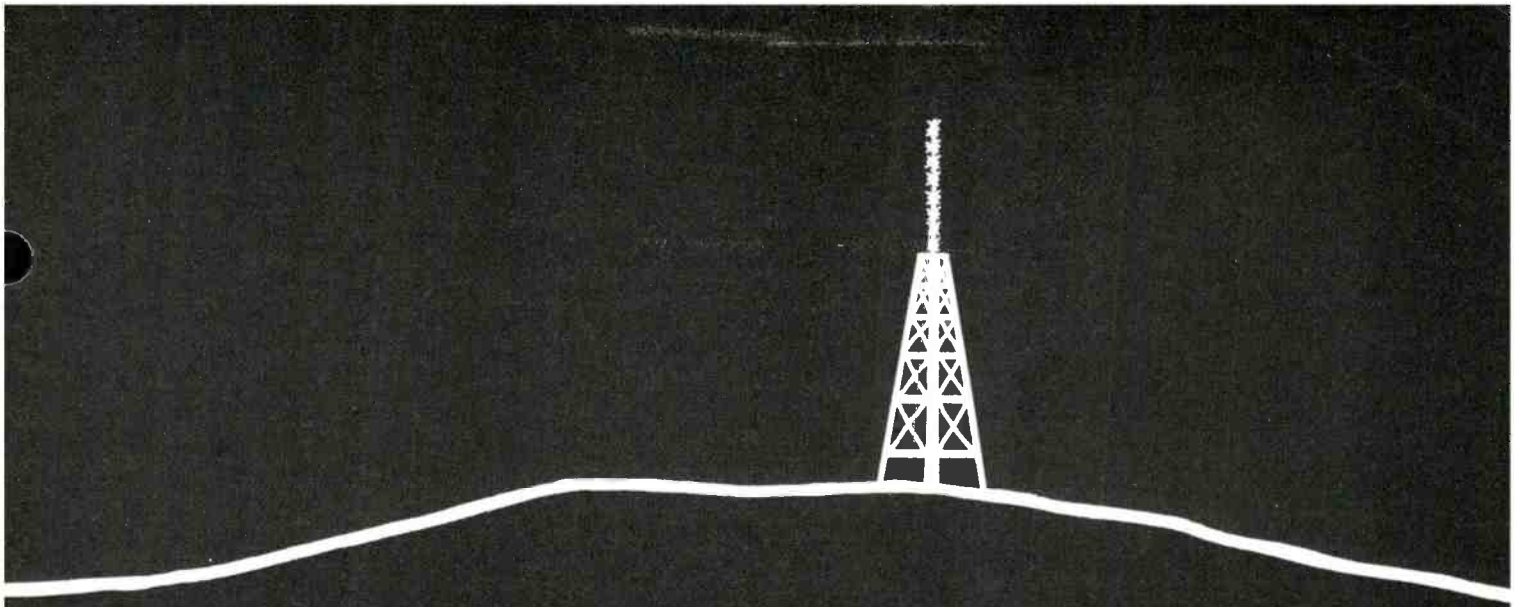
Communications and electronics firms representing Britain, Sweden, Italy, France, the Netherlands and West Germany, have formed a consortium to create a domestic satellite communications system for Europe and Africa.

Called Communications European Satellite Team (Comest), the group has already placed a bid with the European space agency that requests operation by the European Broadcasting Union, which operates the Eurovision TV and radio network. The proposed system would provide two color television programs and 10 sound channels between a satellite and ground terminals in Europe and Africa.

Kaiser moves into fm

In late October, Kaiser Broadcasting heralded its fm expansion by announcing an fm stations' division. Kaiser Broadcasting has been operating six television stations, one a-m and two fm radio stations.

To be headed by WJIB General Manager Peter C. Taylor, the new



Varian klystrons hold back the cost of doing business.

You might say that UHF TV klystrons from Varian cost about a buck an hour. Although Varian warrants its UHF TV klystrons for 5,000 hours video, their average operating life is 8-9,000 hours . . . at an average cost of about $9,000 per tube. If that's not a bargain, think of the UHF stations that get 20,000 hours per tube, or the one in Texas that's logged over 30,000 operating hours on one tube.

It's a fact that since the first commercial UHF TV station went on the air back in the '50's, Varian has more than doubled the operating life of UHF TV klystrons. And the price hasn't changed much since then. No wonder over 90% of the stations use Varian tubes.

varian
palo alto tube division

You can get all the figures on Varian klystrons from any one of the more than 30 Electron Tube and Device Group Sales Offices around the world. Or write the Palo Alto Tube Division, 611 Hansen Way, Palo Alto, California 94303.

Circle Reader Service Number 36.

division was spurred by the success of Kaiser's two fm stations—KFOG, San Francisco, and WJIB, Boston; KFOG is usually among the top 10 radio stations and is said to be the top Frisco fm-er. WJIB ranks among the top five Boston radio stations and is said to be the top Boston fmer. Both are programmed 24 hours a day with "adult-album music," minimal talk and commercial interruption; commercials are held to a maximum of six minutes an hour.

"Kaiser has approached fm not as special or distinct from a-m, but simply as radio," said Taylor. "We will adhere to this approach in the development of fm stations in new markets."

NBC Radio loses, gains Philly affiliate

In October, NBC Radio broke even on affiliation in Philadelphia —WPEN(AM) disaffiliated and WFLN-AM-FM took its place.

Independent stations WFLN-AM-FM affiliated with NBC Radio on October 1. Owned by Franklin Broadcasting Company, WFLN (AM) operates on 900 kHz with 1 kW days; WFLN-FM operates on 95.7 mHz with 50 kW.

Upon canceling its NBC contract, WPEN(AM) affiliated with ABC's American Entertainment Network. Licensed by William Penn Broadcasting Company, it operates on 950 mHz with 5 kW.

Black Audio Network takes over Soul News

With the late October acquisition of Washington, D.C. facilities of the Soul News Network, the Black Audio Network (see *BM/E,* July, 1969, p. 11) now has the largest world-wide news gathering staff of any black news service.

MCI goes west

MCI Pacific Coast Inc., the newest system in a projected microwave network that proposes to lease customized channels on a common carrier basis, has announced its application to the FCC for permission to provide service between San Diego and Seattle.

The west coast system would use 54 microwave radio towers to link major coastal industry areas, including San Diego, metropolitan Los Angeles and San Francisco, the San Joaquin Valley and Sacramento, up through Salem and Portland, Oregon, to Tacoma and Seattle-Everett, Washington. Initial cost of the microwave system was reported as $6 million.

Ability to interconnect with MCI-type common carriers presently under FCC consideration is central to the new system. The west coast company would join with the MCI-proposed New York-to-Chicago hookup, also coordinated through Microwave Communications of America, Inc., a national service organization based in Washington, D.C. (See *BM/E,* November, 1969, pp. 6-8.)

Want a contest? try graffiti

A highly successful audience-involvement contest run by San Francisco fm-er KIOI (K-101) invited listeners to send in original (or at least not widely circulated) graffiti. Since most graffiti originate on the walls of rest rooms, many would not be readable on the air as such. Contest winners were both readable and inspiring. Here are a few culled from K-101's "Top-40" list:

"Hippiness is a warm poppy."
"Unzipped mail is immoral."
"Julia Child eats TV Dinners."
"Lester Maddox: 'There's a black agitator in your washing machine.'"
"Draft graduate students—care enough to send the very best."
"J. Edgar Hoover sleeps with a night light."
"Socrates drank himself to death."
"Cinderella's prince had a foot fetish."
"If you have excess acid, throw a party."
"Wilt Chamberlain wears elevator shoes."
"Pythagoras knows all the angles."
"Chinese fishermen are junkies."
"Mummies are Egyptians who were pressed for time."
"Seismologists are fault-finders."
"The Pope is a pill pooper."

The station's promotion director, Terry Smith says that more than 6000 individual entries were received. Every week, 20 winners were each awarded two bottles of champagne; the best entry of each week received a cash prize of $101.00. Visit any good rest rooms lately?

Attention TV Stations:

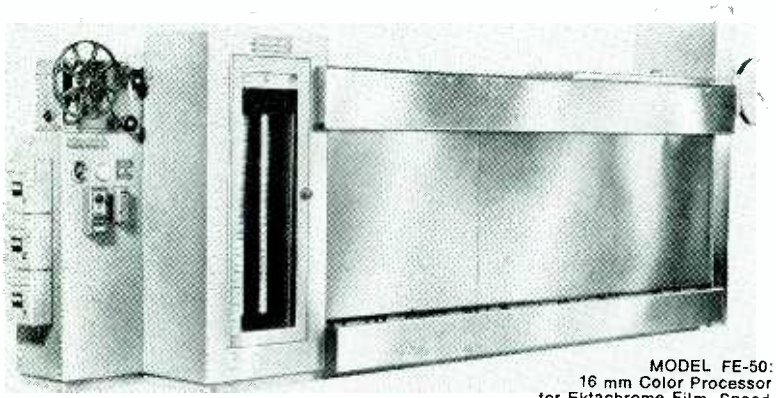
We've got news for you!

FILMLINE'S professional color film processors now available for TV NEWS

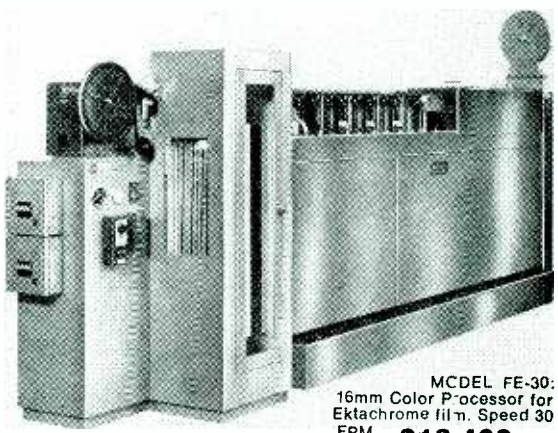
The FILMLINE Models FE-30 and FE-50 are exciting new color film processors designed specifically for use in television station news departments. The design is backed by Filmline's reputation as the world's leading manufacturer of professional film processors for the commercial motion picture laboratory industry.

Now for the first time the television industry can enjoy the benefits of professional caliber equipment incorporating exclusive FILMLINE features that have paced the state-of-the-art in commercial laboratories, at a cost lower than processors offering less.

After you check these exclusive Filmline features you'll want to install a Filmline processor in your news department ***NOW!***



MODEL FE-50: 16 mm Color Processor for Ektachrome Film. Speed 50 FPM. **$22,500**



MODEL FE-30: 16mm Color Processor for Ektachrome film. Speed 30 FPM. **$16,400**

- **"FILMLINE OVERDRIVE FILM TRANSPORT SYSTEM"** This marvel of engineering completely eliminates film breakage, pulled perforations, scratches and operator error. The film can be deliberately stalled in the machine without film breakage or significant change of film footage in solutions. The heart of any film processor is the drive system. No other film drive system such as sprocket drive, bottom drive or simple clutch drives with floating lower assemblies can give you the performance capability of the unique Filmline Overdrive Film Transport System.
- **"TORQUE MOTOR TAKE-UP"** gives you constant film take-up and does not impose any stress or strain on the film itself. Completely independent of the film transport system. This FILMLINE feature is usually found in professional commercial processors but is incorporated on the FE-30 and FE-50 models as standard equipment. Don't settle for less!
- **"TEMP-GUARD"** positive temperature control system. Completely transistorized circuitry insures temperature control to well within processing tolerances. Temp-Guard controls temperatures accurately and without the problems of other systems of lesser sophistication.
- **"TURBO-FLOW"** impingement dryer. Shortens dry-to-dry time, improves film results, and carefully controls humidity content of your valuable (and sometimes rare) originals. Immediate projection capability is assured because the film dries flat without the usual curl associated with other film processors.
- **"ZERO DOWN TIME"** The reputation of any film processor is only as good as its reliability. The combination of the exclusive and special added Filmline features guarantees trouble-free operation with absolute minimum down-time and without continual operator adjustments. Recapture your original investment in 2 years on maintenance savings alone. Filmline's "Push the button and walk-away processing" allows inexperienced operators to turn out highest quality film.
- **"MATERIALS, CONSTRUCTION AND DESIGN"** All Filmline machines are constructed entirely of metal and tanks are type 316 stainless steel, heliarc welded to government specifications. The finest components available are used and rigid quality control standards are maintained.

Compare Filmline features to other processors costing more money. Feature-by-feature, a careful evaluation will convince you that Filmline offers you more for your investment.

Additional Features included in price of machine (Not as extras).

Magazine load, daylight operation ■ Feed-in time delay elevator (completely accessible) ■ Take-up time delay elevator (completely accessible) ■ Red brass bleach tank, shafts, etc. Prehardener solution filter ■ Precision Filmline Venturi air squeegee prior to drybox entry ■ Air vent on prehardener ■ Solid state variable speed D.C. drive main motor ■ Bottom drains and valves on all tanks ■ Extended development time up to two additional camera stops at 50 FPM ■ Pump recirculation of all eight solutions thru spray bars ■ Temperature is sensed in the recirculation line ■ All solutions temperature controlled, no chilled water required ■ Built-in air compressor ■ Captive bottom assemblies assure you constant footage in each solution ■ Change over from standard developing to extended developing can be accomplished in a matter of seconds ■ Impingement dryer allows shorter put through time.

Partial listing of Filmline Color Installations: — NBC- New York, NBC- Washington, NBC- Cleveland, NBC- Chicago, CBS & ABC Networks, Eastman Kodak, Rochester.

Laboratories: De Luxe Labs, General Film Labs (Hollywood), Pathe-Labs, Precision Labs, Mecca Labs, Color Service Co., Capital Film Labs, Byron Film Labs, MGM, Movie Lab, Lab-TV, Technical Film Labs, Telecolor Film Labs, Guffanti Film Labs, A-One Labs, All-service Labs, NASA Cape Kennedy, Ford Motion Picture Labs.

TV Stations: WAPI-TV, KTVI-TV, WXYZ-TV, WTPA-TV, WBTV-TV, WEAT-TV, WMAL-TV, WSYR-TV, WDSU-TV, WVUE-TV, WJXT-TV, WTOP-TV, WAVY-TV, KTAR-TV, WTVR-TV, WFBC-TV, WMAR-TV, WCKT-TV, WAVE-TV, WCPO-TV, WAPA-TV, WCIV-TV, WJIM-TV, WWL-TV, KYW-TV, KETV-TV, WNBQ-TV, KSLA-TV, WSAZ-TV, WHP-TV, WHCT-TV, WTWO-TV.

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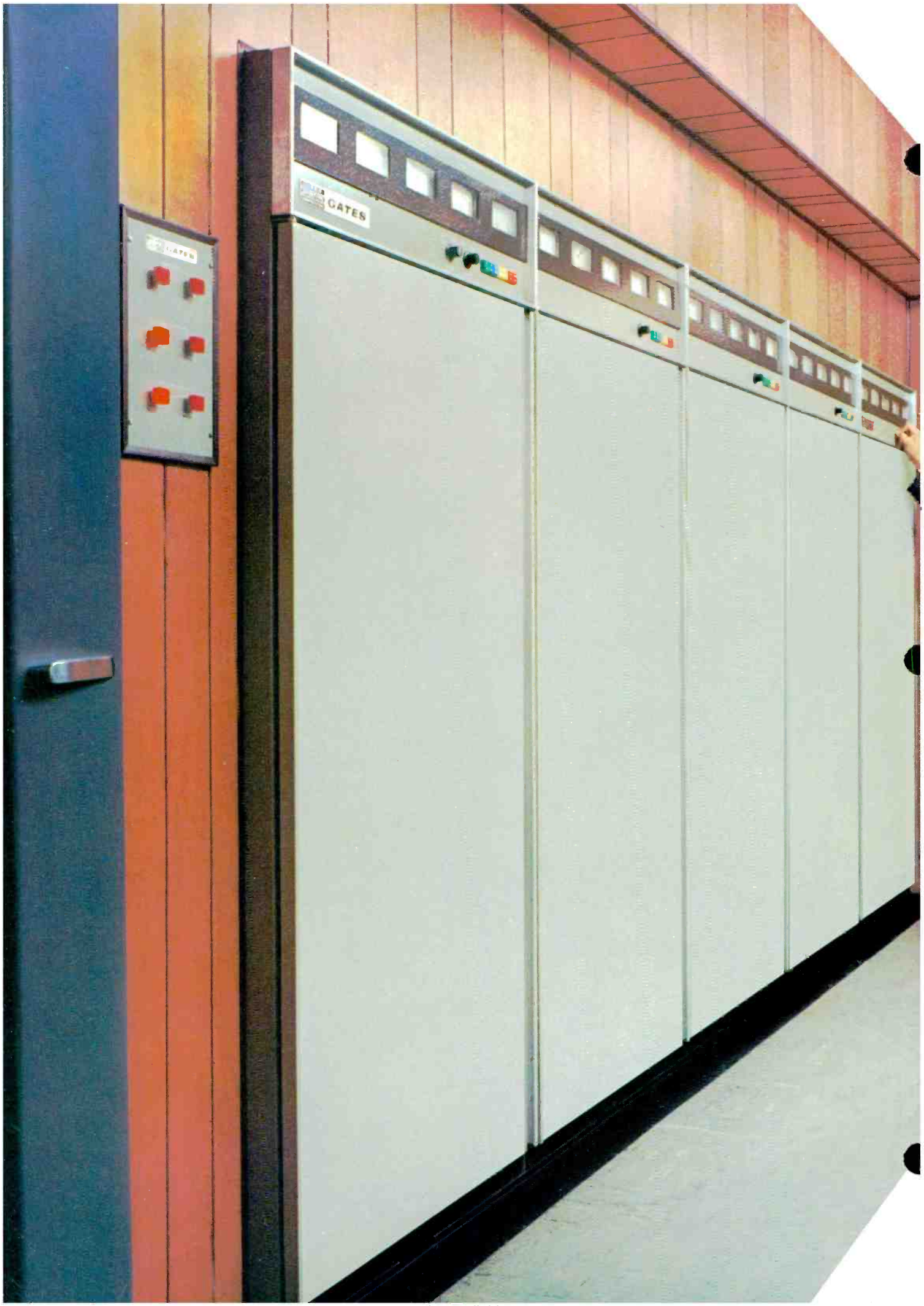


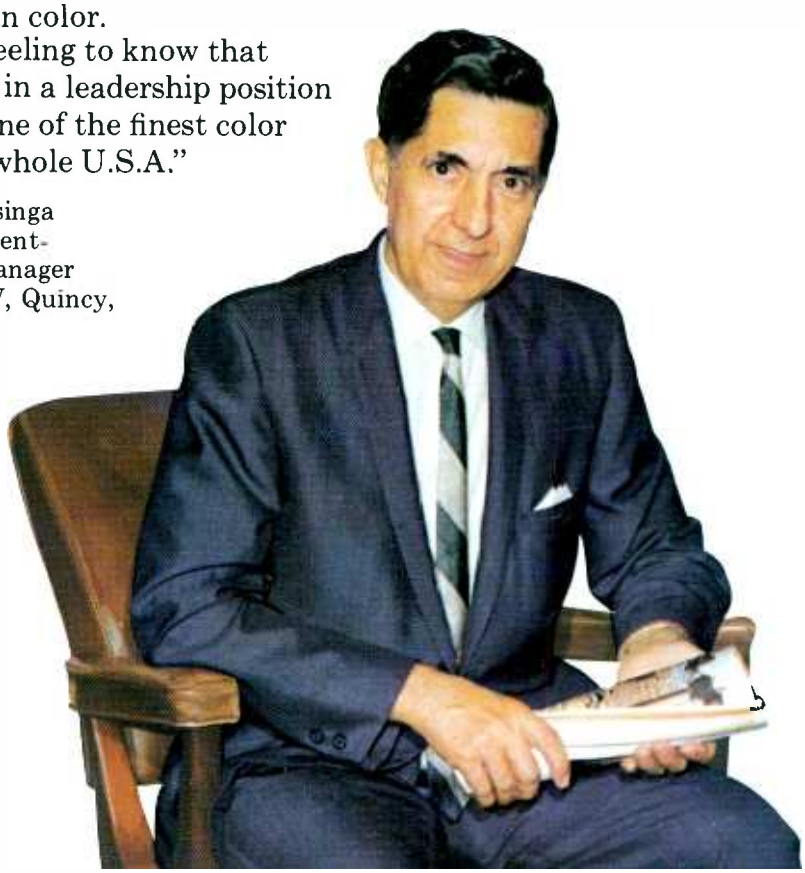
Look what WGEM-TV says about their new Gates 35 kW VHF TV transmitter

"To replace our 16-year-old equipment, we looked for a transmitter with superior color performance, solid state design, built-in reliability, and one which would be backed by a company with a solid reputation for service.
"Our new Gates transmitter not only met these four points, but as a bonus we obtained a 35 kW transmitter that was easy to install and took up less space than our old DuMont 5 kW driver. This enabled us to keep our former main transmitter right in place as an auxiliary."

Jim Martens
Chief Engineer

"We feel like real pacesetters placing on the air America's very first IF MODULATION TV transmitter.
"We switched over to our new Gates transmitter on Sunday, October 5, and immediately there was a noticeable improvement in color.
"It is a great feeling to know that WGEM-TV is in a leadership position transmitting one of the finest color signals in the whole U.S.A."

Joe Bonansinga
Vice President-
General Manager
WGEM-TV, Quincy,
Illinois



HARRIS INTERTYPE CORPORATION

GATES
A DIVISION OF HARRIS-INTERTYPE
123 Hampshire St., Quincy, Ill. 62301

FOCUS ON CATV

AT&T eases up on CATV

According to a letter sent in late October from AT&T Vice President D. E. Emerson to the FCC, the days of only one CATV system per utility pole are numbered.

AT&T Proposal

Besides providing for the attachment of "any communications system" to Bell-controlled utility poles and space for any lawful communications system lines in underground telephone conduits where it can "reasonably" be made available, AT&T would permit any CATV system to use transmission facilities for all types of service, irregardless of the cable system's method of attachment—its own lines or telephone channel service.

Although the Bell companies think their former policies were reasonable, wrote Emerson, "evolving circumstances have indicated that certain modifications may be appropriate."

FCC Response

In a letter to Emerson in late November, FCC Common Carrier Bureau Chief Bernard Strassburg wrote: "Inasmuch as this revised policy appears to contemplate public offerings on a nondiscriminatory basis, it presents the question as to whether such offerings constitute . . . any offering of interstate common carrier communications within the meaning of the Communications Act of 1934 for which tariffs are required to be filed with this Commission. If it should be the position of the Bell System that the provision of such facilities or services do not constitute . . . interstate common carrier communications . . . a further question is raised as to whether the provision of such facilities or services is or would be inconsistent with the requirements of the Western Electric Consent Decree, 13 RR 2143, Paragraph V. Accordingly, it is requested that you submit a memorandum of law within 30 days from the date of this letter . . ." At press time, AT&T hadn't sent a second letter to the Commission.

The AT&T letter didn't say whether the "modifications" it felt necessary had anything to do with a Supreme Court ruling that same day to uphold the Commission's 1968 order requiring telephone companies to apply for a certificate of public convenience and necessity before building facilities for CATV systems. The U.S. Court of Appeals for the District of Columbia had previously upheld the FCC in saying that state jurisdiction over such matters would fragment CATV regulations. Thirty-five affiliates of AT&T, General Telephone & Electronics Corporation, United Utilities Inc. and the National Association of Regulatory Utility Commissioners, had appealed the order in arguing that the federal government lacked regulatory authority because the service was intrastate.

NCTA's new president

Donald V. Taverner, 50-year-old former ETV executive, was scheduled to succeed Frederick W. Ford as NCTA president on January 1. President and board member of WQED and WQEX, Pittsburgh, since 1963, Taverner led Metro-

Donald V. Taverner

politan Pittsburgh Educational Television in winning awards sought by both commercial and educational television. Under his leadership, MPET's budget tripled from $600,000 to $2 million, staff grew from 60 to 145 and studio-office expanded into a $5.5 million complex built almost entirely through private funding.

Chairman of the CATV committee of the NAEB from 1966 to 1968, Taverner is chairman of the board of the Eastern Educational Television Network and a member of Sigma Delta Chi.

FCC gives CATV some air

In early November, the Commission authorized both the use of Community Antenna Relay Sys-

Continued on page 56

all solid state TELEVISION MICROWAVE RELAY LINKS for high quality color and monochrome TV systems

Use as rack mounted STL
or Remote TV Pick-up
or for Intercity Relay

- Meets EIA, CCIR, and FCC standards
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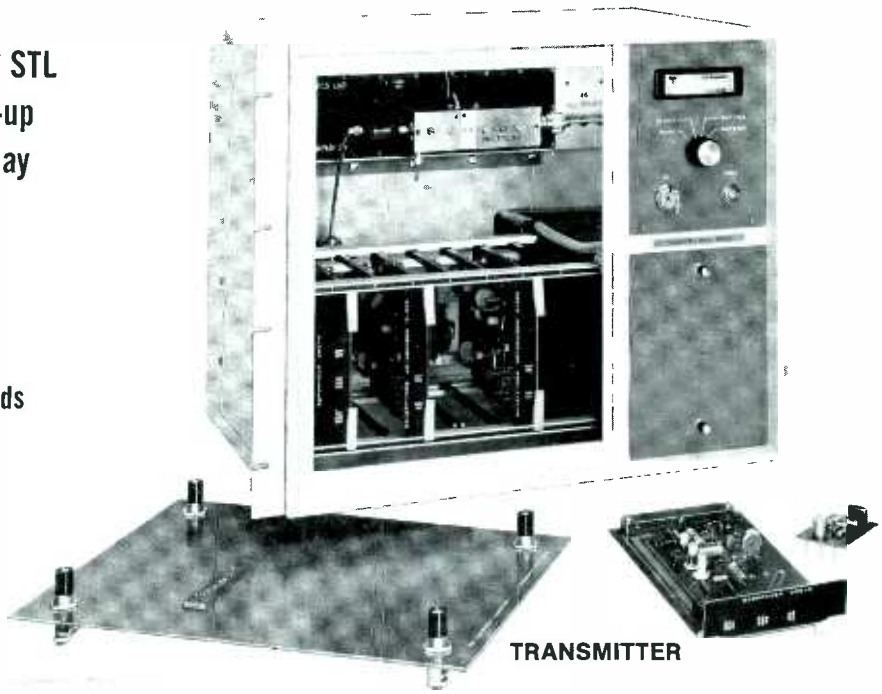
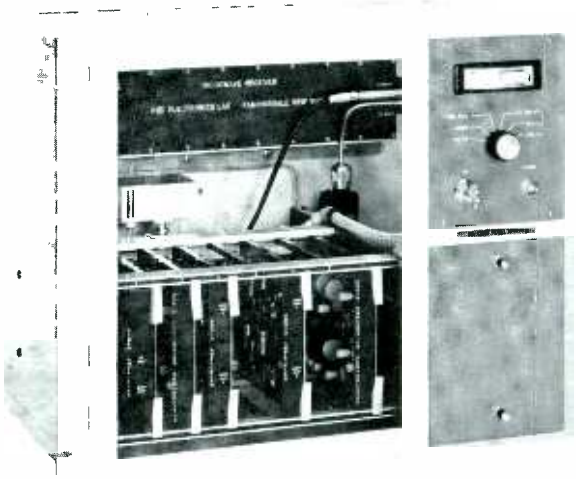


TRANSMITTER



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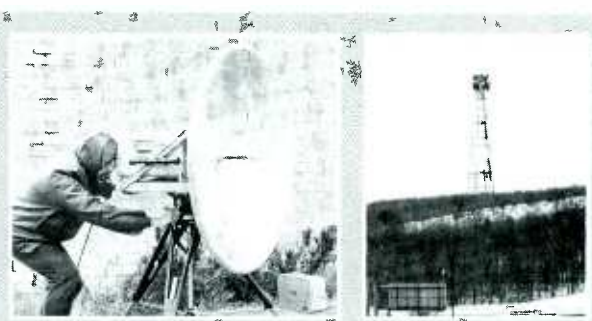
- Ferrite isolator
- All Solid State RF Module
- Key lock switch
- Removable power supply module
- Plug in pre/de-emphasis
- Plug in printed cards
- Optional audio subcarriers

RHG, a leading supplier of military TV relay links, now offers Series MRS to the broadcast industry. Transmitters and receivers, with advanced field proven designs provide solid state reliability, no warmup, and low power drain.

To improve your color transmission quality and to insure trouble free operation specify RHG equipment fully described in Bulletin 69C. Call for "no obligation" demonstration.



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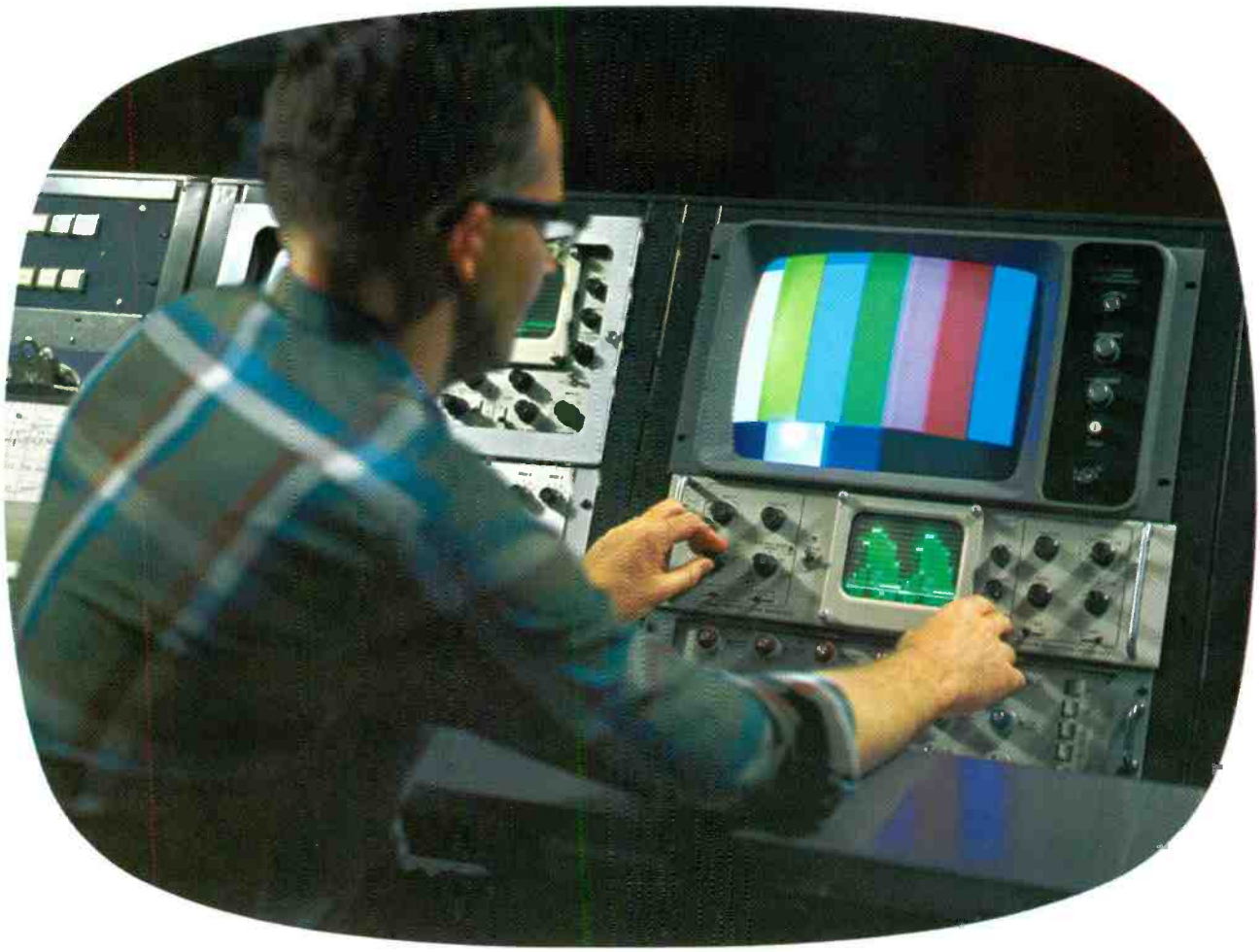
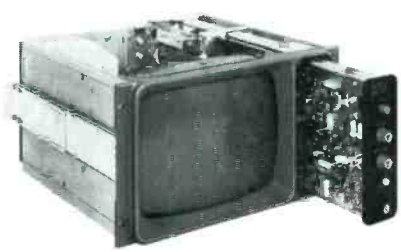
see it as it is



and know it will stay that way! When you use Ball Brothers Research Corporation's new TCB-14R color broadcast monitor, you know your color is true —that what you're seeing, your viewers (and your exacting program sponsors) are seeing, too.

Rare earth phosphors used in the 14-inch CRT display provide you with the truest colors possible today in a color monitor. Reds are really red—and flesh tones look like live flesh—not like muddy brown pancake make-up.

And once you have made your critical alignments—such as balancing separate color cameras—the highly stable TCB-14R monitor locks on without drift, so you know any change in color is the result of misaligned signals from other equipment—and not the result of instability in your color monitor!



The TCB-14R monitor is a unit only 10½ by 19 by 18 inches that fits in your studio console in the space you used for your black and white monitor—or in a small amount of space in your mobile units. In either location, all-solid-state circuitry gives you maintenance-free reliability, day-in and day-out.

As an added feature, frequently-used controls are on the front panel—which pulls out to expose the critical controls used in initial set-up and adjustment.

Get the same highly stable performance from your monitor you expect from your cameras. Get the Ball Brothers TCB-14R. For full specifications, write to Ball Brothers Research Corporation, Boulder, Colorado 80302.

BALL BROTHERS RESEARCH CORPORATION, BOULDER, COLORADO 80302
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BB9/1

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INTERPRETING THE FCC RULES & REGULATIONS

Financial Qualification Form Revisions

The Commission has revised the Financial Qualifications Section (Section III) which must be submitted as part of FCC Forms 301 (application for new station or change in existing station), 314 (transfer application) and 315 (assignment application.)[1] Effective since October 15, 1969, the Commission no longer accepts applications accompanied by the old Section III Form (see *BM/E*, August, 1967, pp. 14-18). *Applicants should therefore destroy all old forms and secure new FCC Forms 301, 314 and 315.*

Ultravision Revisited

Revised Section III is the Commission's latest attempt to ascertain an applicant's financial ability to operate a broadcast facility in the public interest.

During the 1930's and 1940's the Commission merely required applicants to meet costs of construction and expenses for operation of the station over "a reasonable extended period of time."[2] With the phenomenal growth of TV and fm in the 1950's, the Commission found it necessary to make the reasonable period of time more explicit by changing it to *the first three months' cost of operation.*[3] Then, as fm went stereophonic and the all-channel TV receiver legislation insured uhf reception on all new television sets, the Commission extended the period for meeting costs.

The famous decision in Ultravision[4] and subsequent actions by the Commission[5] established strict financial standards requiring new-station applicants (whether a-m, fm, vhf or uhf) to demonstrate "their financial ability to operate for a period of one year after construction of the station."[6] This strict standard, however, confused applicants and increased the already burdensome administrative workload. Many applicants unfamiliar with the Ultravision standard, or unable to meet it, had their applications delayed in the administrative process as the Commission was forced to write and rewrite applicants for additional financial information. The Commission therefore revised Section III to break the log jam. The new form was adopted February 26, 1969, subject to approval by the Bureau of the Budget. This approval was granted by the Bureau, and *the revised Section III is now effective.*

Section III Revisions

The most dramatic change in the three-page Section III revision is the striking "tabular format." The form has taken on the salient features of a regular balance sheet, requiring explicit and specific information about all items of construction costs, all possible sources of funds, as well as means and methods of financing the station.

The Commission believes that the new form (when properly executed) will *quickly tell the applicants whether or not they are financially qualified.*[7] This, the Commission hopes, should reduce the number of Commission requests for additional financial information from applicants.

Specific Item Analysis

On page one of revised Section III, *separate* cost figures must be entered for each of the following: *Transmitter, antenna system, rf generating equipment, monitoring and test equipment, program originating equipment, land cost, building cost, legal fees, engineering fees, installation costs* and *other costs.*

Obviously, the revised form requires applicants to break down construction costs carefully. No longer may "lump-sum" amounts be entered under "miscellaneous costs." The *basis of estimates* (as entered in the appropriate portions de-

1. Rpt. No. 8472, September 18, 1969.
2. Radio Enterprises, Inc., 7 FCC 169 (1939).
3. Sanford A. Schafitz, 24 FCC 363; 14 RR 582 (1958).
4. Ultravision Broadcasting Co., 5 RR2d 343 (1965).
5. Clarification of Applicability of new Financial Qualifications Standard Concerning Broadcast Applications, FCC 65-659 (July 7, 1965).
6. Id.
7. Id., at Fn. 1.

scribed above) must be sufficiently explained in *exhibit form*. New station applicants must also submit an exhibit showing *the complete itemization of cost of operation for the first year, including cost of proposed programming*.

Proposed Financing

Comparing the new and old Section III, applicants will readily see that much more complete information is now required as to *proposed financing*. The new provisions request not only available capital and loan information, but also specific details on deferred credit from equipment suppliers. The applicant must answer a series of direct questions about the specific amount of *down payment, first-year payments to principal* and *first-year interest*.

As in the past, applicants must submit exhibits setting forth the names of those individuals who will (or have) furnish funds for the operation and/or construction of the station.

Moreover, to get succinct information as to assets, the Commission now asks applicants to identify specific securities held, *the market or exchange on which they are traded, and their current market value*.

Accounts receivable may be treated as liquid assets; provided that such accounts have been aged and *certified collectable* within 90 days by a Certified Public Accountant. *However, only three-fourths of these certified-collectable accounts receivable may be treated as liquid assets.*

Conclusion

The Commission's new Section III is the latest refinement of the Ultravision doctrine and clarification of applicant financial requirements. Applications may now be granted without the delay caused by searching questions from the Commission. By properly executing the new section, an applicant should be able to avoid having a financial issue designated against his application if it is designated for hearing. Careful preparation should minimize many of the problems inherent in filing an application before a regulatory agency, as well as make the Commission's task of ascertaining financial qualifications relatively simple.

As in the past, the applicant must show that adequate funds are available to construct and operate the facility for *one full year without income*. If the applicant intends to rely on *projected revenues*, he must still provide accurate estimates and demonstrate the soundness of the figures submitted. All applicants (or potential applicants) for (1) a new station, (2) a change in existing station (especially where contemplated expenditures will exceed $5000) or (3) transfer or assignment, should familiarize themselves with the new Commission revisions relating to financial qualifications. The revised Section III (and FCC forms incorporating it) is now available from the FCC's Forms Distribution Office, Room B-10, 1919 M Street, N.W., Washington, D.C. 20554, or from your counsel. **BM/E**

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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The new 500-A Series reflects the concept that good design results in functional simplicity. This, combined with heavy duty construction and careful workmanship, has made these new recorders outstanding performers — assures you of dependable, trouble-free operation and long life.

Metrotech Recorders, Reproducers and Loggers — in networks and major stations everywhere.
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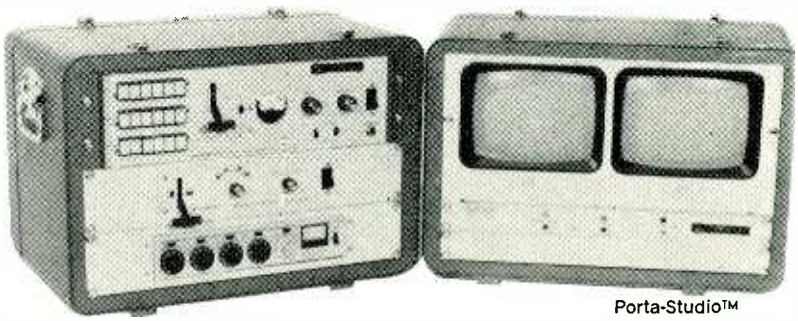
YOU CAN'T BEAT THE SYSTEM.

Our system.

TeleMation supplies broadcast-quality systems to the educational television field. Across the country, universities, colleges, public and private schools are using TeleMation closed-circuit and broadcast production and distribution systems. We've equipped mobile studios for special remote projects and have supplied multi-media equipment including dial access systems.
We do more than make sophisticated television equipment. TeleMation is the Total System Supplier.

TMC-2100

The heart of our system is the TMC-2100 Camera. You can go anywhere from there. The basic camera operates as a self-contained unit, or it can be incorporated into multi-camera systems. With TeleMation accessory equipment it can perform to broadcast standards in high-quality live camera or film chain applications.

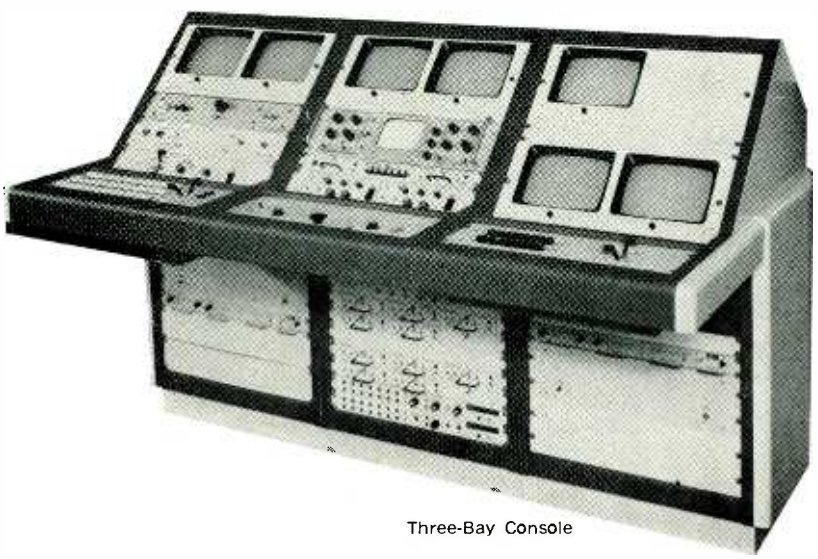


Porta-Studio™

Our Three-Bay Console houses professional studio systems. One man can simultaneously operate a variety of closed-circuit or broadcast production equipment. The Three-Bay Console can include TeleMation video switchers, audio controls, camera control units, special effects, remote control panels for video tape recorders and film chains, video and pulse distribution amplifiers, and picture and waveform monitoring equipment.

TeleMation's PORTA-STUDIO™ is the ideal way to transport video and audio control equipment for remotes. A typical PORTA-STUDIO™ system provides for vertical interval switching of up to six video sources. It includes special effects and audio controls. Lets you monitor program / preview lines and program waveform.

Talk to TeleMation.
It could be the start of a beautiful system.



Three-Bay Console

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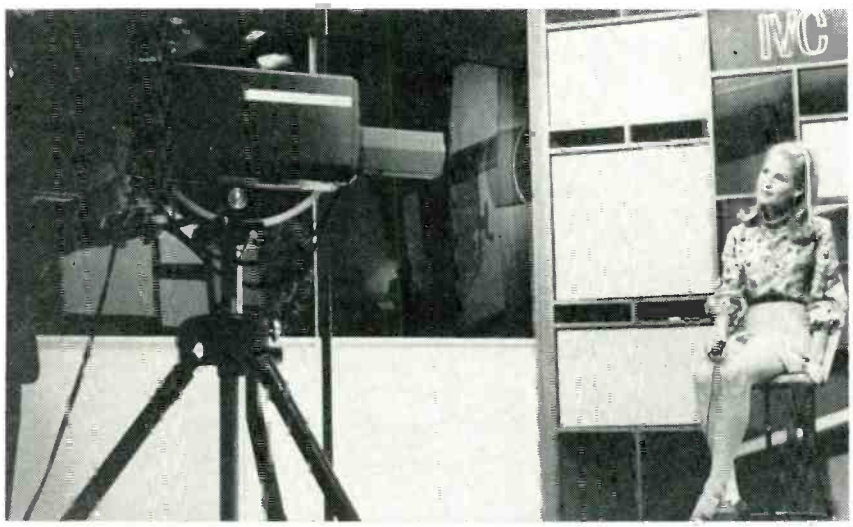
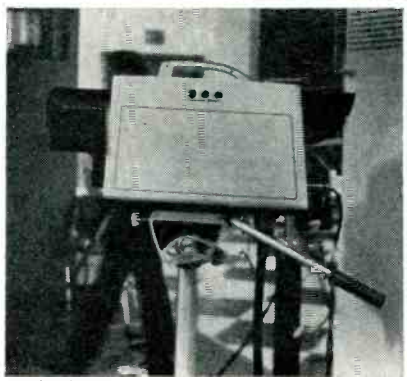
CONVENTION LOG

Full Color and Social Responsibility





BM/E Photos

(Top) Setting the pace for low-cost color, IVC-90 three-vidicon camera was tagged at $7500. (Left, top) Low-light level camera production model from Commercial Electronics worked well at 10 footcandles with lens stopped down to f8. (Left, center) RCA's $9500 single-vidicon PK-730 lifted its hood for a looksee. RCA announced start of deliveries. (Left, bottom) New Panasonic color camera on convention floor was not operating. (Right, top) Shibaden showed off new compact color camera, along with ½-inch helical tape color equipment and ultra-miniature mono gear. (Right, center) Singer's GPL Div. showed new color camera that worked, but not well. GPL booth personnel felt they'd rather show bad color than none at all. (Right, bottom) Low cost ($21,000) three-Plumbicon camera from Philips produced crisp color pix and is slated for production in about a year. Modular construction adds to flexibility.

The NAEB's 45th Annual Convention was a melange of committee-, council-, association- and *ad hoc* meetings from breakfast 'til dusk competing with an array of concurrent formal sessions. Those souls who couldn't figure out where they wanted to be rode down to the Sheraton Park's lowest level to be bedazzled by a collection of color cameras, VTRs, switchers, lamps and lights and accessories of every imaginable kind. The emphasis on the exhibit floor was color, while many of the sessions stressed social responsibility—the convention themes.

Public television's role in the community and instructional television's role in the school got close scrutiny and ample criticism. Keynoter Marya Mannes said public broadcasting's image in the eyes of Congress is "a seedy beggar with a cultured voice, approaching cap in hand." PTV will get the money it needs when it forces itself on the public's attention and captures it, she said. This means more imagination and less managerial timidity in tackling controversy.

Public broadcasters are the only broadcasters who spend full time in the pursuit of the public interest said John Macy, president of CPB. Public broadcasting must bring the issues of the day to the people, and, in turn, bring the view of the people to those officials whose decisions affect them. The NAEB board asked the membership to find ways to deal with the matter of national priorities. A Board resolution asked for a commitment to resolve important issues such as man's despoilation of the natural environment and the critical deficiencies of American education.

The Sesame Street color telecast which teaches cognitive skills to preschoolers was heralded by U.S. Commissioner of Education James E. Allen Jr. as a significant pioneer effort. Allen promised no new federal funds, but asked for assistance from educational broadcasters in helping to reach the child of poverty who is not now being adequately helped by our schools.

Color has come of age for the educational broadcaster and several companies were making pitches for his limited TV dollars. Lowest-priced newcomer was the IVC-90, a three-vidicon camera priced at $7500, with 30-day delivery promised. Philips introduced a three-Plumbicon camera tagged at $21,000, to be available late next year. RCA has started deliveries of its single-vidicon PK-730.

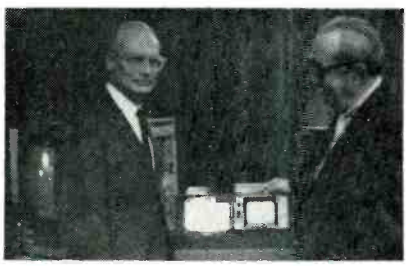
Not to be outdone, Bell & Howell knocked down the price on its 2970 (IVC-100A) camera—normally tagged at $14,000—to an unbelievable $7995. This lent some credence to industry scuttlebutt that B & H is dropping the IVC line and is dumping. Apparently, Bell & Howell will concentrate on Japanese-made color equipment for the forseeable future.

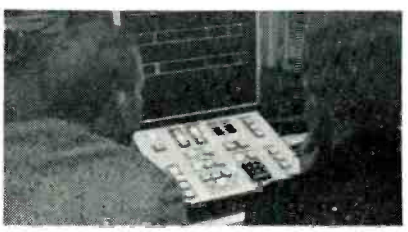
Another new color entry was the Sony two-vidicon camera. This one uses no scanning wheels—one pickup is for luminance, the other for red/blue with filter stripes a la RCA and Nippon Columbia (see *BM/E*, June, 1968, p. 42; July, 1969, pp. 22-24). The Sony camera is compact and colorimetry eyeballed well. Singer's GPL also showed a new color camera that was either out of whack or needs some more time in the R & D lab. This camera is replacing the IVC line which GPL has dropped. GPL booth personnel admitted that the color was bad, but said they'd rather show something than nothing at all.

Standout among cameras was the first production model low-light-level unit from Commercial Electronics. High-priced for the educational market ($28,500 less lens and encoder), the camera's manufacturer points out that the price difference is easily recouped in savings from lighting and air-conditioning that won't be needed. This camera uses Westinghouse SEC vidicons and produces surprisingly rich, natural color in light levels as low as 10 footcandles (at *f*8 lens opening). Other camera producers quickly point out that their cameras will also operate at 10 footcandles, but they don't mention that low-level operation means cranking the lens wide open (losing depth of field) and putting up with lots of noise in the picture.

Bargain hunters had a field day in the Ampex area. The big A unveiled a stripped-down videodisc broadcast recorder for a surprising $8000. Ampex also showed its new mono-convertible-to-color camera. Tucked away in a remote hotel room in the Windsor Park, Television Equipment Associates showed the market's first professional monitor using Sony's Trinitron picture tube. The new unit is tagged at $750.

Other bargains: new IVC-900 helical recorder is called a "broadcast" VTR priced at $15,500 with full color and all possible options. The unit holds giant-size tape reels—enough for 3¼ hours of con-



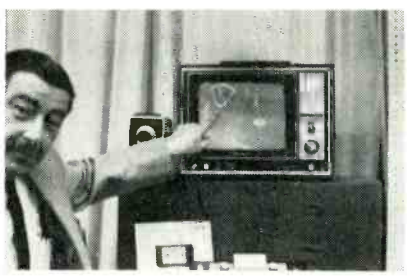


BM/E Photos

(Top) Two-vidicon Sony camera added to that company's color capability. (Left, top) Convertible camera introduced by Ampex can be bought in mono model, have color added later on. Unit shown here is equivalent to model BC-210. (Left, third fm. bottom) New mini-monitors highlighted Conrac booth along with more traditional size equipment. (Left, second fm. bottom) Datatron's "Datacue" video switcher added ease of handling and versatility to sticky tape editing problems. (Bottom) Star attraction in Diamond Power's booth was ultra mini battery portable VTR/camera combo. Unit provides 20 minutes' recording time per tape. (Right, middle) New line of switcher modules from Dynair add flexibility to educational programming operations. (Right, bottom) Raytheon showed new portable origination package that lets user fold it up and put it in station wagon.

BM/E Photos

(Top) Phase stabilizing gear was shown by Tracor. (Left, top) Telemet unveiled new video processing amplifier. (Left, center) Making its appearance under Ward's aegis, Richmond Hill Labs offered line of processing gear. Sales are now being handled by sister company Ward. (Bottom) Memorex showed new line of tape and lots of ideas for special color effects.



(Top) Ultra-tall blonde "guardsman" pushed 3M's new Guardsman tape. (Center) Canon offered complete line of TV camera lenses. (Bottom) Computer animation was exhibited by Computer Image Corp.

tinuous taping. Emcee showed a $16,000 uhf TV transmitter with a 100-watt output. Computer Image Corp. showed its computer-generated color animation sysem that produces animated programs in a fraction of the usual time and at a fraction of the usual cost.

Production-minded NAEB visitors were impressed by a new video tape editing system introduced by newcomer Datatron, Inc. The company's VidiCue Model 5000 system has a designed-in modular approach, permitting the purchaser to add sophistication as his needs change. The unit works with any VTR capable of electronic edit. In its simplest form, the system consists of a time code generator and a human-engineered control panel which helps the operator to conceptualize the edit and search function. The time generator lays a time code identifying hours, minutes, seconds *and frames* on either the cut track or an audio channel. Nixie tube readouts reveal this information in digital form. The control unit offers four modes of edit: cue/preview, sequential edit, insert edit (new material) and A-B roll (meaning three machines can be controlled).

Something new in dial-access attracted crowds to Visual Electronics exhibit—total system control by a small computer. The Visual people claim the new system will obsolete telephone-dial systems whenever more than a handful of remote stations are envisioned. The Visual Random Access and Control System handles up to 1000 sources and 1000 remote stations, and adding more stations is easy and inexpensive.

Users simply press one or more buttons at their control stations. Station display lamps indicate the operating mode of the source requested. If the source is in use, the caller can monitor the program in progress. Master control can override any request if necessary, so scheduled commitments can be honored. Scheduling can be accomplished in advance and classrooms can be automatically programmed to a source.

All remote stations and sources are connected by a single time-shared control cable in the Visual system. A request and connection are made in one-third of a second.

ITV Judged a Failure

The Monday morning session that investigated the main issues

facing instructional television turned up too many. ITV may never be able to surmount them all—not in the USA at any rate.

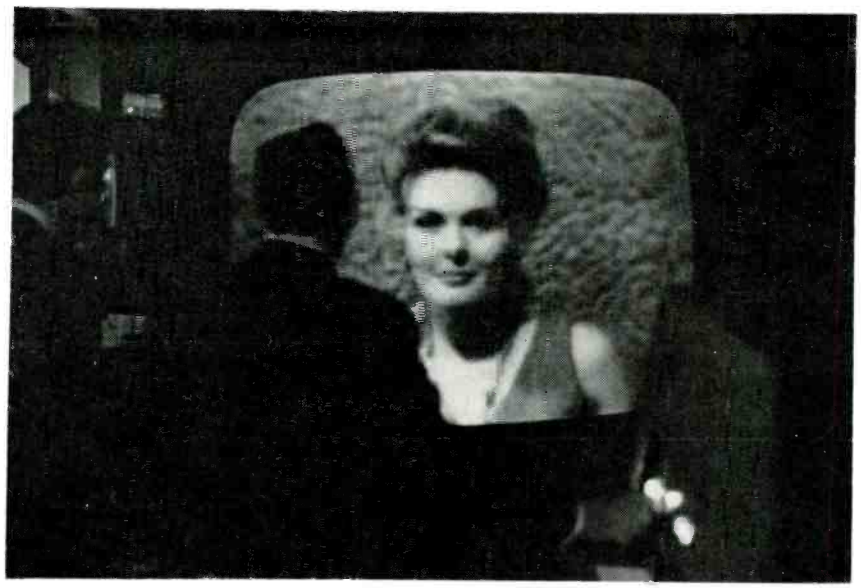
Instructional TV has been on dead center for the last dozen years, declared Ken Jones of San Diego State College and is being abandoned by many schools in this time of tight budgets because its benefits can't outweigh its costs. Wanda Mitchell of Evanston Township High School said the time had come for ITV to put up or shut up. "If ITV can't produce a significant difference in the learning situation, we ought to quit," she said.

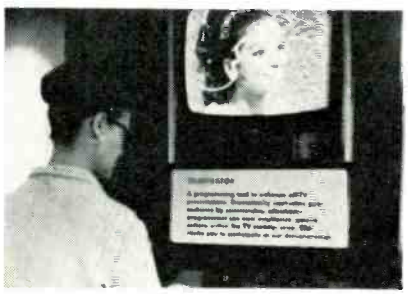
None of the panelists was really ready to quit. Each declared himself or herself an eternal optimist and offered advice on what should be done. Teacher Mitchell urged ITV people to turn from self-preservation to instructional objectives. Push ITV only when it is the right medium, Mitchell said.

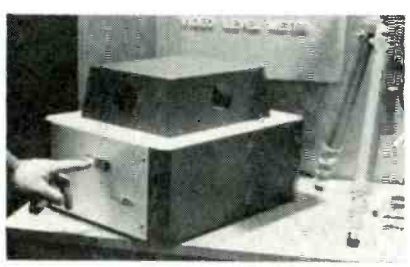
Dr. Lark Daniel, director of the Southern Educational Communications Association called for a new thrust to catapult TV out of its mediocrity. This means no more talking faces on the tube, he said, but more presentations that are unique to the medium. Daniel opined that instructional approaches in the past have been teacher-oriented and not really dedicated to the learner. TV people must know more about learning theory and perception, he said.

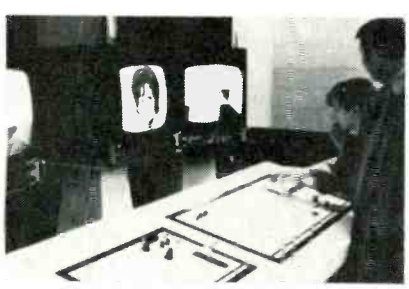
Panelist Jones declared that because of the lack of progress for 12 years many educators have probably written off TV as a serious instructional system. Something dramatically new will be needed to regain recognition. The cassette VTR that is as easy to operate as a toaster will increase TV's usefulness and Jones saw in the future, single-concept video tape cassettes being used much as film loops are now used. In a larger context, Jones endorsed the establishment of networks for knowledge within a given community. One goal of such a network should be to help the citizen who wants a better job.

The panelists' assessment of the enormous failure of ITV and the big job ahead left the audience frustrated. "So we've had our annual catharsis" complained one. "Can't we do something about it?" Someone else recited the statistics on how many hours kids spend in front of a TV set at home and declared that commercial TV's tech-





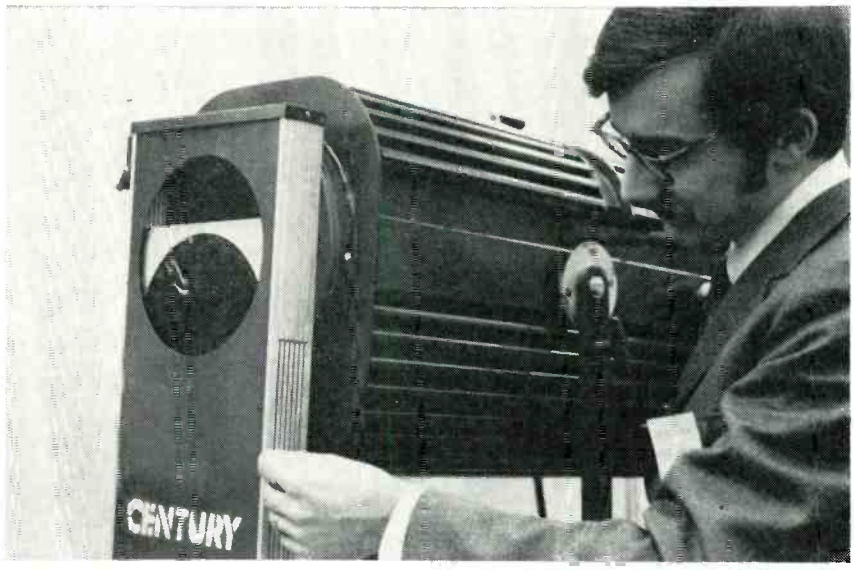


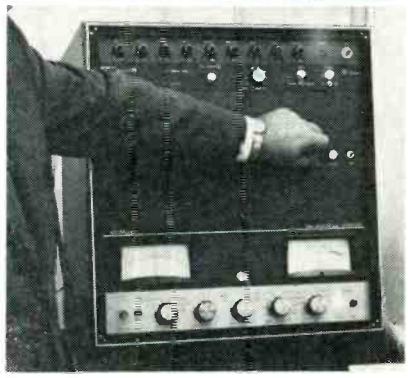


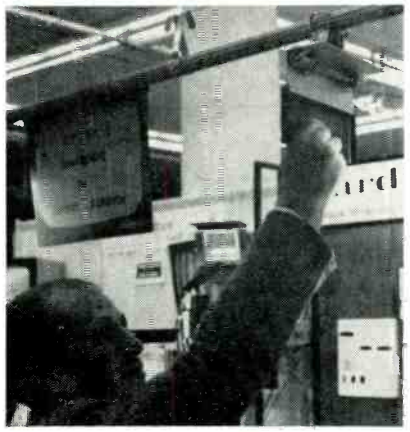
(Top) Amphicon showed large-screen color projector with good brightness level. (Left, top) Visual's "Telestrator" gives instructor a "light pen" for painting on TV picture. (Left, third bottom) Bert Merchant offered digital editor. (Left, second bottom) Kalart showed new optical multiplexer. (Bottom) Vital Industries' new switcher/effects board had more for the educational broadcaster.

BM/E Photos

(Top) Squiggly color effects were possible with CDL's equipment. (Center) More squiggles were made by Grass Valley's generator. (Bottom) Ball Bros. visitor tries effects.







BM/E Photos

niques must be copied. This drew forth a floor speech from Vernon Bronson, executive consultant to NAEB's Office of Research and Development, who said there was no relationship between the instructional process and commercial TV which provides escape from the boredom of reality.

Bronson said ITV may be able to make a significant difference if it could become an integral part of the educational process. This means dropping the notion of ITV as programs and concentrating on the learning process. Bronson called it relevancy. Entertainment is not relevancy, he said. Rather the material has to be interesting —so interesting, so relevant from a personal standpoint that the student is compelled to get involved.

Bronson's criticism of entertainment evoked an outburst from an elementary school teacher present who pleaded most fervently, "don't make entertainment a dirty word." Her comments drew hearty applause from a good third of the audience. Another observed that one doesn't have to adopt the ideals of the devil to use his methods.

The frustrations voiced at the session on identifying instructional priorities were matched and outdone the next day when attendees gathered to hear what was billed, "Report of Commission on Instructional Technology." The speaker was the Commission chairman, Dr. Sterling McMurrin, but since the report had not been approved for release by President Nixon, McMurrin would not reveal the substance of the nearly $500,000 study. He did describe it as "more intensive than extensive" —whatever that is supposed to mean. McMurrin did intimate that the report would have very large implications for the government and very large implications for education.

(Top) Series of slide-selectable filters by Century Lighting can be added to most spot lights. (Left, top) Portable, battery-powered spot with barn doors was shown by ColorTran. (Left, center) Clip-on quartz light was introduced by Bardwell & McAllister. (Left, bottom) Bank of solid-state dimmer controls was star attraction in Skirpan booth. (Right, top) Single SCA channel can carry two different program signals using McMartin's new modulation system. (Right, center) Low-cost ($16,000) 100-watt uhf transmitter for educational use was displayed by Emcee. (Right, bottom) Gates exhibited new generation of vhf TV transmitters.

In fishing for something concrete, one member of the audience asked McMurrin if he or his University (Univ. of Utah) would be using any more technology in the future. The doctor allowed that he might try an overhead projector if he could requisition one.

A later session devoted to the Report's implication for research bared some insight as to what the report might recommend. Dr. C. Ray Carpenter, one of the Commission members, advised his listeners to forget about any massive support for hardware coming from federal agencies. More grants for research, however, should be available. Carpenter thought there would be great interest in the future in application research, *i.e.* how schools might go about applying the benefits discovered in pilot studies. Carpenter stressed that the great need was not for hardware but for software. An R&D center in addition to the various present regional labs is needed, Carpenter said.

An early-bird session under the direction of Dr. Andrew Molnar of the U.S. Office of Education, described several research efforts under way. Dr. Jesse Kunz of the U.S. Naval Academy described the research efforts in programmed instruction at the Academy to develop optimum learning systems. (See *BM/E,* Nov. 1969, p. 39-41 for a description of one such program.) Dr. William Lybrand of American University discussed total teaching via ITV systems to reach several groups not served adequately by the local school system: the American Indian, children of migratory laborers and children in ghettos who end up in three or more schools each year.

In what is now becoming an annual ritual at NAEB, Dr. Clair Tettemer of Northern Illinois University reported on his latest survey of helical VTR users. Questionnaires were sent out to 1800 educators gleaned from lists supplied by Bell & Howell and Sony. Some 816 replies formed the basis for the survey which disclosed that instant playback accounts for 67 percent of educational applications. Recording material for future use accounts for 56 percent of VTR uses, 42 percent reported that they use VTRs for closed-circuit distribution, 37 percent do off-the-air recording, 30 percent use equipment for pre-recorded tape playback and 24 percent record research data. There was lots of overlap in this question, since almost all VTR users have more than one application for video tape.

Respondents felt that a high level of technical expertise is no longer needed to run a VTR, with average responses indicating a needed level only a little better than unskilled. Generally, the least-expensive ½-inch equipment was rated easiest to maintain and had the best repair records.

When polled on what machines they would buy if they had it all to do over again, 49 percent of those willing to change said they'd buy IVC, 27 percent opted for Sony, 14 percent for Ampex and 10 percent for miscellaneous other manufacturers. In rating overall equipment performance of comparable 1-inch medium-priced equipment, the Sony EV220 came out on top, the IVC-800 was second, while the three Ampex units in this series placed third, fourth and fifth. However, the number of recorders involved in this particular reply were so few that the ratings may not be significant.

In a session concerned with animation, Lawrence Kilty, director of the CPB Animation Project, spoke about conventional animation: frame-by-frame planned film that's pre-edited. His pet project involves establishing at least one national animation center. This would exist for noncommercial TV and would offer advice about cost efficiency. It would also have internship programs run by animation experts to help noncommercial TV to upgrade its techniques and knowledge of possibilities of animation. Kilty recommended setting up the first such center on the west coast, where 80 percent of animation produced by some 1100 artists is centered. Other general Kilty comments: "Animation is not cartoons!" He urged TV people to consider using animation not only because of its possible long-run low cost, but also because of its "syndicatability." Some 80 percent of animation is already syndicated and is quite reusable. He accused public TV of lack of involvement.

Continued on page 57

(Top) Jerrold's "Beam berder" helps reach inaccessible schools. (Second top) Houston-Fearless showed new cam pedestal, type PD-18. (Second bottom) New in Quick-Set line was camera boom/pedestal with electric powered movements. (Bottom) Power Optics had more sophisticated remote camera head motion controls in its line.

BM/E Photos

Easy-Load VTRs Add to Market Muddle

First it was "home" VTRs for under $1000 that no one bought for the home. Then came EVR and SV—the former for educators, the latter for "home" use. Now it's cassette VTRs with Tape-of-the-Month Club first-run movies. Will this be the ultimate form of pay TV?

IT'S A SPECIAL KIND of tradition—a prominent manufacturer starts production of a low-cost video tape recorder "for the home." A few may end up in somebody's living room for a weekend, but the main customers for these "home" units turn out to be school systems, industrial CCTV users and CATV operators. Now, two new "home" VTRs have appeared, with the tape neatly packaged in cassettes and priced low enough so any living room with a color TV set can afford one. But wait—the consumer will have to play second-fiddle again, getting into line behind the educators, industrialists, hospitals and cable operators.

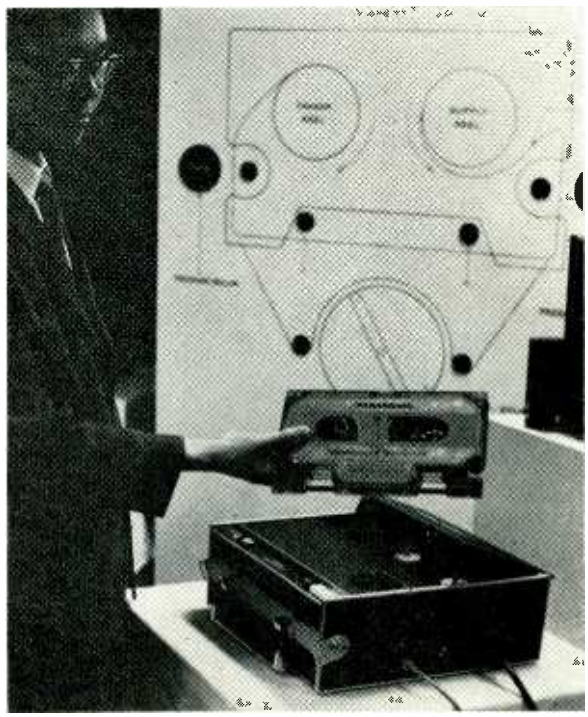
An unabashed swipe at the potential market for EVR and SV, these new cassette recorders also offer recording capability, not feasible with EVR's movie film and SV's hologram formats. The two Japanese firms in the fray—Sony and Matsushita—has each come up with its own, non-compatible cassette, and others are sure to follow suit. Soon, no doubt there'll be a proliferation of budget-priced Japanese "home" color VTRs and not a one will be compatible with another.

First off, Panasonic (Matsushita) unveiled its ½-inch cassette during NAEB in Washington. As demonstrated, the cassette was an easy auto-loading device with both its internal reels in the same plane. The slant-track scan is done by a head drum that's inclined at an angle of "approximately" 3° 11′. Tape speed is 7.5 ips and the format is fully compatible with Panasonic's standard ½-inch recorder. Thus the tiny reels in the cassette can be removed and the tape played, dubbed or edited on a standard machine. The tape machine's output is NTSC color and rendering on an 11-inch monitor was quite good for this type of format. No price or distribution date was set.

Another Cassette Format

Almost on the heels of the Panasonic demonstration came the new Sony cassette VTR. This one uses a ¾-inch tape running at 8 cm/sec (about 3.15 ips) to produce a 250-line resolution color picture and two channels of audio. Stereo sound was demonstrated, along with bilingual tapes—with the two audio channels used for two different languages.

The compact VTR is about the size of a standard home stereo tape deck. In its demonstrated

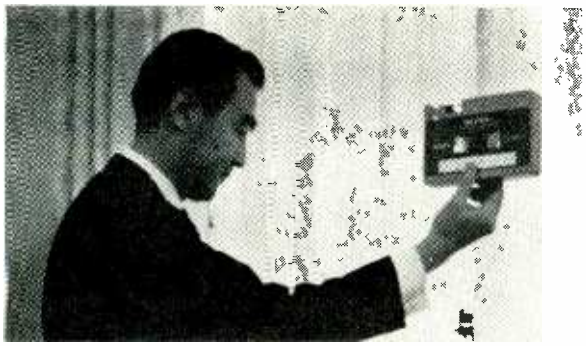


BM/E Photo
Panasonic's cassette and VTR are demonstrated against backdrop chart showing tape path in the machine.

form, the machine is for playback only—both for color and monochrome. The unit will be available in the U.S. sometime in 1972, according to Sony officials, and the retail price has been tentatively set at $350. A companion, add-on accessory for about $100 will permit off-the-air recording on the cassette in both mono and color.

Price is cited as the cassette player's biggest advantage, by Sony Corp. of America President Akio Morita. The convenience and relatively low material cost of the 90-minute cassette (about $20) will make it a convenient way to distribute movies and special-interest TV productions for home viewing. A rental fee of perhaps a dollar or two would be charged, possibly along with an initial deposit of $20 for the first cassette. The bicycle rental plan might follow a Book-of-the-Month-Club type of format, and the cost of the original blank tape would be easily amortized in such a setup.

The actual tape duplication, according to Morita, would be on normal-speed recorders,



Sony's ¾-inch video cassette is held aloft by engineer at demonstration, prior to insertion in playback unit.

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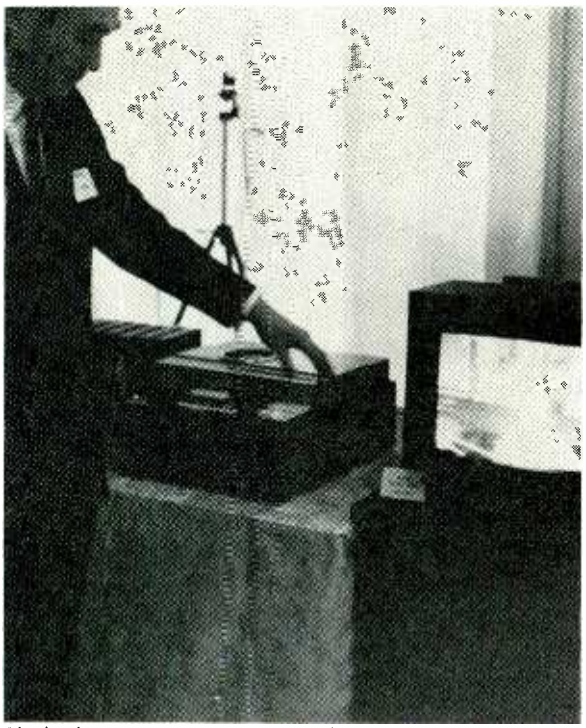


Playback unit, in conjunction with Sony Trinitron receiver, provides crisp, well defined picture with excellent color.

with as many as 100 duplicators slaved to the mastering machine. High-speed duplication apparently still isn't feasible for videotape, and may not be for some time.

Because the tape can be erased and re-used, actual production costs may be considerably lower than for EVR, which is locked into its program material once it's on the film. Thus a single cassette might carry a dozen or so different feature films during its usable lifespan.

Monthly Tape Releases

Eventually, if enough of these units were in enough living rooms, this "Movie-of-the-Month" club could cut into potential markets for pay-CATV channels. Such pay channels offer cable subscribers special program material, such as first-run movies, for an additional monthly fee. But unlike the pay cable services, the cassette could be viewed at any time during the week or two the subscriber has it in his possession.

There's another, almost chilling aspect of the VTR cassette. Sony's Morita indicated that his company plans to incorporate a counter mechanism in the cassette so the rental library could see how many times the tape has been played and then charge accordingly. That would mean no repeat viewings of a movie for the neighborhood kids—that'd be money down the drain. The counter would also let the tape distributor know when the tape was getting old and gray and ripe for retirement. The pay cable channel on the other hand, would repeat the same first-run movie each night of the week at no extra charge.

The tape unit's output is rf, and it's set to play on a vacant TV channel. Hookup is to the receiver's antenna terminals. The tape itself uses fairly standard iron oxide coating—surprisingly not the chromium dioxide coating that Sony can now produce under terms of its DuPont license. Possibly there are still too many bugs to be worked out with chrominum dioxide (Crolyn) tape. Yet Philips, another DuPont licensee for Crolyn tape, has already introduced a ½-inch helical VTR specifically designed to use this new tape formulation (see Sept., 1969, *BM/E*, p. 8).

Are Standards Possible?

Format standardization is another avowed Sony goal, and company officials are currently negotiating with Philips and Grundig in an effort to establish a worldwide standard. Yet Sony has seemingly stifled such possible standardization for the moment by using a tape width that has never before been used for VTRs. At first blush, it hardly seems likely that other manufacturers will abandon the ½-inch tape width that's now so widely used in at least six different VTR formats. Ironically, it was Sony that first introduced ½-inch helical video tape machines several years ago.

Another factor to be contended with is the Japanese EIA's newly formed VTR format standards committee. The JEIA rightfully feels that non-standardization will ultimately hurt VTR export sales. Yet Sony's new format may have thwarted JEIA's efforts, if not at least making the whole thing that much more difficult.

Ultimately, most Japanese firms who want to comply with the Association's standards may have to manufacture machines meeting two different formats—the company's traditional one plus whatever new standard format is adopted. Thus, double standards may be the rule for several years. Initially, such JEIA-imposed standards may be mainly for educational VTRs, says Sony's Akio Morita.

In the meantime, if Sony is successful in its European negotiations, the era of the home VTR may at last be upon us. Certainly the cassette VTR seems a more viable (and cheaper) format than CBS Labs' EVR (see January, 1969 *BM/E*, p. 41) and RCA's still developmental SV (see November, 1969, *BM/E*, pp. 50-51). The production deadline is realistic, the hardware works well and the price is right. **BM/E**

CATV Bingo Gets Everybody Involved

A highly effective cable TV promotion, CATV Bingo not only gleans new subscribers, but gets local merchants into the act. Everybody wins as the audience gets hooked on free Bingo and storekeepers get lots of mileage from their investment.

PROMOTING A CATV SYSTEM can sometimes be an iffy affair, with mixed reactions from both local merchants and potential subscribers. An excellent technique for increasing a system's reach is to offer some kind of additional inducement. Ideally, such an inducement should have a tie-in with appropriate merchants, such as TV and appliance outlets and department stores.

One such technique that has already worked well in several cable systems is CATV Bingo. Marketed by Jack Hampton of Littleton, Colorado, cable Bingo is an offshoot of broadcast Bingo, which the firm started over a decade ago.

First in Line

Cable Bingo started up about six years ago in Gallup and Farmington, New Mexico, and both towns still have it. The format uses one half-hour each day—either on an unused channel or on the system's time-weather channel. Local cable personnel or possibly radio station announcers form the talent pool, giving CATV Bingo a totally local orientation. Subscribers play the Bingo game in their own homes and win cash or merchandise.

The bingo cards, using a different color each week, are distributed free by certain local merchants. This distribution method in effect makes each participating merchant a CATV salesman; they distribute both Bingo cards and free hookup certificates to their customers. In some cases, these merchants may even do some advertising, letting the public know that they have free Bingo cards in their stores. Some of these merchants may also want to participate in co-op ads with other stores and the cable company.

Very often, local Bingo parties spring up when non-subscribers see Bingo in a cable customer's home. In Mt. Home, Idaho, nonsubscribing residents in a mobile home park would converge on a trailer with cable to play Bingo with cards received at their local grocery store. They just couldn't stand to have the cards and not play. Every player of this kind soon becomes hooked on the game and is an excellent candidate for a cable hookup of his own.

Cable Bingo produces lots of floor traffic at local retail stores as subscribers come in to pick up their new color bingo cards each week. Generally, participating merchants give out just one card per request. But it's certainly possible, and up to the retailer's option, to provide additional cards with appliance sales and to regular customers—something like the way trading stamps are given away.

Cable subscribers who are really hooked on the Bingo game may make the rounds of all the participating merchants in the area, to collect as many Bingo cards as possible. Generally, these merchants are mentioned in all of the cable system's local promotions—advertising in the local papers, on radio, on the local cable channel and in direct-mail campaigns. The retailers also receive point-of-purchase materials which promote the cable company. The results are impressive, and these local merchants are usually eager to underwrite the cost of the Bingo program.

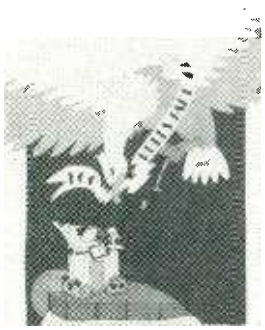
Results include new subscriber hookups. The Gallup, N.M. system added 280 new subscribers as a direct result of its first 13-week airing of cable Bingo. In Merced, Calif., total subscribers jumped from 390 to 2000 during Bingo's first 13 weeks. Jefferson-Carolina in Greensborough, N.C. liked the results so much that management opted for Bingo in the parent firm's other 10 systems. GenCoE liked the results in Gallup and has since added Bingo in Moab, Utah; Grand Junction, Colo.; Perryton, Texas and Casper, Wyo. GenCoE is planning to add it to three other systems as well.

In all cases, the expense of carrying out the Bingo program is borne by the local merchants. The copyrighted package offered by Jack Hampton includes releases and all necessary equipment —Bingo cards, flashboard and blower, point-of-purchase materials, format and full counselling services on setting up the program. The startup cost for these materials is $1950, and once started, the Bingo program can be carried indefinitely. The only recurring cost is for new Bingo card supplies.

Hampton has a special deal for systems with over 1000 subscribers. The 13-week "trial" period is free, with Hampton retaining any applicable fees from participating merchants. The cable operator keeps the new subscribers attracted by Bingo. For more information on adding Bingo to your CATV system, write to: J. R. Hampton & Associates, 5109 S. Newton, Littleton, Colo. 80120. **BM/E**

TODAY'S TRANSMITTERS
The Straightforward A-m

There's nothing radically new about today's a-m transmitter lineup. Many contain sophisticated solid-state circuits in driver stages, but tried-and-true high-power bottles still glow in the finals, and the biggest innovation is dual-redundancy.



MOST OF TODAY'S a-m transmitters use a classic design, illustrated by the block diagram of Fig. 1. An rf oscillator which uses an ovenless vacuum crystal drives a buffer amplifier, which in turn drives one or more intermediate power amplifiers. The PA or final is single-ended. Audio is amplified by push-pull drivers and fed to push-pull modulators working class AB_1 or B. The final is high-level plate modulated.

In most rigs, silicon rectifier stacks have replaced the once standard mercury-vapor tubes. Many transmitters employ transistors in low-level stages, although tubes are still used in high-power service. All transmitters but one use forced-air cooling of the high-power tubes. All are designed for remote control and most have automatic plate off-on recycling (up to three or four times) under momentary overload.

Typical specifications of most a-m transmitters are: audio input +10 VU in, 150 or 600 ohms, balanced; frequency response ±2 dB from 30 to 12,000 Hz; harmonic distortion 2 percent from 50 to 10,000 Hz; residual hum and noise 60 dB below 100-percent modulation; carrier shift at 100-percent modulation 3 percent; carrier frequency stability ±2 Hz; rf output, 40 to 250 ohms, unbalanced.

Maximum Powers

Table 1 lists modern type-accepted transmitters by power ratings. Maximum powers are listed because phasor losses at a directional station are sometimes considerable, and if you don't have extra transmitter power you may not be able to make power easily. Power cutback is also useful at stations operating with reduced power during critical hours or nighttime. The usual method of power cutback is to reduce plate, screen and grid voltages on the PA.

Several factors contribute to transmitter efficiency and overall economy, but one important consideration is the PA stage and how conservatively it's run. The most common a-m transmitter used in the U.S. today is the 1-kW type. The various manufacturers use four tube types as finals in this class.

Gates' BC-IG uses a pair of 833A triodes as parallel plate-modulated Class C amplifiers, a combination with a maximum plate power rating of 2000 watts. Most manufacturers use parallel 4-400A tetrodes as plate-modulated Class C amplifiers; maximum power rating of that pair is only 1260 watts. Collins uses parallel 5-500A pentodes in its 820D-1, with a maximum power rating of 1560 watts for the pair. The most conservative operation, however, is the Gates Vanguard II. It uses a single 4CX3000A pentode as a Class AB_1 linear amplifier. The tube is rated at 5600 watts maximum in such service.

The Gates Vanguard embodies the newest a-m design, and the arrangement is shown in block form in Fig. 2. All stages except the PA are transistors, and modulation is applied to the third rf amplifier stage. The foltlowing IPA and PA stages are, of course, linears.

The power consumption of a 50-kW transmitter is considerable, and through the years several methods have been developed to obtain as much as efficiency as possible at that power rating. For a comparison of the power consumption of various 50-kW rigs, see Table 2.

Continental 317C. One high-efficiency circuit is that of Continental's 317C transmitter—the only design in current production to use high-level screen modulation of the PA stage. The circuit is shown in Fig. 3; two 4CX35,000C tetrodes are

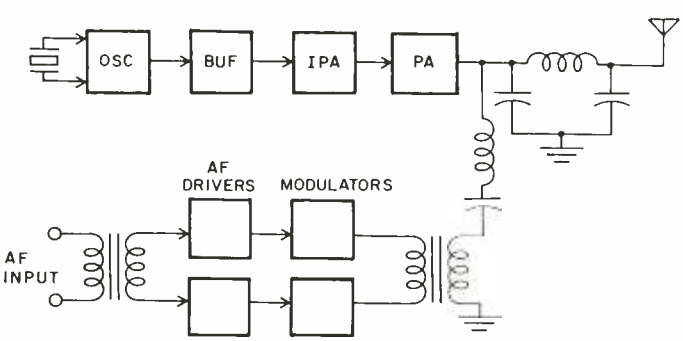


Fig. 1. Classic high-level modulation is common in a-m.

Table 1: A-m Transmitters

Manufacturer	Type No.	Power in kW Maximum	Power in kW Cutback to	Modulation Type	Final Tube(s)	Notes	Circle no. on Reader Service Card
		250 watts					
CCA	AM-250DS	0.35	0.05	HLP	(2) 4-400A		311
Gates	BC-250GY	0.28	0.1	HLP	(2) 810		312
		500 watts					
CCA	AM-500DS	0.55	0.25	HLP	(2) 4-400A		311
Gates	BC-500G	0.55	0.25	HLP	833A	1	312
		1 kilowatt					
AEL	AM-1KA	1.25	0.5, 0.25	HLP	(2) 4-400A	1, 2, 3, 4	313
Bauer	707	1.10	0.5, 0.25	HLP	(2) 4-400A	5	314
CCA	AM-1000D	1.20	0.5, 0.25	HLP	(2) 4-400A		311
CCA	AM-1000DX	1.50	0.5	HLP	(4) 4-400A	6	311
Collins	820D-1	1.10	0.5, 0.25	HLP	(2) 5-500A	7, 8, 10	315
Gates	Vanguard II	1.15	0.5, 0.25	LL	4CX3000A	1, 8	312
Gates	BC-1G	1.10	0.5, 0.25	HLP	(2) 833A	1	312
RCA	BTA-1R3	1.10	0.5, 0.25	HLP	(2) 4-400A		316
Visual	AM-1KA	1.30	0.5, 0.25	HLP	(2) 4-400A	1, 3	317
Wilkinson	AM-1000A	1.30	0.5, 0.25	HLP	(2) 4-400A	1, 2	318
		5 kilowatts					
AEL	AM-5KA	7.0	1, 0.5	HLP	7237	2, 3, 4	313
Bauer	FB-5V	6.0	1, 0.5	HLP	4CX5000A		314
CCA	AM-5000D	5.5	1, 0.5	HLP	3CX2500F3		311
CCA	AM-5000DX	7.5	2.5	HLP	(4) 4-1000A	6	311
Collins	820E-1	5.5	1	HLP	4CX5000A	8, 9, 10	315
Continental	315-C	5.5	1, 0.5	HLS	4CX10,000D		319
Gates	BC-5H	5.6	1, 0.5	HLP	3CX2500F3	3, 13	312
RCA	BTA-5U2	5.5	1, 0.5	HLP	5762		316
Visual	AM-5KA	6.0	1	HLP	7237	3	317
Wilkinson	AM-5000B						318
		10 kilowatts					
AEL	AM-10KA	12.5	5, 1	HLP	(2) 7237	2, 3, 4	313
Bauer	FB-10J	12.5	5	HLP	4CX15,000A		314
CCA	AM-10000D	12.0	5, 1	HLP	3CX10,000A3		311
CCA	AM-10000DX	15.0	5	HLP	(4) 3CX2500F3	6	311
Collins	820F-1	10.6	5	HLP	(2) 4CX5000A	8, 9, 10	315
Continental	316-C	10.6	5	HLS	(2) 4CX10,000D		319
Gates	BC-10H	10.8	5, 1	HLP	(2) 3CX2500F3	8, 11	312
RCA	BTA-10U2	10.6	5	HLP	(2) 5762		316
Visual	AM-10KA	11.0	—	HLP	3CX10,000A3	3	317
Wilkinson	AM-10000B						318
		25 kilowatts					
AEL	AM-25KA	35.0	10, 5	HLP	4CX35,000C	2, 3, 4	313
Bauer	725	27.5	12.5	HLP	(2) 4CX15,000A	6	314
CCA	AM-25,000D	30.0	—	HLP	3CX20,000A3		311
CCA	AM-25,000DX	30.0	12.5	HLP	(2) 3CX10,000A3		311
		50 kilowatts					
AEL	AM-50KA	55	25, 10	HLP	4CX35,000C	2, 3, 4	313
CCA	AM-50000D	55	10	HLP	4CX35,000C		311
CCA	AM-50000DX	60	25	HLP	(4) 3CX20,000A3	6	311
Continental	317-C	53	25, 10	HLS	(2) 4CX35,000C	3, 4	319
Gates	VP-50	55	25, 10	HLP	7480	8, 11, 12	312
RCA	BTA-50J1	53	10	PTA	(2) 6697		316
Visual	AM-50KA	60	—	HLP	(3) 4CX15,000A	3	317
Wilkinson	AM-50,000						318

See notes on page 33.

used in the final as a modified Doherty or high-efficiency circuit.

The PA tubes are operated Class C with the usual efficiency of that mode. But since the screens (not the plates) are modulated, modulator power requirements are less than the usual plate-modulated stage.

The final tubes are not fed rf in phase with each other. The top or peak tube is fed direct rf, while the lower or carrier tube gets rf through a 90-degree phase-advance network. The carrier tube supplies power for the carrier only, while the peak tube supplies power for modulation peaks. During the negative half cycle of the modulating voltage, the peak tube remains cut off while the output of the carrier tube linearly follows the audio signal applied to its screen. During the positive half cycle the screen of the peak tube swings in a positive direction so that its output increases linearly until it is delivering twice carrier power at the positive peak.

The power delivered to the load by the peak causes the impedance presented to the interplate network to increase in value until it's double normal value at the positive modulation peak. The impedance-inverting characteristic of the network causes the load impedance at the carrier tube plate to decrease until it's one half normal value at the positive peak. That impedance change produces impedance modulation of the carrier tube so that it also delivers twice carrier power. Thus the total power output is four times the carrier power.

In the 317C, plate voltage swing does not increase with positive modulation; hence a higher dc plate voltage can be used than is normal for plate-modulated transmitters. At 16 kV dc, the 317C has a plate efficiency of about 80 percent.

Screen-grid modulation isolates the modulator from the rf driver or IPA, thereby eliminating the need to swamp the PA grid drive to maintain linearity. Driving power required by the PA stage is relatively small—a few hundred watts, easily furnished by a single 4-400A tetrode IPA. There is no modulation transformer in the 317C, a factor contributing to wide frequency response. The modulators are cathode-coupled to the PA screens.

Gates VP-50. A second approach to 50-kW efficiency has been taken by Gates in the design of its VP-50. A single 4CX3000A IPA tube drives the 7480 triode PA, whose maximum plate rating is 60 kW as a Class C modulated amplifier. Two 3CV30,000H3 triodes are used as Class B modulators. The circuit is straight high-level plate modulation; unusual is the cooling method used.

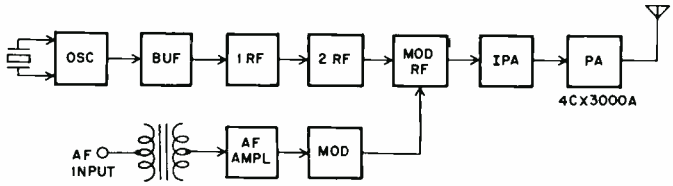


Fig. 2. Gates Vanguard II uses low-level modulation.

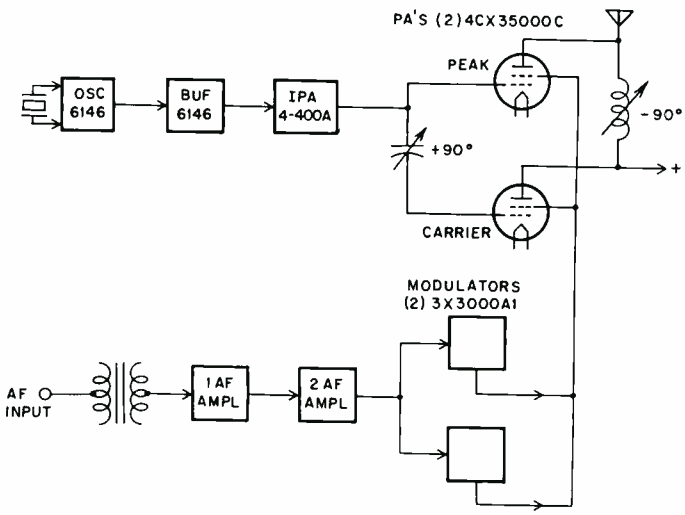


Fig. 3 Screen modulation is used in Continental 317-C.

Both modulators and the final are cooled by steam vapor, which removes nearly 20 times as much heat as a water-cooling system. The result is greater overall efficiency than in the usual air-cooled circuit.

RCA BTA-50J1. RCA's version of 50-kW high efficiency is phase-to-amplitude modulation, which it has named Ampliphase. The circuit is shown in block form in Fig. 4. The carrier frequency is generated by the crystal-controlled oscillator and amplified by the buffer, then separated into two channels differing in phase by 180 degrees. Each signal is then passed through dc modulator stages adjusted so phase difference of approximately 135 degrees exists between the two signals. Phase modulation is applied to each rf channel at this point by a variable-resistance modulator.

All stages following the modulators are operated Class C, resulting in high efficiency. Each PA develops 25 kW and two are combined to obtain the rated 50 kW power output. The combining networks are two 90-degree pi networks which have the effect of tying the PA's together in an out-of-phase condition. The waveforms

Code for Table 1
Modulation Types
HLP: High level plate
LL: Low level
HLS: High level screen
PTA: Phase to amplitude

Notes:
1: Built-in dummy load.
2: All but HV regulated.
3: Vacuum capacitor PA plate tuning.
4: Running-time meter.
5: Available as kit.
6: Parallel redundant transmitter.
7: Automatic power output control.
8: Partially transistorized.
9: Automatic PA tuning with change in loading.
10: Oscillator operates at either two or four times carrier frequency.
11: Standby exciter built in.
12: Vapor-cooled modulator and PA.

3-Plumbicon color to Zanesville...from

Broadcasters throughout the country are saying great things about a new camera from IVC. Take for instance WHIZ-TV in Zanesville, Ohio, and KTAL-TV in Shreveport, Louisiana.

They're using a new television camera that delivers superb color — color that is equal to any broadcast camera in use today — yet available at a sensible price. The camera is the IVC-300 "Maverick."

IVC's new three-Plumbicon camera is proving itself both as a front line studio camera and a "winner" for remotes.

In Zanesville WHIZ-TV General Manager, Bob Hodous, comments:

"We were on the air four times a day with live, half hour presentations from the Muskingum County Fair. The IVC camera was easily remoted to 'capture' the various events and the color was excellent. The importance of this camera is evident in one fact — all 20 program segments were completely sold out."

From Lee Bryant, General Manager of KTAL-TV in Shreveport:

"A quality camera at a reasonable price . . . the IVC-300 is increasing our profits. It has enabled us to offer a wider variety of color programming than ever before and stir-up a great deal of enthusiasm and excitement with our local advertisers."

The IVC-300 weighs only 72 pounds and is easily operated by one man. Pick up of fast action is outstanding. All the sophistications are built-in — Varotal XX 10:1 zoom lens, with local or remote servo driven iris . . . negative registration

...from Shreveport studio to remote...

... four-step gamma correction ... filter wheel ... R/G/B sequencer ... color masking.

The complete IVC-300 system includes tubes, vertical aperture equalizer, intercom, encoder, camera control and junction unit, and 100 feet of camera cable including all interconnecting cables.

Priced complete at $36,000, the IVC-300 "Maverick" is an ideal combination of three-Plumbicon color, light weight, and high sensitivity.

Let us tell you more about how the IVC-300 can satisfy your production requirements. IVC sales offices around the U.S. and in Canada are at your service. Interested in demo? Call collect.

In the East phone Jim Landy in White Plains, New York at (914) 761-7820. In the Southwest, Clarence Deal in Dallas at (214) 357-1881 will work with you. In the Southeast call Dick Rex in Atlanta at (404) 633-1462. Midwesterners can phone Coyle Dillon in Des Plaines, Illinois at (312) 297-5160. Jim Jensen in Englewood, Colorado at (303) 761-3850 serves the Rocky Mountain area. Dick Reilly in Sunnyvale, California at (408) 738-3900 handles Western sales. Emil Adamyk in Montreal at (514) 636-4480 serves Canada.

IVC has the broadest line of studio and film chain cameras available today. Prices range from $14,000 to $76,000.

Last year IVC built and sold more color television cameras than any other manufacturer. Our friends in Shreveport and Zanesville can tell you why.

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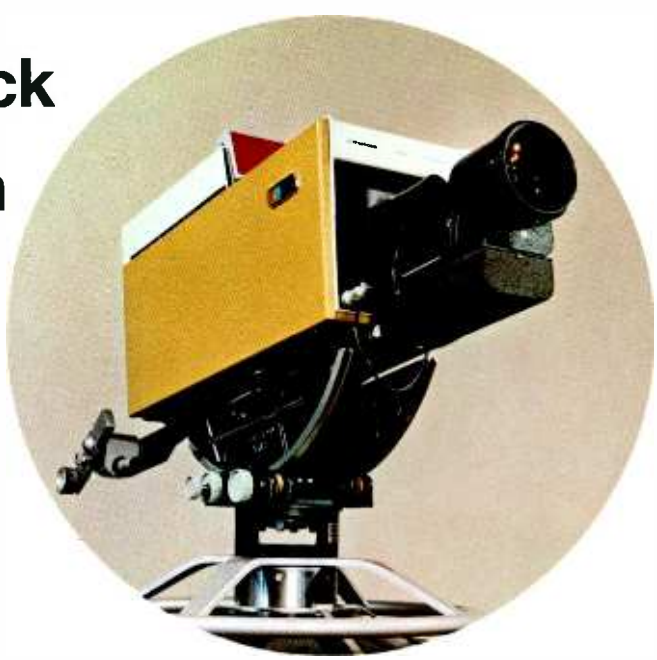


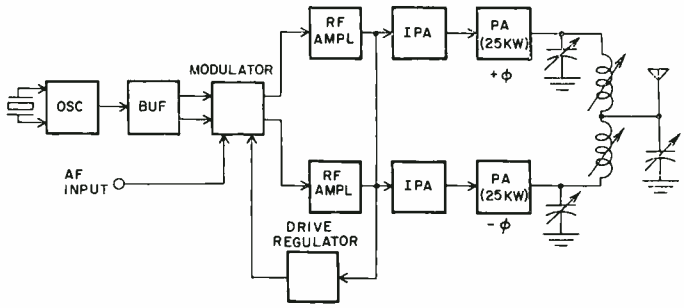


Fig. 4. RCA uses phase-to-amplitude modulation in 50-kW rig.

add, converting the phase modulation to amplitude modulation at the common point.

The drive regulator consists of three cathode-follower tubes which control the grid operation conditions of the PA tubes to assure maximum plate efficiency over the complete audio cycle. During modulation lows, when zero or very little output is required from the final, the drive regulator reduces the final stage drive. Conversely, at modulation peaks, when maximum power is required from the final, drive is increased over carrier condition drive.

Modulation is accomplished at a low level, thus no large, expensive modulation transformer is required. This feature contributes to wide frequency response given as ±3 dB from 35 to 25,000 Hz. Also, any change in load reactance doesn't detune the PA stage to a great extent, but merely adjusts the proportion of power contributed by each tube. Thus an antenna with highly reactive sideband impedances doesn't affect modulation linearity and efficiency.

Parallel Redundant Transmitters

Used for years in fm and TV and in other countries, parallel redundancy is rather new in U.S. a-m rigs. The idea is simple but sound: if a station operates with a single transmitter which fails, the station is off the air, and loses money. To avoid this, many stations buy an auxiliary or alternate main transmitter, which stands idle 98 percent of the time, and represents wasted capital.

The parallel redundant transmitter consists of twin exciters and twin modulator/power-amplifier sections. Each PA section is capable of delivering half the station's rated power to the antenna or common point. Normally both PA's are driven by one exciter and the PA outputs are combined to feed the antenna. If one exciter should fail, the spare is switched in. If either modulator/PA section should fail, a monitor circuit triggers an alarm as station power drops 6 dB (¼ power). The operator then shuts down the station for a moment, switches the defective PA out of the combiner and into a dummy load. Then he feeds the good PA direct to the antenna or common point, and the station power is only 3 dB down (½ power).

A further advantage of the parallel-redundant design is that all components are used in duplicate and virtually no failure can do worse than reduce the station to half power.

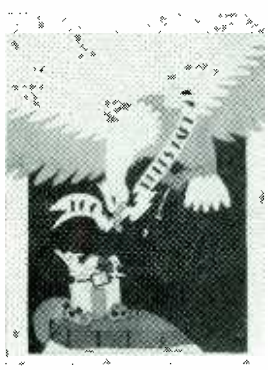
Bauer's 725 is a 25-kW transmitter consisting of two 15-kW models in parallel. CCA's line is called Dual Reliable, and includes 1,- 5,- 10- and 50-kW rigs. Type numbers carry the DX suffix. **BM/E**

Table 2: Power Consumption of 50-kw A-m Transmitter

Modulation Percent	Continental 317-C High-level screen modulation	Gates VP-50 High-level plate modulation	RCA BTA-50J1 Phase-to-amplitude modulation	AEL AM-50KA, CCA AM-50000D High-level plate modulation	Visual AM-50KA High-level plate modulation
0	82	85	94	95	95
30	92	95	100	103	112
100	120	125	130	140	150
	Power in kilowatts				

Fm: A Cornucopia of Transistors

Once the misbegotten stepchild of radio, fm has now come of age and there are many transmitting plants to choose from. Add to this the complexity of specialized generators for stereo and SCA and the needed multiplexers, and you have a bag full of type-accepted gear to choose from.



ALL MODERN FCC-TYPE-ACCEPTED transmitters are built in modules or sections. The exciter converts audio to a main-channel modulated fm signal of about 10 watts power on the assigned frequency. The power-amplifier section amplifies the exciter output up to the desired level to feed the antenna. The stereo generator adds L and R audio signals to form the composite main-channel audio. It generates the 19-kHz pilot and derives a 38-kHz subcarrier and modulates that subcarrier with, L − R. The stereo generator output drives the main exciter. The SCA generator converts audio into a frequency-modulated subcarrier somewhere between 20 to 75 kHz, which is fed to the main exciter. Generally, the SCA subcarrier is 41 or 67 kHz, and 67 kHz is now the accepted industry standard.

Serrasoid Modulators

Exciters are listed in Table 1. Three systems

Table 1: Fm Exciters

Manufacturer	Type No.	Osc. Freq.	Modulation Type	Modulator	Output power watts	Final Amplifier	Active Devices	Notes	Circle no. on Reader Service Card
AEL	2202	fc	DCFM	Varactor	10	Transistor	AT	1	320
Bauer	660	fc	DCFM	Varactor	20	Transistor	AT	3	321
CCA	FM-10DS	¼ fc	DFM	Varactor	10	7984	PT	1	322
Collins	31OZ-1	1/10 fc	DFM	Varactor	20	Transistor	AT		323
Gates	TE-1	fc	DCFM	Transistor	10	Transistor	AT	1	324
RCA	BTE-15A	fc	DCFM	Varactor	15	Transistor	AT	2, 3	325
Standard	910	fc	DCFM	Varactor	10	Transistor	AT	1	326
Visual	DFM-10A	1/5 fc	DFM	Transistor	10	Transistor	AT		327
Wilkinson	FM-10D	1/864 fc	PM	12AT7	10	6146	VT		328

DCFM: Direct carrier frequency modulation; DFM: Direct frequency modulation; PM: Phase modulation;
AT: All transistor; PT: Part transistor; VT: Vacuum tube; fc: Carrier frequency.
1: Regulated power supply. 2: Off-frequency detector. 3: Available with stereo and two SCA's, and switchable between stereo/SCA and mono/two SCA's.

of frequency modulation are used today; the oldest is phase modulation, which is illustrated by the block diagram of Fig. 1. The basic oscillator is crystal-controlled and stable, operating at 1/864 of the carrier (center) frequency. Following the oscillator, a buffer and pulse shaper trigger a sawtooth generator which gives the circuit its name—*serrasoid* (from the Latin *serra,* for saw). The sawtooth goes into the modulator which functions more as a switch than an amplifier, and produces a square wave at the output. The leading edge of the square wave is advanced or retarded in phase by the audio signal fed into the modulator cathode.

That small change in phase is also a small change in frequency. The chain of frequency multipliers that follows the modulator steps up the center frequency to the station carrier freqeuncy, and at the same time increases deviation until it becomes 75 kHz for 100 percent modulation at the carrier frequency.

Note however, that the frequency deviation produced this way is proportional to the time rate of change of phase. The maximum rate of change of a sine-wave modulating signal is proportional to the slope of the curve as it crosses the X axis. This slope is proportional to frequency (assuming constant peak amplitude); hence the maximum frequency deviation is proportional to modulating frequency. Since this frequency response is not desired, a low-pass integrating circuit is placed in the audio chain to correct it.

Direct Fm

Developed after phase modulation, direct FM is simply modulating a basic oscillator with audio. A typical circuit is shown in Fig. 2, a block diagram of the CCA FM-10DS exciter. The oscillator is an FET, modulated by audio that's fed to a pair of varactor diodes across its circuit. At the oscillator, 100-percent audio modulation causes a deviation of about 19 kHz.

Oscillator output goes through a buffer and two doublers, stepping up center frequency to the 88-108 MHz fm band and deviation to 75 kHz. A sample of the carrier output is fed to a mixer which also receives a signal from a stable reference oscillator. The difference frequency is 250 kHz, which is amplified, limited, and divided down to 125 kHz. Finally, a dc correction voltage is derived which is fed to a separate pair of varactor diodes across the modulated oscillator. If output center frequency is exactly on the assigned value, no correction voltage is generated, and the modulated oscillator is not corrected. If output center

Table 2: Stereo Generators

Manufacturer	Type No.	Use	L/R Combiner	Crosstalk dB*	Pilot Stability Hz	Active Devices	Notes	Circle No. on Reader Service Card
AEL	2203	Complete	Matrix	45	1	T		329
Bauer	7562	Plug-in	Matrix	42	1	T		330
CCA	SG-ID	Complete	TDM	45	1	T	1	331
Collins	786V-1	Plug-in	Matrix	40	2	T		332
Collins	786M-1	Complete	TDM	40	2	T		333
Gates	M6533	Plug-in	Matrix	42	1	T	1	334
Moseley	SCG-3T	Complete	TDM	43	1	T		335
RCA	BTS-1B	Plug-in	TDM	45	1	T		336
Standard	203	Complete	Matrix	45	1	T	1	337
Visual	SMX-1A	Complete	Matrix	65		VT		338
Wilkinson	SG-1D	Complete	Matrix	65		VT		339

*Main-to-sub or sub-to-main, below 90% modulation.
1: Regulated power supply.
TDM: Time-division Multiplex.

Table 3: SCA Generators

Manufacturer	Type No.	Use	Available SCA Frequencies kHz	Center Frequency Stability	AF Response Hz	Active Devices	Notes	Circle No. on Reader Service Card
AEL	2204	Complete	30-75	±400 Hz		T		340
Bauer	7566,68	Plug-in	41, 67	±500 Hz	50-7500	T		341
Collins	786W-1	Plug-in	67	±0.2%	50-15,000	T		342
Gates	M-6507	Plug-in	25-75	±500 Hz	30-15,000	T	*	343
Marti	SCG-67	Complete	41, 67	±500 Hz	40-6000	T	*	344
Moseley	SCG-4T	Complete	25-90	±0.5%	30-12,000	T	*	345
RCA	BTX-1B	Plug-in	30-75	±0.2%	30-10,000	T		346

*Regulated power supply.

frequency varies, a positive or negative correction voltage is generated by the AFC loop, and this voltage pulls the modulated oscillator back to the correct value.

Direct-Carrier Frequency Modulation

In both serrasoid and direct fm systems, modulation takes place at a low frequency and the composite signal is multiplied up to the carrier frequency. This creates problems when inserting the stereo sidebands and/or SCA subcarriers, as they must be added after main-channel modulation, farther along in the multiplier chain. Direct-carrier fm overcomes this problem, because the modulated oscillator operates at the final carrier frequency. A typical circuit is shown in Fig. 3, which is a block diagram of the Gates TE-1 exciter.

Mono or stereo audio is applied to the bases

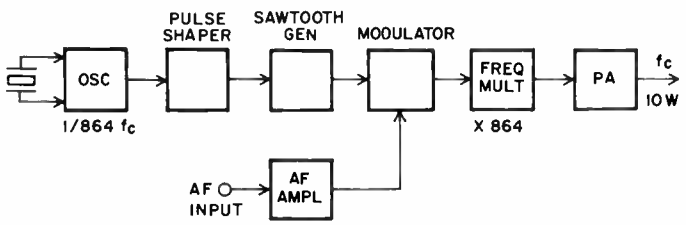


Fig. 1. Typical serrasoid phase-modulated fm exciter.

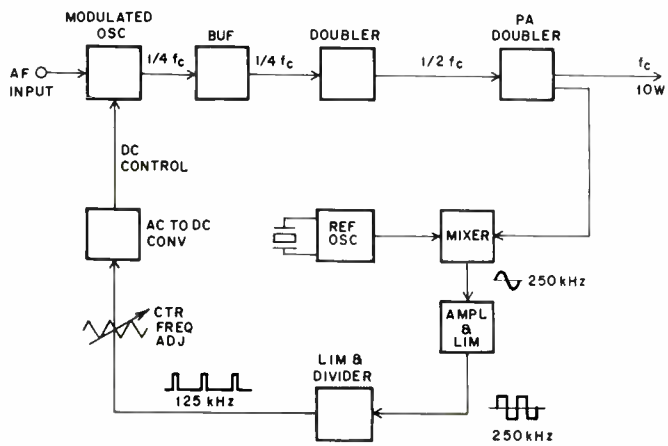


Fig. 2. CCA FM-10DS exciter uses direct fm system.

of two transistors which is then a modulated oscillator. SCA signals are applied to the AFC control line, which feeds a pair of varactor diodes across the oscillator's tuned output circuit. The modulated signal is then amplified on-channel by several stages, until it appears at the PA output as 10 watts at carrier frequency.

Meanwhile, a sample of the modulated signal is taken from an IPA stage and fed to a mixer. Reference is provided by a stable crystal oscillator operated at approximately ⅓ the carrier frequency. The reference signal is tripled to beat with the sample of modulated rf, providing a difference of 200 kHz. This 200-kHz difference frequency is amplified, clipped and limited, then used to gate an ac-to-dc converter. The converter's dc output is the correction voltage fed to the varactor diodes in the frequency control circuit. The AFC loop works substantially the same as that outlined previously for DFM.

Exciter Specifications

Because of FCC rules and industry practice, most fm exciter specifications are similar. Typical values are: audio input +10 VU at 150 or 600 ohms, balanced; frequency response, ±1 dB from 50 to 15,000 Hz with 75 −μsec preemphasis; harmonic distortion 0.5 percent from 50 to 15,000 Hz; fm noise 65 dB below 90-percent modulation (stereo); a-m noise 55 dB below 90-percent modulation (stereo); carrier frequency stability ±1000 Hz; rf output 50-51 ohms, unbalanced.

Exciters and low-power transmitters (10 watt) look very much alike. The principal difference between them is that the transmitter includes a harmonic filter and a meter panel.

Stereo Generators

Table 2 lists pertinent specifications of the various stereo generators available today. Complete units may be used with any exciter, but plug-ins are usually intended to work only with the same manufacturer's exciter, even so far as drawing operating power from the exciter. Two kinds of L/R combiners are in current use. The matrix system was first, but recently the time-division multiplex or switching method has be-

come popular. Its proponents claim TDM offers better seperation in a less critical circuit. All stereo generators have separation of at least 35 dB.

SCA Generators

A number of manufacturers offer SCA generators, as shown in Table 3. Some are complete

Table 4: FM Transmitters

Manufacturer	Type No.	Maximum Power kW	Final Tube	Notes	Circle no. on Reader Service Card
10 watts					
AEL	FM-1DB	0.012	Transistor	.....	347
CCA	FM-10D	.....	.....	.....	348
Gates	BFE-10C	.....	6146	.....	349
RCA	BTE-15AT	0.015	Transistor	.....	350
Standard	910	.....	Transistor	.....	351
Visual	DFM-10B	.....	Transistor	.....	352
Wilkinson	FM-10E	.....	.....	.....	353
50 watts					
Gates	BFE-50C	.....	(2) 6146	.....	349
Standard	920	.....	Transistor	.....	351
Wilkinson	FM-50A	.....	.....	.....	353
250 watts					
CCA	FM-250DS	0.275	8122	.....	348
Collins	830B-1B	.....	4CX250B	.....	354
Gates	FMS-250H	.....	4CX250B	.....	349
Standard	930-1	.....	Transistor	2	351
500 watts					
AEL	FM-5HB	0.550	4CX300Y	.....	347
1 kilowatt					
AEL	FM-1KB	1.2	4CX1000K	1, 2, 4	347
Bauer	607A	1.6	(2) 3-400Z	.....	355
CCA	FM-1000DS	1.5	3CX1000A7	3	348
Collins	830D-1B	.....	4CX1000A	.....	354
Gates	FMS-1H	.....	4CX1000A	.....	349
RCA	BTF-1E2	.....	4CX1000A	.....	350
Standard	940-1	.....	4CX1000A	2, 3	351
Visual	DFM-1KA	.....	3CX1000A7	3	352
Wilkinson	FM-1000CS	.....	4CX1000A	3	353
2-2.5 kilowatts					
Bauer	602	.....	5CX1500A	12	355
Collins	831D-1	.....	5CX1500A	.....	354
Gates	FMS-2H	.....	5CX1500A	6	349
RCA	BTF-1+1E2	.....	(2) 4CX1000A	8	350
RCA	BTF-1/1E2	.....	(2) 4CX1000A	9	350
3 kilowatts					
AEL	FM-3KB	4.0	3CX3000A7	1, 2, 3	347
CCA	FM-3000DS	3.5	3CX3000A7	3	348
Gates	FMS-3H	.....	4CX5000A	6, 7	349
Standard	2012-3	.....	5924A	2, 3	351
Visual	DFM-3KA	.....	3CX3000A7	3	352
5 kilowatts					
AEL	FM-5KB	5.5	3CX3000A7	1, 2, 3	347
Bauer	603A-5	5.2	(2) 5CX1500A	.....	355
CCA	FM-5000DS	6.0	3CX3000A7	3	348
Collins	830E-1B	.....	4CX5000A	.....	354
Gates	FMS-5H	.....	4CX5000A	6, 7	349
RCA	BTF-5E1	.....	4CX5000A	2	350
Standard	2012-5	.....	5924A	2, 3	351
Visual	DFM-5KB	.....	3CX3000A7	3	352
Visual	DFM-5KC	.....	3CX10,000A7	3	352
7.5 kilowatts					
AEL	FM-7.5KB	8.0	4CX10,000D	1, 2	347
Gates	FMS-7.5H	.....	4CX5000A	6, 7	349
Visual	DFM-7.5KC	.....	3CX10,000A7	3	352
Wilkinson	FM-7500DS	.....	.....	.....	353
10 kilowatts					
AEL	FM-10KB	11.5	4CX10,000D	1, 2	347
CCA	FM-10000DS	12.0	3CX10,000A7	3	348
Collins	830F-2B	.....	4CX5000A	.....	354
Gates	FMS-10H	.....	4CX10,000D	6, 7	349
RCA	BTF-10E1	.....	4CX10,000D	2, 10	350
RCA	BTF-5+5E1	.....	(2) 4CX5000A	2, 8	350
RCA	BTF-5/5E1	.....	(2) 4CX5000A	2, 9	350
Standard	2013	.....	(2) 5924A	2, 3, 8	351
Visual	DFM-10KB	.....	3CX10,000A7	3	352
Visual	DFM-10KC	.....	3CX10,000A7	3	352
Wilkinson	FM-10000DS	.....	4CX10,000D	.....	353
15 kilowatts					
Visual	DFM-15KB	.....	3CX10,000A7	3	352
20 kilowatts					
AEL	FM-20KB	21.0	3CX10,000A7	1, 2, 3	347
Bauer	620	22.0	3CX15,000A7	3,5,11,12	355
CCA	FM-20000DS	22.0	3CX10,000A7	3	348
Collins	831G-1	.....	4CX15,000A	5	354
Gates	FMS-20H	.....	4CX15,000A	6, 7	349
RCA	BTF-20E1	.....	4CX15,000A	2	350
RCA	BTF-10+10E1	.....	(2) 4CX-10,000D	2, 8	350
RCA	BTF-10/10E1	.....	(2) 4CX-10,000D	2, 9	350
Standard	2014	.....	(4) 5924A	2, 3	351
Visual	DFM-20KB	.....	3CX10,000A7	3	352
Wilkinson	FM-20000DS	.....	4CX15,000A	.....	353
40 kilowatts					
Gates	FMS-40H	.....	(2) 4CX-15,000A	6, 7, 8	349
RCA	BTF-40E1	.....	(2) 4CX-15,000A	2, 8	350
Standard	(2) 2014	.....	(8) 5924A	2, 8	351

Notes

1: Regulated filament supply.
2: Running-time meter.
3: Grounded-grid PA.
4: Grounded-screen PA.
5: Automatic power-output control.
6: Variable-line PA tuning
7: Power-supply protective circuit.
8: Parallel-redundant transmitter with single output.
9: Parallel-redundant transmitter with two half-power outputs.
10: Field expandable to 20 kW.
11: Field expandable to 40 kW.
12: Stripline PA tuning.

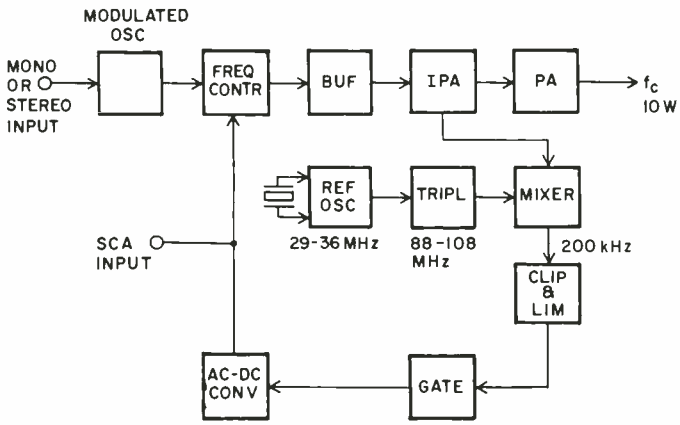


Fig. 3 Gates TE-1 exciter uses direct-carrier fm.

units and some are plug-ins. Direct fm is used, and the usual SCA output is from 1 to 4 volts of rms rf. Crosstalk between main and sub is at least 60 dB.

Complete Transmitters

Table 4 lists fm transmitters by power ratings. Each consists of a mono exciter and one or more Class C power amplifiers which produce the desired nominal output power. All are capable of handling stereo and SCA from suitable generators. All have silicon rectifier power supplies, automatic plate off-on recycling (three or four times under momentary overload), forced-air cooling, and remote-control capability. Many rigs use hi-mu, zero-bias, grounded-grid triodes in the PA, eliminating the need for neutralization.

PA tuning today is often done with a length of transmission line rather than a coil or a variable capacitor. The idea is to produce a design which is stable and doesn't need to be continually readjusted.

Bauer has introduced an innovation in PA tuning called *stripline*. A no-moving-contact system, it consists of two flat conductors separated by a dielectric, and is used in Bauer's 2- and 20-kW transmitters.

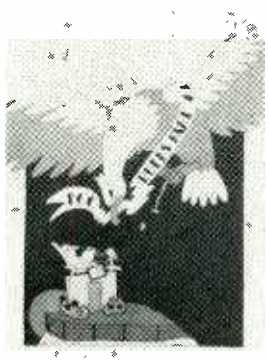
Redundancy Cuts Downtime

Parallel-redundant transmitters are popular and useful, since they offer built-in protection against station downtime while allowing the backup rig to work every day. It's relatively easy to parallel fm PA's driven by a common exciter, since you don't have to phase the outputs as precisely as in a-m or TV. Some transmitters include twin exciters, while others have only one, with a second available as an accessory.

Standard offers a parallel 10-kW transmitter, while Gates, RCA and Standard all make parallel 40-kW types. At the 2-, 10- and 20-kW power levels, RCA offers two kinds of parallel-redundant transmitters. For example, the BTF-10+10E1 is a 20-kW rig consisting of two 10's in parallel with a single rf output. It's used at a station with a single antenna array (horizontally or circularly, polarized) or at one with two arrays and a combiner network. The BTF-10/10E1 is the same rig with two half-power outputs. It's used at a station with separate horizontal and vertical antennas and no combiner. **BM/E**

TV Transmitters Go Solid-State

Lots of TV transmitters in use today still use design techniques that date back to the 1930's. Small wonder some color signals aren't all they should be. New design features and parallel-redundant operation make today's TV plants something else again.



SHORTLY AFTER World War II, when television broadcasting crawled out of its cradle and began to grow, there were only three TV transmitter types on the market and less than 100 TV stations were on the air, all vhf. Between 1947 and 1955 additional stations were built. Many still use their original transmitter (broadbanded for color). There has been little incentive to get a new vhf transmitter, for until recently there were few design innovations. Today, the picture is considerably different. Several manufacturers are using such things as a new type of visual modulation, solid-state exciters and parallel redundancy.

Uhf television began in 1953-54 with a short-lived boomlet. The first transmitters were low power and used no transistors. The design remained fairly static during uhf's dormant period of the late fifties and early sixties. By 1965, uhf operators had learned that the only way to compete successfully with vhf was to pump out superpower and saturate the area with rf. Manufacturers redesigned the old rigs to add power. Solid-state exciters appeared and some new companies got into uhf TV.

Table 1: Vhf TV Transmitters

		Visual						Aural			
Manufacturer	Type No.	Peak Power kW	Mod. Type[a]	A-m Noise dB[b]	Single Frame Ampl. Var.[c]	Output Pwr. Reg.	Diff. Phase deg.	Diff. Gain dB	Rms Power kW	Harm. Dist.	Notes	Circle no. on Reader Service Card
Ampex	TA-8000	1.5	i-f	−50	2%	2%	3	1.0	0.75	0.5%	4, 5	356
	TA-8000	6.0							4.0		4, 5	356
	TA-8000	18							14		4, 5	356
	TA-8000	25							18		4, 5	356
Gates	BT-1300L	1.3	i-f	−50	2%	3%	3	0.5	0.26	0.5%	6	357
	BT-13L	13							2.6		6	357
	BT-18L	18							3.6		6	357
	BT-25L	25							5.0		4, 6	357
	BT-35H	35							7.0		1, 4, 6	357
GE	TT-49-C	1.0	f_c	−51	3%	5%	3	0.5	0.22	0.5%	7	358
	TT-50-C	5.0							1.1		7	358
	TT-515-C	15							3.3		7	358
	TT-530-E	30							7.5		7	358
	TT-530-G	30							3.8		7	358
	(2) TT-515-C	30							7.5		3, 7	358
	(2) TT-530-E	60							15		3, 7	358
Philips	PT-6A	6.0	i-f	−54	2%	2%	3	1.0	0.6-1.2	1.5%		359
	PT-12A	12.5							1.2-2.4			359
	PT-17A	17.5							1.75-3.5			359
RCA	TT-5EH	5.0	f_c	−45	5%	7%	7	1.5	1.1	1.5%	1	360
	TT-6EL	6.0							5.5		2	360
	TT-12EL	12.5							2.75			360
	TT-25EL	25							7.0		2, 4	360
	TT-25EH	25							5.5		1, 4	360
	TT-25EH (LA)	25							2.75		4	360
	TT-30FL	30	f_c	−50	2.5%	3%	3	0.7	7.5	0.5%	2, 3	360
Standard	TL-623-2	2.0	f_c	−45	5%	5%	7	1.0	0.4	1.0%	8	361
	TL-653-3	5.0							1.0		8	361
	TL-614-4	10							2.0		8	361
	TL-624-2	17.5							3.5		8	361
	TL-624-2	20							4.0		8	361
	TL-634-3	25							5.0		8	361
	TL-644-3	35							7.5		3, 8	361
	TH-654-3	50							10		1, 3, 8	361
	TH-674-2	70							14		1, 3, 8	361

Notes:

1: High band only.

2: Low band only.

3: Parallel-redundant transmitter

4: Parallel-redundant visual PA's.

5: Optional rubidium frequency control with stability of 5 parts in 10^{-11}/year.

6: Stripline tuning of PA stages.

7: Built-in sweep generator for alignment.

8: Aural may be multiplexed into visual for emergency operation if aural fails.

9: Built-in test equipment includes frequency and modulation monitor, sideband response analyzer and oscilloscope and picture monitors.

10: Built-in rf envelope monitor.

Today eight manufacturers offer more than 50 type-accepted TV transmitters in power ratings from 100 watts to 110 kW. All are broadband and handle color with good linearity. Table 1 lists important specifications for vhf models. Unless footnoted to the contrary, all models will operate on both the low and high vhf bands. Table 2 shows specs for uhf transmitters.

There are two basic systems of visual modulation used today—carrier frequency and intermediate frequency. These two modulation techniques are the basic difference between general transmitter types.

The first technique, carrier-frequency modulation, is the older of the two. It was devised in the 1930's when electronic television first became a reality. It's still used by GE, Marconi, RCA and Standard. The carrier frequency is usually modulated in a high-level stage—1 kW or more. The exception is Marconi equipment, which is modulated at the 10-watt level.

The block diagram of Fig. 1, a simplified layout of the RCA TT-5EH transmitter, is typical of high-level, carrier-frequency modulation. A common exciter simplifies keeping the aural carrier 4.5 MHz above the visual. The master oscil-

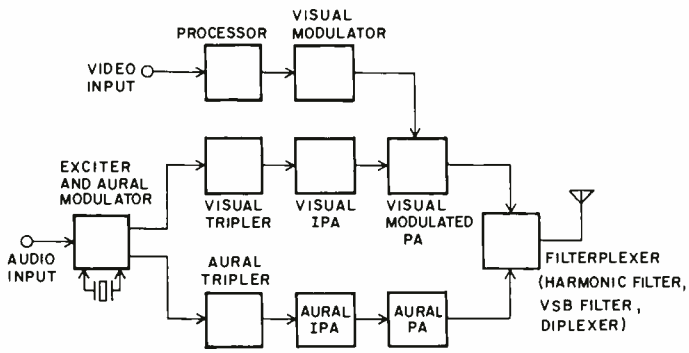


Fig. 1. Conventional carrier-frequency modulation is method used in RCA TT-5EH vhf television transmitter.

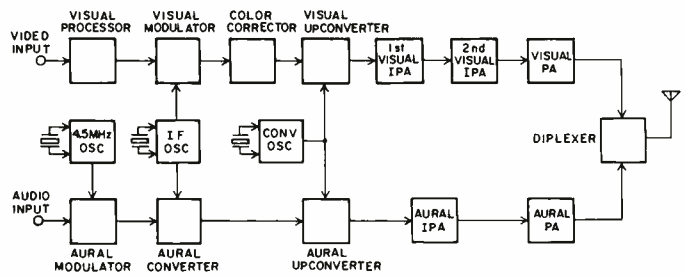


Fig. 2. Newer system is intermediate-frequency modulation as used in Philips vhf television transmitter.

lator operates at 1/36 the visual carrier frequency.

The audio input signal frequency-modulates the aural master oscillator by direct fm, and a feedback loop maintains the oscillator at the design center frequency. Several multiplier stages in two separate chains follow the master oscillator. There are two outputs—the frequency-modulated aural signal and the unmodulated visual rf signal. Each is 1/3 the respective carrier frequency.

Triplers then convert the signals to carrier frequencies, and IPA and PA stages furnish the required power to drive the line and antenna. Note that the visual PA is grid-modulated by the visual modulator. Preceding this stage, the video input signal has been fed through a processor stage for sync stretching and dc clamping.

The outputs from the two PA's are then fed to what RCA calls a Filterplexer. This circuit contains the vestigial sideband filter, the harmonic filter and coupling circuits which isolate the two PA's from each other while coupling both into the line. In other transmitters, there are separate circuits for these functions.

In the example of Fig. 1, the modulated stage is the 5-kW final. In higher-power transmitters using carrier-frequency modulation, the same circuit arrangement is used, but with an additional stage or stages following the modulated stage. Those additional stages are of course, linear amplifiers. Sometimes two tubes in parallel are used to obtain the required output power.

Intermediate Frequency Modulation

Recently, a new system of visual modulation has appeared in transmitters made by Ampex, Gates, Philips and Visual. The block diagram of Fig. 2, a simplified version of the Philips system, illustrates the method.

Three basic oscillators control the various frequencies in the transmitter. The i-f oscillator generates the basic frequency (somewhere in the range 30-40 MHz) used for visual modulation. The 4.5-MHz oscillator output signal is fed to the aural modulator. Modulated 4.5-MHz is then fed to the aural converter, which also receives the i-f signal. Its output is a frequency-modulated signal 4.5 MHz above the visual i-f.

Meanwhile, video signals are fed through a processor for sync stretching and dc clamping, and thence to the visual modulator, which receives its rf from the i-f oscillator. Hence visual modulation takes place at this low-power, low-frequency stage. The next stage is color correction, and the vestigial sideband filter and harmonic filter are also used at this point. Because of the low power level, the filters are physically small, relatively inexpensive, and comparatively easy to adjust.

The desired carrier frequency determines the frequency of the conversion oscillator. It simply furnishes the difference frequency needed to convert the i-f signals to the respective visual and aural carrier frequencies. This conversion is done in the two upconverter stages. The following IPA and PA stages are broadband linear amplifiers.

One advantage of the i-f modulation system is that modulation takes place in a low-level stage in the exciter. As in an fm transmitter, the exciter produces a complete, modulated signal, and you add as much power amplification as you need to produce the desired output power. Thus you can go on the air with the basic exciter and a 1-kW linear PA. When higher power is desired, you simply buy another PA, and continue using the exciter. Furthermore, better group-delay correction can be had at i-f than at carrier frequency.

Just as valuable in TV as in a-m and fm, parallel redundancy minimizes the possibility of being off the air due to transmitter downtime. Another plus—your backup equipment works, rather than standing idle most of the time. There are two kinds of redundancy: PA's and transmitters.

Many TV transmitters use two tubes in parallel as the visual PA stage. If either should fail, you simply run on the remaining tube at half power. But this system offers no protection against failure of the IPA, exciter-modulator or aural transmitter. Thus some manufacturers provide a single, full-power transmitter which is actually two complete, half-power rigs. In operation, a single exciter drives both power amplifiers, with the standby exciter available for switching in when the on-air unit fails.

In Tables 1 and 2, the same specifications apply to all transmitters made by a single manufacturer, with one exception: RCA's new vhf TT-30FL betters the performance of its older brethren.

Some specifications aren't listed and are somewhat similar from line to line. Visual sideband response is generally no more than 0.75 or 1.5 dB from the FCC curve; the FCC limit is 1.5 dB. Visual carrier frequency stability must be ±1000 Hz, according to the Rules. Most transmitters

Table 2: Uhf TV Transmitters

		Visual							Aural			
Manufacturer	Type No.	Peak Power kW	Mod. Type[a]	A-m Noise dB[b]	Single Frame Ampl. Var.[c]	Output Pwr. Reg.	Diff. Phase deg.	Diff. Gain dB	Rms Power kW	Harm. Dist.	Notes	Circle no. on Reader Service Card
Ampex	TA-10BT	10	f_c	−45	5%	5%	7		2.0	1.5%	8, 9	362
	TA-15BT	15							3.0		8, 9	362
	TA-30BT	30							6.0		8, 9	362
	TA-55BT	55							11		8, 9	362
	TA-60BT	60							12		2, 8, 9	362
	TA-100BT	100							20		2, 8, 9	362
GE	TT-55-B	0.1	f_c	−49	3%	5%	3	0.5	0.06	0.5%	7	363
	TT-56-B	15							3.5		7	363
	TT-57-B	30							7.0		7	363
	TT-59-B	55							11.5		7	363
	TT-61-B	60							13.2		4, 7	363
	TT-62-B	110							22		4, 7	363
Marconi	BO501	25	f_c	−50	2%	2.5%	3	0.5	2.5-12.5	1.5%		364
	BO500	50							5-25		3	364
RCA	TTU-2A	2	f_c	−48	3%	7%	6	1.5	0.225-2.8	1.0%		365
	TTU-10A	10							0.225-2.8		4	365
	TTU-30A	30							3.3-17			365
	TTU-50C	55							6-16		4	365
	TTU-50C1	55							6-16		3	365
	TTU-110A	110				3%			12-24		3	365
Visual	VTU-30A	30	i-f	−50	1%	3%	3	0.5	3-6	0.3%	8	366
	VTU-55A	55							6-11		8	366

Notes:

a: i-f: intermediate frequency; f_c: carrier frequency.

b: Rms value below 100% modulation.

c: Referred to sync peak.

1: High band only.

2: Low band only.

3: Parallel-redundant transmitter.

4: Parallel-redundant visual PA's

5: Optional rubidium frequency control with stability of 5 parts in 10^{-11}/year.

6: Stripline tuning of PA stages.

7: Built-in sweep generator for alignment.

8: Aural may be multiplexed into visual for emergency operation if aural fails.

9: Built-in test equipment includes frequency and modulation monitor, sideband response analyzer and oscilloscope and picture monitors.

10: Built-in rf envelope monitor.

manage 250 Hz on vhf and 500 Hz on uhf. Not so RCA; except for the new TT-30FL (500 Hz), all its rigs are specified at the 1000-Hz limit. The FCC specifies the aural carrier stability as ±1000 Hz of 4.5 MHz above the visual. Most manufacturers manage 500 Hz.

The modulation capability of most transmitters is specified as reference white, or 12.5 ±2.5 percent. RCA's TT-30FL makes it 10 percent, Gates claims 3 percent, and Ampex and Philips state zero percent.

Visual envelope delay tolerance is specified in three areas: 0.2-2.1 MHz; 3.58 MHz; and 4.18 MHz. The quoted figures, all in nanoseconds, are as follows: Visual, 50/20/50; Ampex and Philips, 60/30/60; Gates, 70/35/70; Standard, 75/40/75; GE and RCA, 80/40/80.

FCC rules require that harmonic attenuation below 100 percent visual modulation be at least 60 dB. All transmitters meet or exceed this value. Best figure is 80 dB, claimed for the Gates line and RCA's TT-30FL.

Aural frequency response of all transmitters is within 0.5 or 1.0 dB of the 75-μsec preemphasis curve. Aural fm noise is 60 dB down, and aural a-m noise 50 dB down, both from 100-percent modulation, or carrier deviation of 25 kHz.

All transmitters are capable of optional remote control; all have automatic recycling under overload; all have regulation of low-voltage power supplies; most have some form of interlocked starting sequence involving the blowers, the filament and plate supplies.

Except for the older RCA transmitters, all exciters are solid-state, sometimes even including the output stages. Power supplies use silicon rectifier stacks. The principal difference between vhf and uhf transmitters is that the PA in a uhf rig is usually a klystron, and the driver is often a traveling-wave tube. **BM/E**

BM/E Photo
One show's panel: Rudolf Steiner, Sonia Francis, Rev. Dana F. Kennedy, host Bill Burtenshaw. Producer is Daniel Fricks.

New Talk Show Hits Problems Head-on

Aired as a free public service, "Suggested Solutions" is an informative panel idea exchange that touches on some of today's stickiest social problems.

RADIO FORMATS today are generally in three categories: music, talk, and variety. And there are roughly three types of talk shows: the studio interview or panel discussion; the audience phone-in; and a combination of the above.

Probably the most interesting talk format is the controversial panel discussion. A current example of this program type is called "Suggested Solutions," a series of 24-minute noncommercial and free taped shows just starting on several hundred U.S. stations. Three proposals discussed on the program indicate its breadth: denial of bail for crimes of violence and vandalism; drugs made available to addicts for 25¢; and labor camps in the Pacific for second offenders.

The program's title comes from a book by that name written several years ago by iconoclastic puzzle manufacturer Rudolf Steiner. An unorthodox man with ideas from both the Old Right and the New Left, Steiner proposed radically different solutions to many social problems. After his book came out, he was interviewed on several radio and TV talk shows, and made an LP on the same theme. At Philadelphia's WCAU Radio, Steiner debated opposite Bill Burtenshaw, a New York program producer. Later Burtenshaw proposed to the NAB a panel-discussion program featuring Steiner and his ideas. Several stations liked the idea, and in July, 1969 the first show was taped and mailed to a few stations.

Series Is Free

Burtenshaw then placed an ad in a trade magazine offering a series of 26 programs, each 24 minutes long, in either mono or stereo, available without charge as a public service. "Frankly," says Burtenshaw, "I'm hoping to attract sufficient interest in this series to put together a similar, commercial program on television. In this business you have to gamble to make money."

Burtenshaw moderates the show, and Steiner introduces his unusual solutions to the panel, which includes: the Rev. Dana F. Kennedy, who represents conventional viewpoints; John W. Best, a public-relations man and professional party planner; Budd Hallowell, who introduced the Beatles in the U.S.; and a teenage girl reporter. (The teenager is Lynne Brunton, 18, on some programs, and Laura Fulton, 19, on others.)

Panel members generally know each other, and are not experts in any particular field, but are laymen instead. Although the topics are controversial, the panel members are polite, following ground rules and avoiding *ad hominem* arguments.

BM/E asked Burtenshaw about possible obscenities during a discussion. "It hasn't happened so far," he said, "and I doubt that it will; these people are fairly friendly. However, if someone accidentally used an unbroadcastable word, we'd clip it out of the tape before we released the program." We also queried Burtenshaw about the possibility of a program causing someone to invoke the Fairness Doctrine against a station carrying it. "I doubt that, too," he said. "We've deliberately balanced our panel to avoid slanting."

In late September, Burtenshaw had 13 shows in the can, taped in a radio studio. The next 13 programs were to be taped in Vesuvio's Restaurant in New York City. Burtenshaw believes the atmosphere of people eating and drinking contributes to the spontaneity of the show.

"Suggested Solutions" premiered August 3 on New York's WPIX-FM. Next, it was picked up by the Mutual Broadcasting System, starting October 5. The net carries it as a public service, under the auspices of the New Jersey Council of Churches. Some 90 other stations have scheduled it in cities where the Mutual affiliate didn't. And some 26 college fm stations are airing the show. Markets covered at this writing include New York, Chicago, Los Angeles, Philadelphia, Baltimore, New Orleans and Portland (Oregon).

For more information and availabilities write to: Radio & TV Roundup Productions, 111 Maplewood Ave., Maplewood, N.J. 07040. **BM/E**

Look at the Difference

Unretouched photographs of 21" studio monitor. Photographic data: Rolleiflex C-3, CPS color negetive film — ASA 100, 1/15 second at f/5.6

...after 3M Color Dropout Compensation

Here's what 3M's Color Dropout Compensator does for your VTR reproduction:

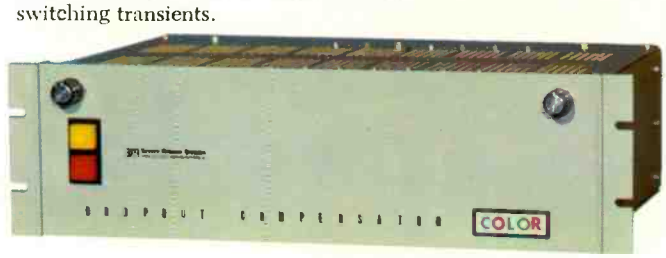
Look at this unretouched composite photograph of a studio monitor. It shows, at the left, a videotape playback with 13 electronically recorded-in dropouts. These dropouts were created by a special test generator which attenuates the RF level to the record driver. On the right, these dropouts have been completely restored by the DOC.

The black dropouts shown on the left are followed by a complete loss of color-lock in the direct color recovery equipment. Since these dropouts include horizontal sync and color burst, they cause transient color flashing not ordinarily attributed to the dropouts themselves. Even shallow dropouts can create a similar problem due to loss of side-band information.

Only the 3M Color DOC corrects all these effects.

After compensation, note the precise color match and complete freedom from switching transients. Also, the dropout disturbance to the time correction unit has been eliminated. Proc amp and servo stability are improved to such a degree that it is possible to play this tape in full intersync or pixloc mode.

In the compensated half of the photo, compare the replacement material with the original signal two scan lines above the dropout due to a *complete* frame being photographed. Try to find the 13 switching transients.



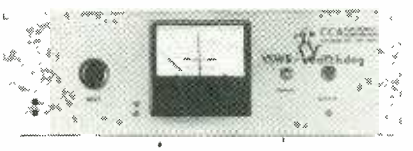
The 3M Color Dropout Compensator is the only system available that can provide proper color and luminance replacement. For details write for the booklet, "Compensating for Dropouts in Color Television Recording."

Mincom Division 3M COMPANY
300 SOUTH LEWIS ROAD • CAMARILLO, CALIFORNIA 93010

BROADCAST EQUIPMENT

VSWR meter/alarm

This device protects fm or TV station

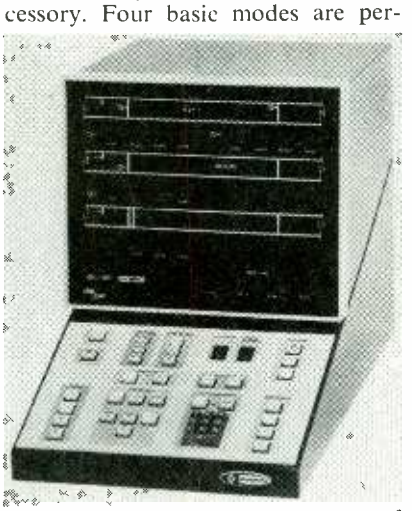


from excessive VSWR on antenna due to icing, loss of air pressure, etc., which might cause damage to transmitter. VSWR Watchdog by CCA Electronics Corp. includes meter which indicates VSWR and a meter relay which turns off transmitter and triggers built-in visible and audible alarms. Overload point may be set by user. May be reset from either local or remote point. Price: $345.

Circle 284 on Reader Service Card

Video editor

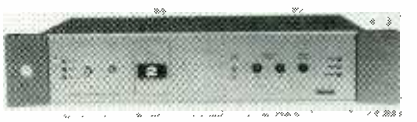
Designed to be used with broadcast quadruplex VTRs, the Vidicue 5000 editing system by Datatron uses a computer to direct tape editing. System will handle one, two, or three machines. More machines may be controlled by adding an optional accessory. Four basic modes are performed: cue/preview, control of single machine; sequential edit, assembly of scenes on the record tape from the playback; insert edit of new material on a prerecorded tape; and A-B roll, involving precise control and sync of three machines for effects. Control is a 30 pps code of 600 Hz frequency which is recorded on the VTR cue track.



Circle 299 on Reader Service Card

CATV demodulator

Converting color or black-and-white TV signals to video, the model 4500 demodulator uses plug-in rf converters for channels 2 through 13. Con-



version quality corresponds to a K factor of 2 percent or better on a 2T pulse. Has full chrominance amplitude with low chrominance/luminance delay difference of 50 ns. Video S/N better than 50 dB at 0 dBmV signal input level. Differential phase is 3° maximum. The demodulator may be used to analyze video waveforms, evaluate VITS and measure noise and color burst levels on carrier signals. Price is $990 for demodulator; $295 for each rf plug-in. Telemet, Inc.

Circle 292 on Reader Service Card

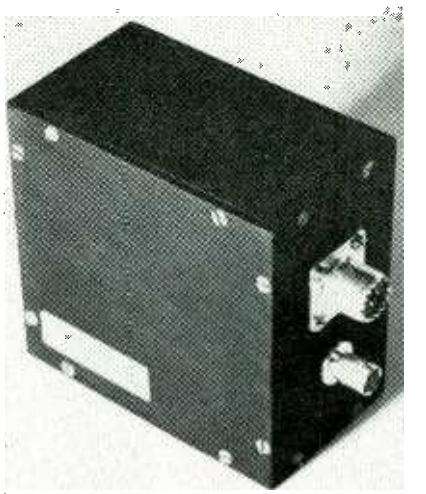
FET input scopes

Series 54 oscilloscopes have basic specifications of: vertical bandwidth from dc to 10 MHz; deflection factors from 10 mV/cm to 50 V/cm in 12 steps; sweep rates, from 200 nsec/cm to 2 sec/cm in 22 steps. Made by Telequipment Ltd., English subsidiary of Tektronix, series includes dual-trace model D54 ($550), single-trace S54A ($435), and S54U ($685), which is capable of being operated from internal batteries or external dc source, as well as from ac line. All inputs use FETs for maximum isolation.

Circle 303 on Reader Service Card

Hum stop coil

Specially wound toroid coil HSC-1 from Audio-Video Engineering Co. eliminates hum and other interference in video lines caused by differ-

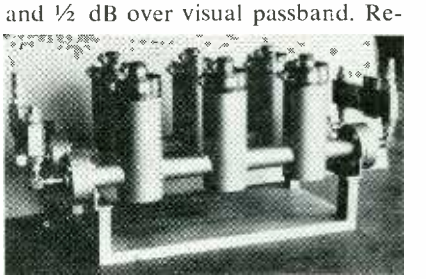


ence in ground potential between studio and remote or similar situation. The device is a completely passive and reversible, with no measurable deterioration of signals over the entire video bandwidth of dc to 6 MHz. Handles color as well as black and white. Price is $100.

Circle 309 on Reader Service Card

Uhf TV sideband filter

Vestigial sideband filter for TV transmitter use is made with instrument type $\pi/2$ hybrids, resulting in small package size so unit may be mounted inside final amplifier cabinet. Insertion loss is ¾ dB at visual frequency and ½ dB over visual passband. Re-



jection of color subcarrier is 30 dB. VSWR is 1.1 over 5 MHz visual passband. Unit is made by Micro Communications, Inc.

Circle 305 on Reader Service Card

IC Building Blocks

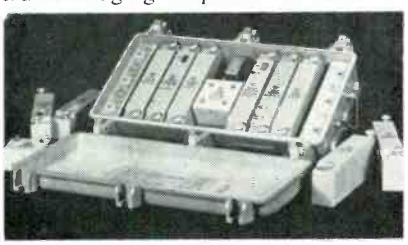
SL 600 series of communications circuits are IC's in TO-5 cans. Line includes SL 610 and SL 611 rf am-

plifiers, SL 612 i.f. amplifier, SL 620 and SL 621 agc generators, SL 630 microphone/headphone amplifier, SL 640 and SL 641 double balanced modulators. Series was designed and built in England by Plessey Microelectronics for use in a SSB communications receiver, and is now available in U.S. in single quantities and up. Only tuned circuits, inductors, and power supply needed to complete these circuits. These products are marketed in the U.S. only by Plessey Electronics Corporation.

Circle 312 on Reader Service Card

CATV amplifier

A two-way amplifier, the Unicom, accepts various modules which make it a trunk amplifier, a combination trunk-bridging amplifier or distribu-



tion amplifier. AGC and temperature control modules are also available. Further modules may be added which provide two-way communications, remote status monitoring for individual amplifiers, extra plant for dual cable operation, or standby plant to insure against breakdown. Cascade Electronics, Ltd.

Circle 296 on Reader Service Card

TV receiver/monitor

The Educator model 2100 VTR is an all-channel black-and-white TV receiver and monitor. It has a 75-ohm video input and a similar video output, thus can drive or be driven by a VTR or similar device. Video input and output are 1.0-1.5 V composite with negative sync. Audio input is low-level, high-impedance. Screen is 22 in. diagonal with antiglare faceplate. A lockable door covers front-panel controls to prevent unauthorized use. List price is $369.95 for 1-5; price for 6 or more units is $363.50. SC Electronics Inc.

Circle 297 on Reader Service Card

CCTV VTR

Remote control, electronic editing, and video/audio AGC are some features of helical-scan model VTR-720 video tape recorder by Concord Electronics Corp. It may be programmed to automatically record or play back on a continuous basis, or for a selected time period. It auto-

matically records or plays back, stops, rewinds, then begins again, or shuts off automatically, ready for the next use. Format is ½-in. tape, 12 ips tape-to-head speed. Price is under $1400.

Circle 304 on Reader Service Card

Counter/timer

Using a nine-digit readout featuring a light-emitting numeric display, the model 1100 programmable universal counter/timer by Monsanto Electronics has a measurement range up to 150 MHz. It totalizes from 0 to 10^8 and is prescaled from 10 to

10^{15}. Frequency ratio is measured from 10^{-8} to 10^{8}. Period average is from 0.1 μs to 1 second and period is measured from 1 μs to 10^{8} sec. Time interval is measured from 0.1 μs to 10^{8} sec. The standard clock is oven-stabilized and has stability of 7 parts in 10^{8} per week or one part in 10^{8} per day. Remote programming of time base selection, function selection, start/stop operation, trigger level, slope selection and display. Price: $1975.

Circle 281 on Reader Service Card

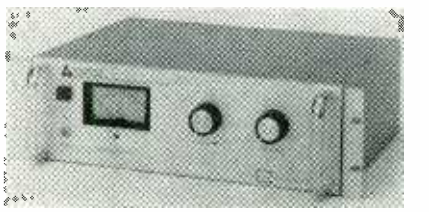
Film conditioner

Type CF2 ultrasonic film conditioning system cleans and coats TV film before projection. Also removes static and renders brittle film more pliable. Film may more safely be stored following cleaning and processing. Lipsner-Smith Corp.

Circle 287 on Reader Service Card

Color TV modulator

This top-of-the-line modulator for CATV service is solid-state and will accept either local or microwave input. Model CTM-2500 from Catel Corp. has an envelope delay equal-

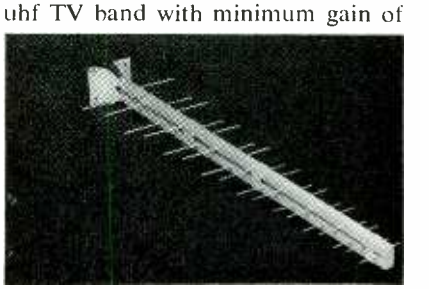


izing network which produces phase equalized color video standards. Video carrier frequency is crystal controlled to maintain stability of .001 percent, and audio center frequency is AFC controlled to insure maximum drift of 2 kHz. List price is $1050 and unit carries one-year warranty.

Circle 293 on Readre Service Card

Headend uhf antenna

Long-periodic antenna covers entire uhf TV band with minimum gain of



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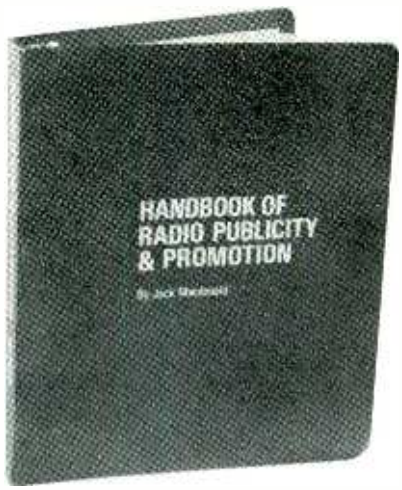

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The difference between a really successful radio station and one just a step or two above the mediocre is usually publicity and promotion—either the lack of it, or the wrong approach. Countless stations plod along year after year with just barely noticeable improvement, while many potential listeners are hardly aware of their existence. Then, there are the stations that seem to be on top—everybody talks about them—they sound involved with the community, and the financial picture usually matches, too.

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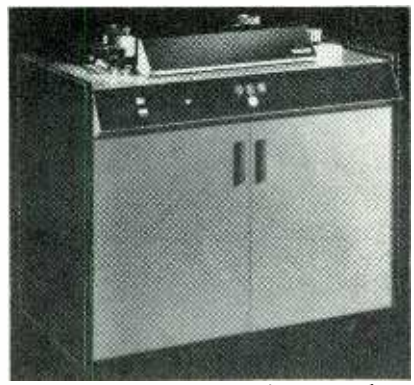
12.5 dB over isotropic source. Front-to-back ratio is 25 dB or better, while side lobes are attenuated minimum of 30 dB. Called the Mini-Channeler, antenna is priced at $228. Scientific-Atlanta, Inc.

Circle 294 on Reader Service Card

24-track player

Ampex model MM-1005 tape machine is a playback-only version of multi-track recorder, available in 8-, 16-, and 24-track versions. The machine is intended for mix-down duty when converting multi-track tapes to mono or two-track stereo, thus freeing multi-track recorders for recording. Cost varies from $11,500 to $22,750, depending on options and track configuration.



Circle 306 on Reader Service Card

Miniature earset

Designed for on-camera use by TV newsmen, announcers, and similar personnel, the Announcers Earset by Telex Communications Division is available with either 500 or 2000 ohms impedance, and three sizes of earmolds. A volume control allows the user to adjust gain to a comfortable level. When driven by 1 mW the earset produces a nominal 117 dB SPL at the ear. Frequency response is ±3 dB from 70 to 3200 Hz. Earset alone costs $12.46; with volume control, $14.70.

Circle 298 on Reader Service Card

Stereo equalizer

Ten octave band level controls are provided in each of the two channels of the Frequency Balance Control by Advent Corp. Device handles either stereo or mono, and level controls operate between 20 and 20,480 Hz. Allows flexible equalizing of any program source, or to equalize speech-reinforcement system in a hall. Equalizer may be switched out to provide straight-through amplification. Price is $200.

Circle 288 on Reader Service Card

CROSS-TALK

Dear BM/E:

Bravo for your July editorial! We agree with you 100 percent, even though we, as broadcasters, aren't in the cable business nor do we have an interest in pay TV.

We have maintained from the beginning that the NAB was doing its members a great disservice by fighting CATV and pay TV. Any effort to outlaw either of these is restraint of trade and a huge blow to free enterprise.

We are becoming more and more disenchanted with the NAB. The Code Board's recent action to phase out cigarette advertising is just another example of the way "our" trade association is yielding to government pressures and writing an end to the American system.

Robert A. Gates
General Manager
Station WFAH
Alliance, Ohio

Dear BM/E:

Regarding the article, "Phase Correction Holds Colors Steady," written by Rolf Drucker in your September issue, I'd like to point out a small discrepancy. Figure 2 shows the application of automatic delay lines to a video switcher. As shown, timing correction in the mix and effects busses is done by switching delay lines in and out.

If mix is feeding effects, then the delay lines ahead of mix are removed from the circuit, and vice versa. In such a case, use of the ADL isn't needed, and if ADLs are used as shown, they'll try to remove the effect of this necessary delay switching, since they appear to be referenced to a common subcarrier source whose phase is not corrected.

It would seem more reasonable for the automatic delay lines to correct video input phase errors by including ADLs in the primary busses Mix "A," Mix "B," Effects "A" and Effects "B." Alternatively, the delay-line switching could be eliminated, allowing the ADLs to take care of the double re-entry timing correction. In such a case, the ADLs must reach full correction within a period of one or two TV lines.

Ken P. Davies
Manager, Product Planning
Central Dynamics Ltd.
Pointe Claire, Quebec

Rolf Drucker's comments:
"Mr. Davies' observation is astute, and the point he raises was carefully

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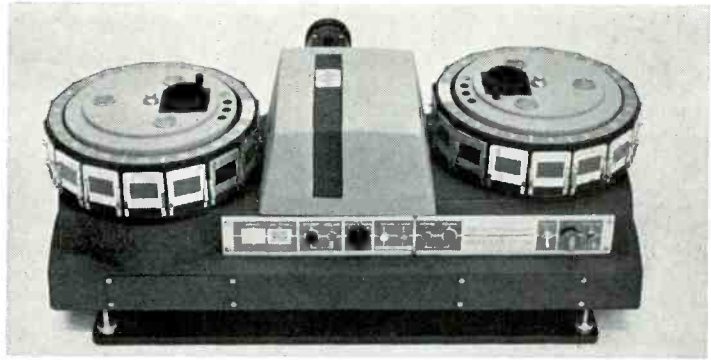

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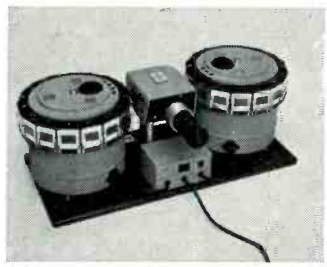

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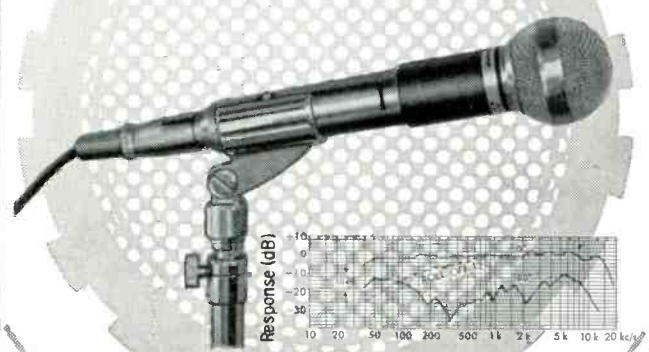

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considered when preparing the design shown in Figure 2 in the article. However, the delay networks D_E and D_M assure an equal video path length through all decks of the switcher. Thus there will be no phase error as seen by the ADLs following them.

"Should two signals enter the switcher with different subcarrier phase, the equal path length maintained by D_E and D_M will pass this difference on to the ADL which will then correct for it. The ADL will also correct for any small change in the delay of the mix or effects amplifiers.

"Keep in mind also that the delay network D_E, which makes up for the delay of an effects amplifier, is substantial, and beyond the range of the present ADL. New automatic delay lines with greater range are presently being developed. When these are available, and if they are referenced to raster timing as well as to subcarrier phase, and can correct fast enough, they will be able to do away with D_E and D_M."

Dear BM/E:

In a recent issue, you ran an editorial about piracy of SCA signals. As a background music operator, I am of course quite in favor of your comments, and was most interested to see you take this position editorially.

I would question your statement, "There's nothing clearly illegal about such sales and use, nor is there anything to stop a pirate from using these handy equipment sources." On August 5, the FCC made it clear that the Commission is of the opinion that the *"unauthorized home use* of the device would also fall within the interception and beneficial use proscriptions of Section 605." It is the Commission's opinion that any SCA communication which is intercepted without the consent of the originating station is a violation of Section 605.

We in the business have been successful in several instances of taking to task various pirates and effecting a judgment against them. In the case of the Lafayette Radio, they were, in my opinion, clearly slanting this to home usage where, of course, the Commission and ourselves maintain it is illegal to do this without our permission. You have only to pursue the various electronic magazines and from time to time you will see other people who are advertising the sale of this type of adapter and/or receiver under the guise that you can use it freely in the home to intercept the SCA services. Our ultimate goal is to dissuade the people from this illegal usage of such signals.

Robert W. Flanders
Director of Engineering
WFBM
Indianapolis, Ind.

We agree with you in principle but not in fact. Nowhere does the

FCC clearly state that purchase and use of an SCA detector in the home is in violation of the law. Further, there is no case that we know of where any legal action of any kind has ever been taken against an individual who listens to SCA programming in his home. Some of those popular electronics hobby magazines have even published plans for building your own SCA detector.

We're with you; we'd like to see an end to commercial piracy, but by no stretch of the imagination can home use be considered to be creating financial hardship for the operator. Further, it would be virtually impossible to enforce such an anti-piracy provision, even if home use were specifically prohibited. What we should really concern ourselves about as an industry are the commercial pirates. They're the ones creating a genuine financial hardship, and there are more than enough of them to worry about without bothering John Q. Hobbyist in his living room.

Dear BM/E:

Your September editorial on protecting SCA transmission really hits the target about pirates who steal, without license, the hard work and property of others.

We agree that an excellent way to track down signal theft is to have a list of people purchasing equipment suitable for SCA reception. In fact, it would be even better if sales were limited to those people actually working as background music operators.

The way we've been handling it is just the way you described it—if we hear our music being played in any public place, we check to see if they're a subscriber. If not, we send them a letter which points out that they're violating the law by intercepting our SCA signal without our permission.

Most of these people aren't even aware that they're violating the law. So, we've taken another, additional route—we publicize (as much as possible) the unlawfulness of such reception.

Another major step would be if publications were to refuse advertising from people seeking to market these devices. Magazines should likewise refuse to run articles that describe how to build your own SCA receiver. The National Better Business Bureau has sent letters to responsible media indicating that acceptance of such ads is in effect advertising equipment whose use is illegal.

Carl W. Schultz
WBMI
Meridian, Conn.

Focus on CATV

Continued from page 14

tems (CARS) for CATV originations and the short-haul microwave system for local distribution of cable television signals.

Permitting cable TV use of frequencies in the 12,700 and 12,950 MHz band of the spectrum previously reserved for broadcast television signals, the new CARS rules limit cable systems to a maximum of three channels for pickup use. Also, applicants for linking studios to headends in areas where cable facilities already exist, would have to show cause why they have chosen microwave. CARS facilities should be available for remote pickups from mobile units as well as carriage of CATV originated programming.

Called Local Distribution Service (LDS) by the FCC, the short-haul microwave system is to operate in the 12.7 to 12.95 GHz band. According to the Commission, a system for local distribution of CATV signals by means of radio waves would "avoid the expense and difficulty involved in the use of trunk line cable in large cities and remote areas." Facilities would be used for both the relay of broadcast programs and program material originated by system operators and others on leased channels. The FCC said that apart from the relay of TV broadcast signals and television programming originated by the CATV operators and others on leased channels, the same procedure would be followed for any other service proposed in an LDS application.

The Commission action stemmed from a Notice of Proposed Rulemaking last February which requested comments on whether a need existed for the service, whether a showing would be required before microwave could be used instead of cable facilities and whether there would be an "undesirable impact" on television stations sharing the same frequencies. At the same time, the FCC approved an experimental operation by TelePrompTer Corporation and Hughes Aircraft Company in New York City and several small Oregon and New Mexico communities. Dubbed Amplitude Modulated Link (AML), this local microwave system differed from the LDS mainly in operating in the 18 GHz band instead of the CARS band.

Convention Log

Continued from page 27

with the biggest audience around —40 million kids under 11 years old—out of its ignorance. He recommended that public TV stop letting commercial TV have the whole $20 million profit to itself from an estimated $90 million revenue. He recommended that educational TV people use animation particularly in titles and fund-raising spots (which he called no fun, too heavy and unimaginative to spark people to open purse strings).

Computer animation was presented by Fred Atkins, district sales manager for Computer Image Corporation, Denver Colorado. This is internally generated animation by computer and is said to be the only one of its kind. Main difference between this animation computer and others: this one uses an analog system, not digital. It is said to be less expensive and to require much less preprogramming than digital types. The machines lets the artist have direct control over the results—both esthetically and technically. Only drawback mentioned is color quality. The computer offers 54 colors at present, but color brilliance isn't assured. They're working on improving the computer color.

Computer Image is now installing the first computer in Los Angeles, then, hopefully, in New York.

Mini-Mote Bows

Fred Rebman, general manager of WJCT(TV) Jacksonville, described his station's two Mini-Motes. Each is a two-camera remote package including microwave and a helical VTR which can be set up on location in 15 minutes. Using such equipment, the station does a lot of local news coverage, a technique popular with its audience.

Calvin Watson, general manager of KWSU, State University at Pullman, Wash., showed a film and discussed the scheduled $2.8 million communications building soon to be built on his campus. It will house the university's school of communication as well as fulltime radio and TV stations and a campus carrier-current station manned by students.

Leroy Lastinger, executive vice president and general manager,

Convention Log

Continued from page 57

WEDU(TV) Tampa, used slides to show his proposed physical plant for a community television station. WEDU recently put $500,000 into a new transmitter, antenna and tower to increase coverage. Next comes a new studio plant. Lastinger plans to built an office building at the transmitter site and help pay for the new installation with building rentals.

William Kroll, operations supervisor of WTIU(TV) and WFIU (FM) Bloomington, Ind., reported on his ITV station and community-programmed fm outlet, both owned and operated by Indiana University. His building houses the radio-TV school, a videotape duplicating facility, fm and TV studios and transmitters. Additionally, the journalism school has a news gathering and writing facility in the same area. Kroll said his studio area was built with floor ducts for cables, but these filled up rapidy. A better idea is what he now uses—wire basket troughs near the ceiling. The cables are simply laid in the trough, and are much more accessible for troubleshooting or replacement.

Fm/TV Interference

An unusual problem—fm/TV adjacent-channel interference was discussed by William J. Kessler and Michael Wilhelm, both of William J. Kessler & Associates of Gainesville, Fla. Educational fm stations occupy channels at the bottom of the fm band, right next to TV's channel 6 audio at 87.75 MHz. Thus in the area surrounding the fm transmitter, TV viewers get interference from fm. The paper explained how a new educational fm station was put on the air in Milwaukee while keeping interference to WITI-TV on channel 6 there to a minimum.

The interference depends on several factors—location, frequency and power of both stations. The worst place for the fm transmitter is on the TV's Grade B contour. The best place for the fm transmitter is at the TV transmitter site, since then both signals are fairly equal in strength.

Kessler and Wilhelm used an fm antenna of about the same number of bays as the TV, mounting it on the same tower as close as possible to the same height. Their object was to match nulls in the two patterns to obtain nearly equal field intensity. They used only horizontal polarization to avoid inducing interference in the vertical rabbit ears used by urban TV viewers.

Computerized Allocations

Richard Ocko of the Pennsylvania Department of Education delivered this paper. Although the FCC does not allocate educational fm channels, as it has done with commercials, Sec. 73.502 grants authority for statewide educational fm plans. Pennsylvania therefore decided to plan for maximum statewide coverage using existing and proposed stations. All existing and CP stations in and near Pennsylvania were grandfathered and new outlets were projected with a computer including Classes A, B, D, and a proposed new F (250 watts at 100 feet AAT). On two cases they proposed switching frequencies and using directional antennas at existing stations to allow more efficient use of frequencies. The result is that nearly every square mile of the state is served by at least one educational station. **BM/E**

NAMES
IN THE NEWS

Shelby Young

Arthur Brymer

Shelby F. Young has been named president of Allied Radio Corporation, and has subsequently named **Arthur O. Brymer** to the newly created post of vice president, controller.

The NAB has announced three new appointments: **Paul B. Comstock** as vice president and general counsel; **John B. Summers** as chief counsel and head of the NAB legal department; and **Victor C. Diehm,** newly elected president of the Mutual Broadcasting System, as the network's representative on the NAB board of directors.

Paul K. Taff, director of children's programming for NET at New York City, is to be president of the Connecticut Educational Television Corporation as of January 1.

FCC Chairman Dean Burch has appointed **Robert V. Cahill** to the post of administrative assistant. Cahill had been legal assistant to Chairman Hyde.

Irwin "Sonny" Fox, producer and host of various children's programs, has been elected president of The National Academy of Television Arts and Sciences; he is to take office June 15, 1970.

James Wilsor

Karen Layland

James L. Wilson has been named vice president and general manager of the audio-video systems division of Philips Broadcast Equipment Corp.

Karen Layland has been appointed administrative director—supervising New York offices and coordinating member services—of the National Association of Fm Broadcasters.

General manager of WIOD Radio, **James W. Wesley,** has been appointed vice president of Cox Broadcasting Corporation.

President Nixon has appointed **Caspar W. Weinberger,** director of finance for California, to the chairmanship of the FTVC.

Charles Snider

Max Ellison

Charles C. Snider has been named executive vice president of IVC.

Max Ellison is new Dynair Elec. v.p.

NEW LIT

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

"Telecommunications Equipment" is a 134-page Collins catalog of systems and equipment. Write: Director of Telecommunications, Collins Radio Company, Dallas, Texas 75207.

Videographic kit including six sheets of lettering, four sheets of illustrations, 12 reusable visual boards, a lettering level, letter removal tape, burnishing tool with crafting point, felt tip pen, desk top easel and instruction book is yours from Sony Corp. of America for $39.95. **209**

International Radio Regulations 1968 edition is available from the Secretary General, International Telecommunication Union, Geneva, Switzerland. Price for 850-page volume, which also includes 1959 Radio Regulations, is $6.54 paperbound and $7.01 looseleaf binder. Indicate English, French or Spanish edition preference in orders addressed to: Secretariat of the International Telecommunication Union, Place des Nations, Geneva, Switzerland. Include an international check or money order with order.

Microwave interference analyzer/receiver Model NM-65T is the subject of a Stoddart Electro Systems' brochure. **211**

Right-angle 50-ohm cable plug for miniature coaxial cables for the SRM[R] series of miniature rf connectors is described in product bulletin from Sealectro Corporation. **212**

Switches—44 pages worth—are the subject of Cherry Electrical Products Corporation's "Master Catalog." **213**

The CC-330 TV camera system for closed circuit TV studio use **(207)**, the VR-7400 time lapse closed circuit videotape recorder for educational applications **(208)** and the BR series of omnidirectional and directional uhf antennas **(206)** are described by Ampex Corporation.

"Tape Head Replacement and Conversion Guide" (form #8001) is the title of the sixth edition, condensed version of a Nortronics Company annual guide. **210**

"A-m Wireless or Radio (STL) Remote Control" is the title of Moseley Associates' four-page brochure. **205**

FCC ACTIONS

Commission action, December 26, 1968—granting Prescott TV Booster Club Inc. application for vhf translator station and denying H & B Communications Corporation's petition for denial of application or designation for hearing—has been reversed by the United States Court of Appeals for the District of Columbia Circuit.

Applications have been granted—for assignment of license of WALA-TV, Mobile, Alabama, from Roywood Corporation to Universal Communications Corporation for a consideration of $4,750,000, and for transfer of control of WRVA Radio Inc. and WRVA-FM Radio, Inc., licensee corporations of WRVA-AM-FM, Richmond, to Southern Broadcasting Company, Winston-Salem, N.C. for a consideration of $3,075,000.

Construction permit has been granted to Pacifica Foundation for a new noncommercial educational fm station to operate on channel 211, Houston, Texas, with erp of 47 kW, antenna height of 430 ft and remote control permitted from main studio. Issuing a dissenting statement, Commissioner Robert E. Lee pointed out his "increasing concern about the number of complaints we have received concerning obscene, indecent, or profane language broadcast over Pacifica Foundation's Los Angeles, San Francisco and New York City stations."

Authorization has been made for the Communications Satellite Corporation to construct three stations using noncommon carrier frequencies and for RCA Alaska Communications Inc. to construct facilities at Anchorage, Alaska, for a microwave link between the Alaska satellite earth station scheduled to become operational about July 1, 1970, at Talkeetna and Anchorage, Alaska.

Assignment of vhf TV channel 13 to Mount Vernon, Illinois, has been approved in an amendment to Section 73.606(b), and ACTS has opposed the reallocation of the channel, charging the Commission "with sloughing off the question of impact on uhf stations by this decision." This is the first TV assignment for Mount Vernon; there is no commercial assignment or station within 50 miles of the city.

No further action warranted has been ruled on consideration of complaints of news slanting by CBS in its documentaries, "Hunger in America," and "Poor People's" Campaign." The Commission said that it wouldn't enter situations where the dispute involved the "truth" of a matter, as when a person says he wasn't quoted correctly in a newscast. It said it isn't the "national arbiter of the 'truth'" and cannot enter the "quagmire" of such an investigation.

Notification has been sent to Straus Broadcasting Group, Inc., licensee of WMCA, New York City, that its introduction of responses by candidates to its editorial endorsement of Mayor Lindsay would "provide additional exposure" for its own viewpoint and "result in an imbalance inconsistent with the Fairness Doctrine . . ." A representative of Democratic mayoralty candidate Mario A. Procaccino had contended that the

station's identification of the speaker before and after each response, including the phrase, "replying to WMCA's endorsement of Mayor Lindsay for re-election," was unfair and a violation of the Commission's rules.

Renewal of the license of WIIC-TV, channel 11, Pittsburgh, Pa., has been granted subject to the outcome of a pending civil antitrust action in which Cox Broadcasting Corporation is a party defendant, and subject to the requirement that the licensee immediately notify the Commission of the final disposition of the case.

Applications for voluntary assignment of licenses of WHIM and WHIM-FM, Providence, the stations' remote systems, and Subsidiary Communications Authorization, from Golden Gate Corporation to Culligan Communications Corporation has been granted for a consideration of $450,000.

Petition for reconsideration and application for review filed by Karin Broadcasting Company, a corporation representing a majority of the employees of the interim operator of former a-m radio station KWK, St. Louis, has been denied. Karin filed its requests on August 4, 1969, as part of its continuing opposition to Commission actions approving joint request by eight applicants for assignment of the license for 1380 kHz.

Notices of apparent liability for forfeitures have been received by licensees including: Mount Airy Broadcasters Inc., of WSYD, Mount Airy, N.C., for $1800 for failure to have properly licensed operator on duty, to maintain operating logs and to operate power within allowable tolerances; Evergreen Broadcasting Corporation, of KFDR, Grand Coulee, Washington, for $750 for failure to operate at times specified in license; WIOO Inc., for $700 for failure to employ one or more operators with valid radiotelephone first class operator licenses; Eller Telecasting Company of Arizona, of KBLU and KBLU-TV, for $500 for failure to file a copy of a time brokerage agreement between KBLU-TV and one Mario Canez within the prescribed time limit.

The Voice of Reason, Inc., temporary operator of radio broadcast station KICM in Golden, Colorado, has ceased as of October 23, 1969, operation pending the outcome of a hearing to determine qualifications of the applicant and whether it participated in an unauthorized transfer of control of the station.

Assignment of Class A fm broadcast channels in each of nine communities has been ordered effective from December 1, 1969: Ark-La-Tex Broadcasting Company, Atlanta; Lloyd E. Klobe, doing business as Radio Station KVLG, La Grange, Texas; Gene R. Smith, Lake Village, Arkansas; Cedar Valley Broadcasting Company, Waverly, Iowa; Tomahawk Broadcasting Company, Tomahawk, Wisc.; Avon Electronic Services Inc., Avon Park, Fla.; WRND, Durand, Wisc.; Robert D. Ditmer, Grayling, Mich.; and Francis L. Hollan, Canton, Mo.

Voluntary application for assignment of licenses of stations WLBW-TV, Miami, and WCKY(AM), Cincinnati, from L. B. Wilson Inc. to Post-Newsweek Stations, Florida, Inc., for about $19,600,000.

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Immediate opening for chief engineer for technical aspects of new color ITV and broadcasting instruction. Instructor's rank; additional summer salary. B. A. or B. S. degree required with first phone and CCITV experience preferred. Send resume to Mr. Klos, Texas Woman's Univ., Box 23775, Denton, Tex. 76204

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HELP WANTED. Educational television director. Degree required. Also studio technicians —experienced. Write: Joseph A. Minahan, Worcester State College, 486 Chandler St., Worcester, Mass.

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First Phone. 2 yrs. Howard Thayer, 651 Manchester, ISU. Normal, Ill. 309-436-6147.

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FROM THE EDITOR

Freedom Be Damned

We've heard quite a bit about freedom of the press lately, especially after speeches by Vice President Agnew and the almost predictable reaction from broadcasters. The big question we have to ask ourselves as an industry: Is Agnew simply engaging in a favorite national pasttime, or is there some validity in his accusations?

We have ourselves been witness to a particular kind of news censorship imposed by not only the newspapers, but TV and radio newsmen as well. It's the censorship of omission, either because the event doesn't seem significant enough to someone to merit coverage, or simply because of short staffs. A case in point is the recent twin Washington and New York demonstrations by BEST (see page 6, "BEST Takes its Fight to NAB Doorstep"). This double demonstration was completely ignored by the networks, the wire services, by virtually everyone in the mass media, at least in New York.

In a recent syndicated commentary on the Mutual Network, Fulton Lewis III pointed out that only the bad news seems to be picked up by the mass media. Good deeds and happy events are largely ignored. A highly ironic case documented by Lewis was the recent award to Detroit resident Bronson Gentry. Gentry received this year's Lane Bryant volunteer action award. Present at the ceremony as principal speaker was former governor George Romney. Detroit's Storer-owned WJBK-TV declined to devote one word of news coverage to this event. The station was also offered free of charge a six-minute color documentary on Gentry's volunteer work. Thumbs down on that one too. Yet Storer spends many advertising dollars in trade magazines telling the Storer story—how Storer stations are so public-spirited and doing so much in the public interest.

Censorship by involuntary omission or censorship by design—it's all the same when the broadcasting industry comes under fire from public officials. No matter what we may think of Vice President Agnew as a person or as a public official; no matter what we think of his public statements; no matter how we categorize others who point their fingers at broadcast news; there's obviously something wrong —something that can be corrected with some little effort.

Last October New York's Governor Rockefeller proclaimed the Long Island Railroad "the best in the country." Never mind that the railroad was still nearly the worst; he proclaimed this fact, and therefore it was. By the same token, just saying a station is community-minded doesn't make it so. You have to work at it. And this work doesn't stop with one documentary about slums and one about air pollution every six months or so. It means a constant, continuing involvement. It means spearheading new civic campaigns, slum programs, pollution cleanups. It means being a leader, not a follower. And it means giving your audience all the news—the not-so-sensational as well as the news that helps sell the papers. Until that happens, we're all open to potshots.

Walter G. Salm
Managing Editor

PRODUCT INDEX

A quick reference to products mentioned editorially or in advertisements. Page number is listed first (light face type) followed by reader service number (bold face).

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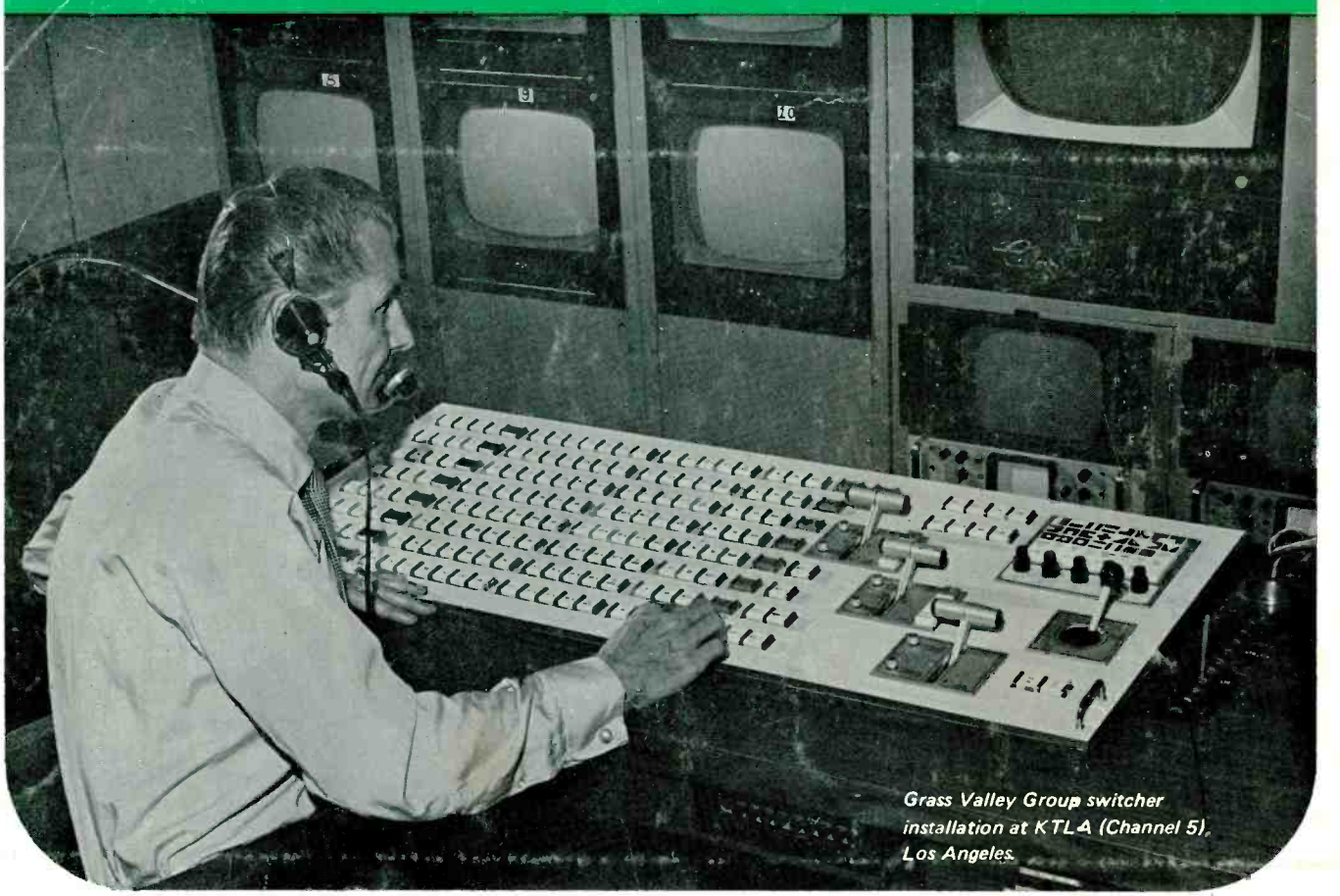

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