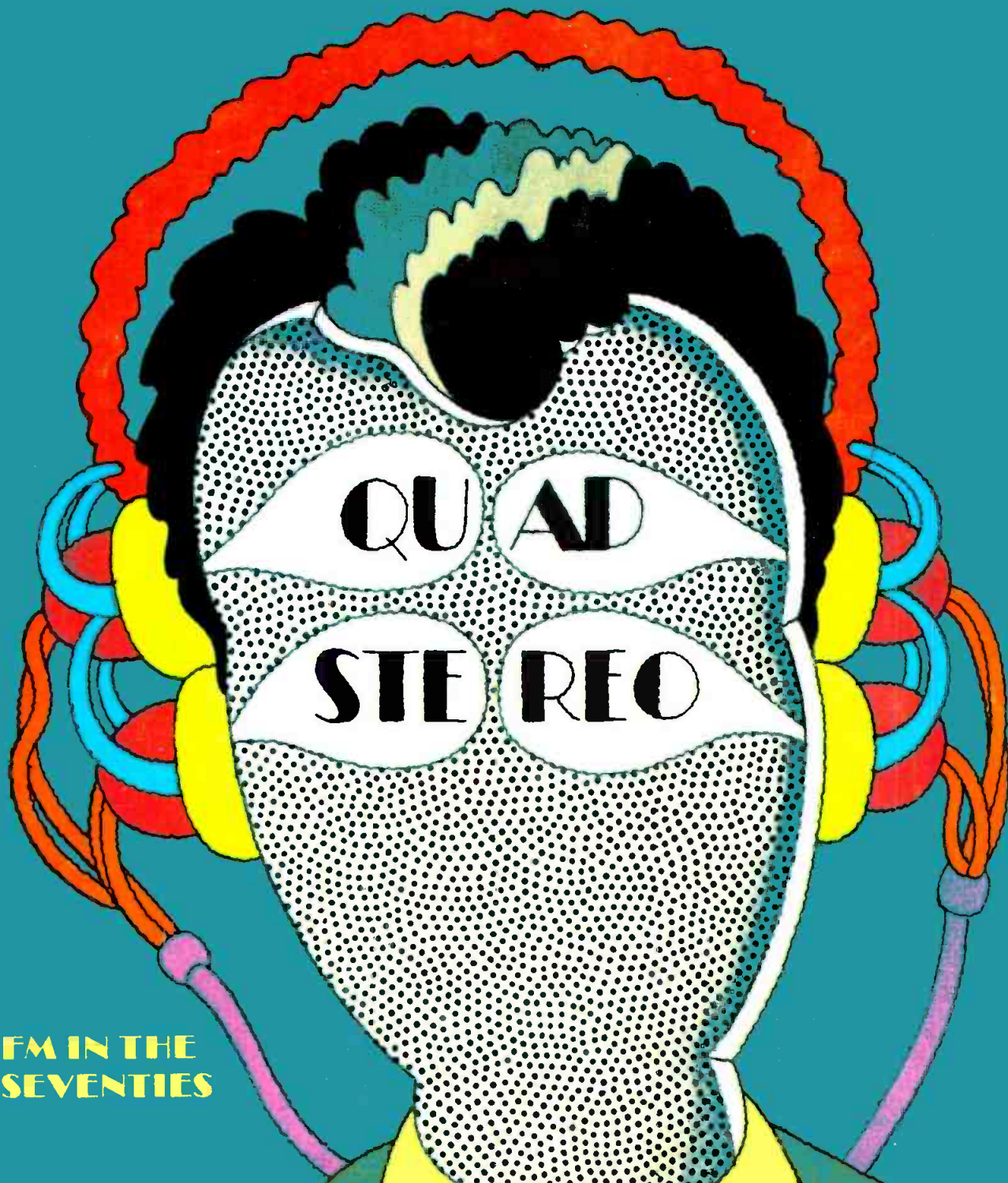


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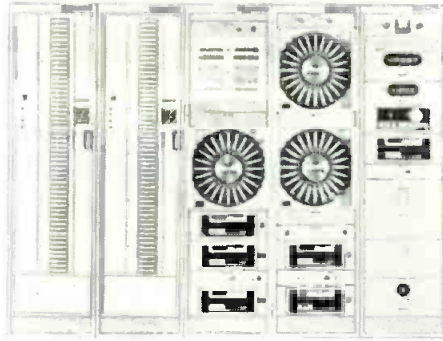
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This month's cover: Fm is gaining ground in most markets and some fm-ers are even experimenting with something new—quadasonic stereo. Why four-channel stereo? Because it's the "in" thing and represents the next major change in fm broadcasting—as depicted in Art Sudduth's cover concept for this month. For more on quad stereo and other fm features, see pages 20-31.

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The latest thing in fm is four-channel broadcasting. Current state of the art is about where stereo was in 1957.

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Piracy is a problem in some markets, but new uses for SCA and quad may make SCA income less attractive.

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Britain has come up with a cable system that works like telco dial central exchanges, with two-way operation possible.

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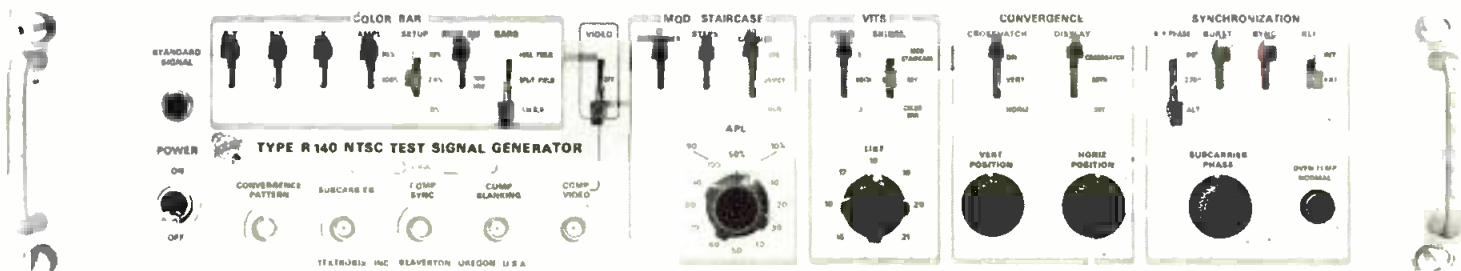
BM/E, Broadcast Management/Engineering, is published monthly by Mactier Publishing Corp. All notices pertaining to undeliverable mail or subscriptions should be addressed to 820 Second Ave., New York, N.Y. 10017.

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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BROADCAST INDUSTRY NEWS

To conglomerate or not to conglomerate

The Justice Department and Vice President Agnew aren't the only federal government agency (see *BM/E*, November, 1969, p. 11) and official concerned by the existence of large mergers and conglomerates in the broadcasting industry. For the FCC joined the fracas late last December in sending pilot questionnaires to parent corporations of six major broadcast licensees "to obtain facts about the effects, hazards and benefits of licensing radio and television stations to such companies."

This mailing culminated a study announced by the Commission's Conglomerate Task Force a year ago and begun last summer in a notice of inquiry, Docket 18849. The companies that received the ten-page form included: Avco Corporation, Chris-Craft Industries, Inc., Cox Enterprises, Inc., Fuqua Industries, Inc., E. W. Scripps Company and Travelers Insurance Company. According to the Commission, these were chosen "because they are representative of three major groups of broadcasters coming within the scope of the inquiry:

- Licensees with substantial and diversified nonbroadcast interests (Avco, Chris-Craft and Fuqua).
- Licensees with substantial nonbroadcast interests in other mass media, primarily newspapers and some cable television systems (Cox and Scripps).
- Licensees whose nonbroadcast interests are primarily in a single large enterprise or groups of closely related enterprises (Travelers).

Responses to the initial forms, said the FCC, "will enable the Commission to test the effectiveness of the questionnaire as a means of eliciting useful information concerning the effects of conglomerate ownership of broadcast stations, primarily on program services to the public and on competition in the broadcast industry."

Among other things, the questionnaire called for the submission of documents containing or reflecting parent company instructions to broadcast subsidiaries and reports from broadcast subsidiaries to parent companies. In cases where a parent company acquired a first broadcast station since January 1, 1959, or considered and rejected the acquisition since then, reports and analyses considered by the board of directors were requested.

The questionnaire inquired into matters like arrangements for pre-clearance by the parent companies of broadcast programs and safeguards designed to prevent the companies' nonbroadcast interests from affecting station programming in a manner detrimental to the broadcast service.

Other Questions

Conglomerate licensees were also asked to specify any ways in which they think their ownership of nonbroadcast enterprises may have benefitted their broadcast service with regard to station programming, the enhancement of competition in the industry, the development of technological innovations, or otherwise. In addition, licensees affiliated with newspapers were asked to provide information about any sharing of staffs or services by stations and affiliated newspapers, and the maintenance of common or separate controls over the editorial policies of each. Other questions related to cable television systems under common ownership with broadcast stations and newspapers serving the same communities.

Avco Corporation deals with financial services and manufactures airplane and industrial engines and parts, aircraft-frame components, missile and space products, defense and industrial electronics, weapons, ammunition and heating equipment. Fuqua Industries is involved

in photo processing, trucking, agricultural equipment, power lawn mowers, mobile homes, pleasure boats and real estate. Chris-Craft Industries Inc. holds manufacturing interests in auto interior textile trim, cotton, automotive carpet, boats and chemicals. Cox Enterprises Inc. and E. W. Scripps Company have significant newspaper interests; while Cox subsidiaries have cable TV interests in 32 communities. As for Travelers Insurance Company, its only broadcast properties are WTIC-AM-FM-TV and nonbroadcast interests in insurance, real estate and financial services.

There was no indication at deadline whether the FCC study and mailing would affect the early December merger agreement between data and business information-service company, Dun & Bradstreet, Inc., and Corinthian Broadcasting Corporation for a proposed \$134 million. According to the companies' agreement, Corinthian would become a wholly owned subsidiary of D&B.

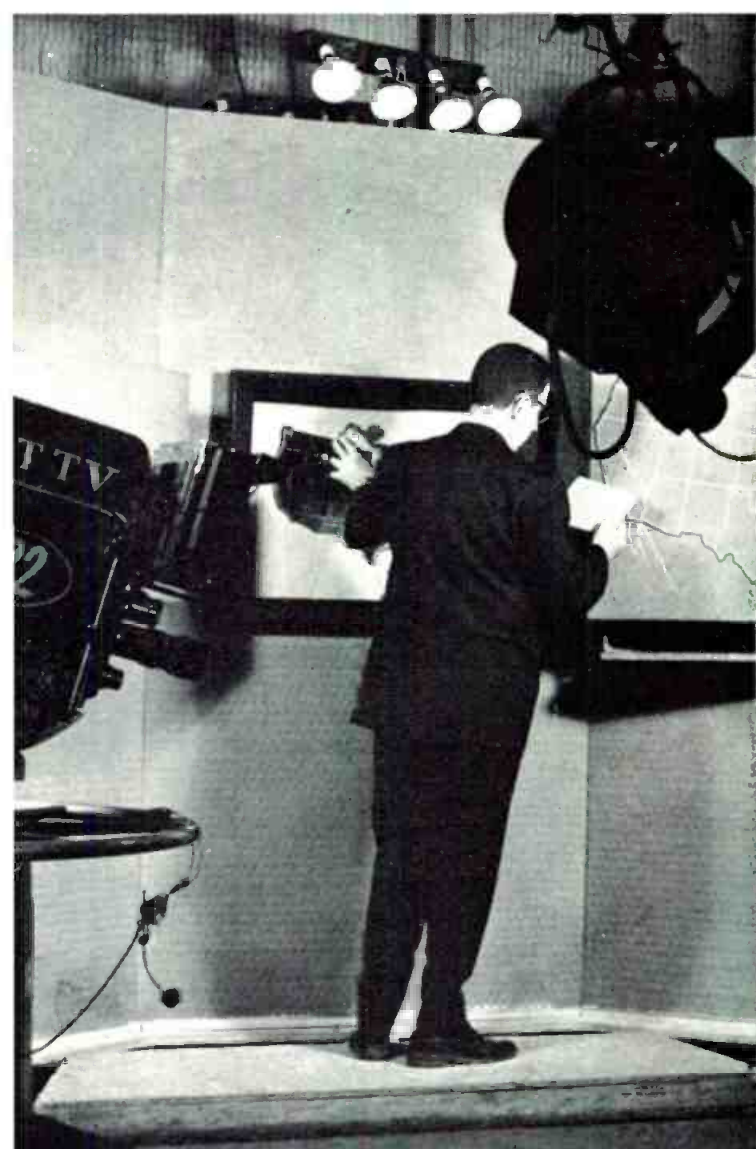
The companies' response to the questionnaire has been negative to date. In an early January letter to FCC Chairman Dean Burch, they questioned the mailing's propriety, "if not legality," and their selection.

Senate committee gets revised copyright bill

Early last December, the five-member Senate Subcommittee on Patents, Copyrights and Trade Marks topped off about three years' work on the 61-year-old basic copyright law by sending an entirely new copyright bill to its parent Senate Judiciary Committee.

Anxiously awaited for months by the NAB, film copyright owners and the NCTA (see *BM/E*, December, 1969, pp. 8, 11), the CATV section of the bill, Section III, recommends:

- A formula for computing



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CATV payments to copyright owners: one percent of the first \$160,000 annual gross receipts; two percent of the next \$160,000; three percent of the third \$160,000; four percent of the fourth \$160,000; five percent of all over \$640,000; and another one percent for each channel added by special permission of the FCC.

- Copyright owners must give license to CATV operators so that they can "give adequate TV service."—three networks, three independents and one ETV in the top-50 markets and 3-2-1 in all other markets.

- CATVs can carry all Grade B signals covering them.

- CATVs outside Grade B of any station can carry all signals they want, provided they carry nearest stations first.

- In top-50 markets, stations get full run-of-contract exclusivity protection.

- All existing CATVs can continue to carry all signals now grandfathered, but they must respect sports blackouts.

- FCC can maintain present carriage and nonduplication rules.

- Restrictions on carriage of overlapping markets are eliminated.

- CATVs get compulsory license to carry a-m and fm signals.

The bill has a long way to go before it can be considered even as a potential law. For a struggle is expected when and if the bill gets to the Senate floor, the Commerce Communications Subcommittee is expected to have a bout with it and only then can the House begin to consider it.

At this writing, the only group that has accepted the bill in principle is the NCTA. M. William Adler, national chairman, wrote to members on December 18 that the NCTA "reserves the right as the bill proceeds through the legislative proceeds to work with Congress to improve, clarify and even to dissent if necessary in order to insure that it provides the best opportunity to serve the public interest." Adler wrote that the CATV industry's willingness to pay copyright royalties is "a longstanding position" and he cited several gains that have been made through the payment of copyright fees.

"The CATV operator secures at the very least his right for all time to carry the television signals he currently provides through the payment of one percent of the system's income derived solely from its reception service," said Adler.

Royalty payments for total copyright clearances are reasonable, he said, because for the most part, copyright royalties are one percent of the total income derived from the basic reception service only. Adler also noted that "the CATV section of the copyright legislation places limitations on the extent of CATV's copyright liability. If the CATV portion of the proposed bill were deleted and the then remaining legislation were passed into law, the CATV industry would be fully liable for copyright infringement and would have to bargain with each copyright owner on a program by program basis."

On the other side of the argument, the Association of Maximum Service Telecasters called the bill "replete with vague, undefined, ill-defined or ambiguous terminology and provisions," and said that the bill was too CATV oriented.

David Sarnoff retires

After 63 years of service in the radio and television industries, an ailing David Sarnoff has stepped down as chairman of the board of RCA Corporation. The new chairman is his son, Robert, who was named president in 1966 and chief executive officer in 1968.

Hospitalized for more than a year, 78-year-old Sarnoff founded the National Broadcasting Company in 1926.

N.Y. fm-er plugs the competition

WRFM (FM), New York City, programs MOR and brief newscasts. Most of its commercials are ordinary. One isn't; WRFM regularly carries spots plugging WCBS Newsradio 88—the CBS O&O all-news operation in New York.

Why? WRFM VP-General Manager Richard Grefe explains that sister station WNYW (international short wave) regularly picks up news features from WCBS. In return, WRFM airs the CBS plugs.

Queried about the idea of doing commercials for a competing radio station, Grefe said, "WCBS doesn't really compete with us. It's a-m and we're fm, and it provides all-news, while we do music in stereo. You can't hear all-news on fm and you can't hear stereo music on a-m."

Would WRFM air a spot for a TV station? Yes. Would it do a commercial for another fm station? No.

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FOCUS ON **CATV**

FCC clarifies 1st CATV report amidst protest

The only new word on the Commission's CATV policy making is that it has clarified a part of its "First Report and Order" and has denied NAB and ACTS petitions for reconsideration of that historic ruling, which requires certain cable TV program originations, authorizes commercial advertising on CATV and encourages a cable television network (see *BM/E*, December, 1969, p. 56).

In clarifying the section of the ruling in Docket 18397 that most confused inquirers—the part about the scope of federal pre-emption—the FCC addressed itself to the most frequent questions:

(1) "Does the Commission's order represent federal pre-emption in the area of local originations and advertising to the extent that a cable system with less than 3500 subscribers may engage in local origination and advertising despite a specific prohibition against local origination and advertising contained in the local franchise which authorizes the operation?" and (2) "If the answer is affirmative, at what point in time would such a cable system be entitled to commence local originations?"

The Commission answered yes and wrote that the invalidity in this situation would commence on the effective date of the first report, December 1, 1969. Pointing to certain paragraphs of the notices of proposed rule making and inquiry and to footnote 29 of the "First Report and Order," the Commission said that "local franchising authorities would remain free to impose additional affirmative obligations which are not inconsistent with the federal regulatory policies."

FCC Denies Petitions

In late December, 1969, about a month after issuing the clarification, the Commission issued a denial of petitions by the NAB and All-Channel Television Society for reconsideration of the cablecasting rules. The NAB had contended that the FCC "failed to resolve simultaneously other related parts

of the rule making proposals in the docket; that CATV originations and advertising may fail to achieve program diversity, and may cause irreparable harm to uhf, small market television and radio stations, and to the public which is dependent upon them for these services; and that relief is necessary to prevent CATV systems, advertisers and the public from acting in anticipation of CATV originations of a kind which may not ultimately be permitted."

The FCC's response was that "the NAB had failed to show 'irreparable injury' to the public or its own interests or likelihood of success on the merits of its petition for reconsideration." Noting that the requirement for program originations as a condition for the carriage of broadcast signals isn't effective until January 1, 1971, the FCC said it is anticipating action on petitions for reconsideration before then.

The basis of ACTS' petition for reconsideration was that "the Commission has reversed its original policy of allowing CATV to function as an auxiliary to free TV, endangering many stations, particularly those in the smaller markets."

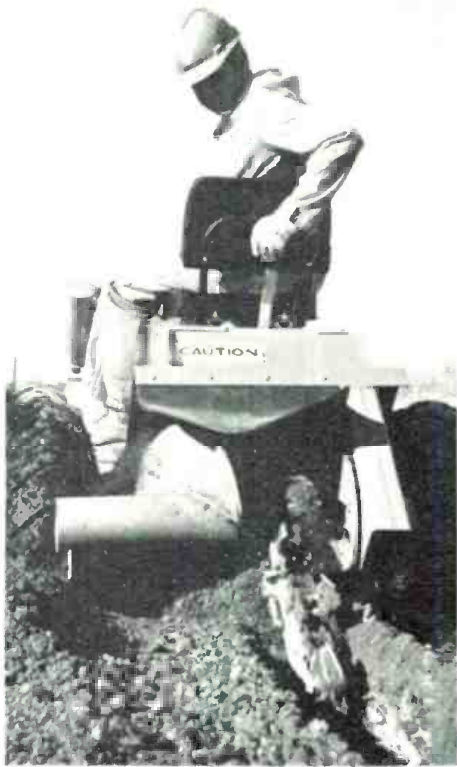
FCC actions on cable TV

The Commission has reported decisions on several CATV docket and initial cases dealing with questions of program exclusivity and authorization to carry distant signals.

Directed to show cause in program exclusivity complaints were: Kar-Mel CATV Systems, Inc., owner and operator of a system at Mt. Carmel, Pa.; Vic's TV Cable Service, owner and operator of a 12-channel system at Carmel Valley, Calif.; and Duvall Radio Sales & Service, owner and operator of a system at Wheeling, W. Va.

Other cases involving program exclusivity included Everett Cablevision, Inc., operator of a system at Everett, Washington, and Great Lakes Community TV, Inc., owner and operator of a system at Petoskey, Mich. The FCC has granted Everett Cablevision's petition for reconsideration of a program exclusivity order and has determined that Everett needn't provide station KIRO-TV (CBS), Seattle, Washington, with program exclusivity over KVOS-TV, Belling-

Continued on page 50



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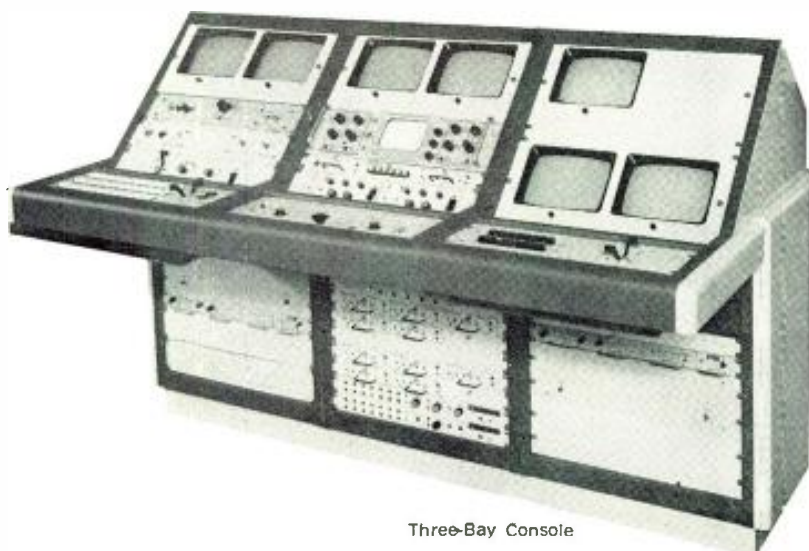
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Three-Bay Console

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INTERPRETING THE **FCC** RULES & REGULATIONS

Change and Revision: A-m Remote Control & CATV

REMOTE CONTROL OF AM STATIONS

The Commission has adopted new rules¹ allowing wireless remote-controlled transmitters for standard a-m stations. Under these rules, meter readings and other information necessary for the operation of the remote station may be conveyed by telemetry signals transmitted on the carrier wave. This should eliminate the costly line installations and/or telephone company leases necessitated by the old (before October 31, 1969) requirement that remote control of a-m stations be done through wire lines between the remote control point (usually the studio) and the transmitter site. Also, operation of the wireless station should be more reliable.

In November, 1967, a broadcast equipment manufacturer filed a petition seeking permission to use a wireless means of remote-controlling standard broadcast stations. The Commission initiated a Notice of Proposed Rule Making and requested comments about transmission on the main program carrier of transmitter meter readings and pertinent, technical remote control information.

Information would be relayed from the transmitter site to the remote-control point by tones amplitude-modulated directly on the carrier of the standard broadcast station. These tones (or frequencies) would be restricted to a band of 20 to 36 Hz and the modulation amplitude would not exceed 10%. The contention was that an a-m station could transmit such tones simultaneously with regular programming without deteriorating the program material or annoying the listener.

Tests and Evaluations

In the past the Commission has followed a consistent policy rejecting proposals to transmit non-program material on the broadcast carrier. However, there was substantial merit to the suggestion of wireless remote control monitoring and, as it was sufficiently related to the broadcast function, the Commission promulgated a rule-making proceeding. Over a period of years, extensive tests were conducted with various types of equipment and different modulation levels and tone frequencies. Professional and lay opinions were solicited. After analyzing and evaluating conclusions of manufacturers' tests and Commission engineers' reports, the FCC decided that a method of wireless remote control of standard broadcast stations was indeed possible.

In its test evaluation, the Commission declared that "the perceptibility . . . in the presence of program material, of tones of fairly short duration of frequencies no higher than 30 Hz at modulation levels [of] approximately 5% is so marginal that their employment is quite unlikely to be detected by the broadcast listener We do not believe that the majority of listeners would notice, much less be disturbed by their use, particularly since the tones, as normally employed, would be of short duration."² Since field test results showed that the telemetry function was satisfactorily achieved with modulation levels of about 5%, the Commission set the upper limit for the tone modulation level at 6% and the value of the highest frequency telemetry tone at 30 Hz.

The Commission also limited transmission of the tones to only those periods during which the transmitter operating parameters are actually being observed. This would preclude use of continuous tone transmission except when periodic meter readings reveal possible irregularities in the operation of the transmitter—thus necessitating frequent and perhaps continuous monitoring of the transmitter until the problems are corrected. To avoid the adverse effect automatic level control amplifiers and peak limiters were found to have on telemetry systems during testing, the FCC stipulated that the telemetry tones must not be injected into the program line until after the carrier has been program limited. Also, to prevent program material from falling into the telemetry signal frequency range, a high-pass filter must be inserted in the program line.

By permitting telemetry data for transmitter operating parameters to be transmitted on the main carrier of an a-m transmitter, these new rules have opened the way for the many remotely-controlled a-m stations in the country to eliminate their costly wire-line installations and/or leases now necessary for transmitter operation and observation. The rules also generate new options which, if carefully scrutinized, could bring substantial economic benefits and increased reliability of operation. Consult your engineer and counsel.

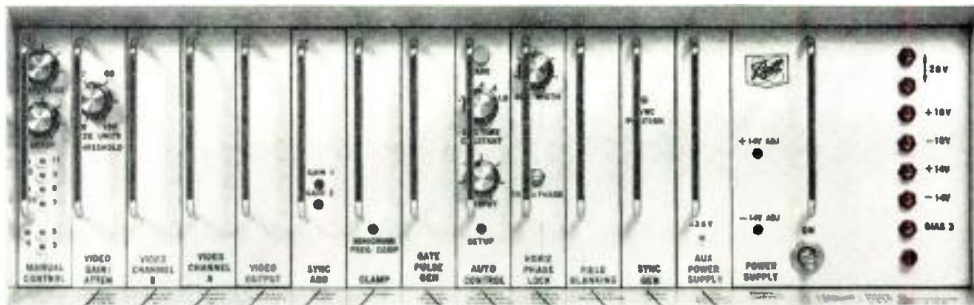
TWO CABLE TV REVISIONS

By two separate Report and Orders released November 14, 1969,³ the FCC has amended Part

2. *Id.* at 1614.

1. FCC Rules and Regulations, §73.67; 17 RR 2d 1607.

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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74 of the rules to expand the use of community antenna relay (CAR) service. Consistent with its October 1969 *First Report and Order* in Docket No. 18397, authorizing program origination by CATV systems, the amendments permit use of microwave facilities:

(1) For CATV-originated programming from point of origination to head-end, and

(2) For transmitting program material from head-end to distribution sites. Both amendments contemplate the use of frequencies between 12.7 and 12.95 GHz.

In the action in Docket No. 17999 (November 14, 1969), the Commission established regulations to permit stations licensed in the CAR Service to transmit program material originated by CATV systems. While examining the proposed rule amendments, the Commission noted a great need for additional auxiliary facilities to aid CATV systems in the production and presentation of locally originated and nonbroadcast programming. Concluding that provisions should be made for the carriage of CATV-originated programming in the CAR Service, the Commission adopted rules permitting the following types of stations to be used in conjunction with CATV systems:

- CAR stations now presenting authorized programming, but no longer limited to carrying only broadcast programming. (In other words, presently authorized CAR stations may now carry programming originated by CATV systems.)
- CAR studio to head-end link (SHL) stations—for the transmission of CATV-originated programming from a CATV studio to a CATV head-end.
- CAR pickup stations which will be land mobile stations—for the transmission of TV signals from the scenes of events outside the studio to the CATV studio or directly to the CATV head-end.

Permittees seeking a license for these new facilities will be expected to conform to standards set forth in the TV broadcast auxiliary area. For example, fixed stations will not be assigned channels in the band which interfere with existing authorized fixed stations. In the absence of a special showing, CATV licensees will be assigned not more than three channels in the band for CAR pickup use. The Commission also requires a specific showing that cable cannot be used instead of microwave. Thus, every application for a CAR studio to head-end link station must include:

(1) A statement to the effect that the applicant has investigated the possibility of using cable rather than microwave and

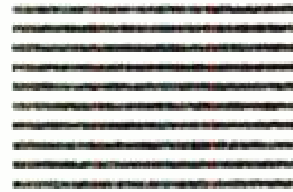
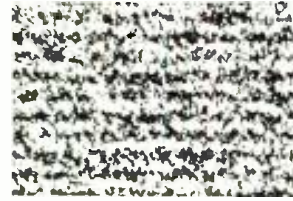
(2) Reasons why the applicant decided to use microwave rather than cable.

CATV Radio Distribution Service

In the action in Docket No. 18452 (November 14, 1969), the Commission adopted rules to provide for local CATV radio distribution of signals from the head-end to possible multiple receiving sites. (From the receiving site program material would be forwarded to the CATV subscriber.)

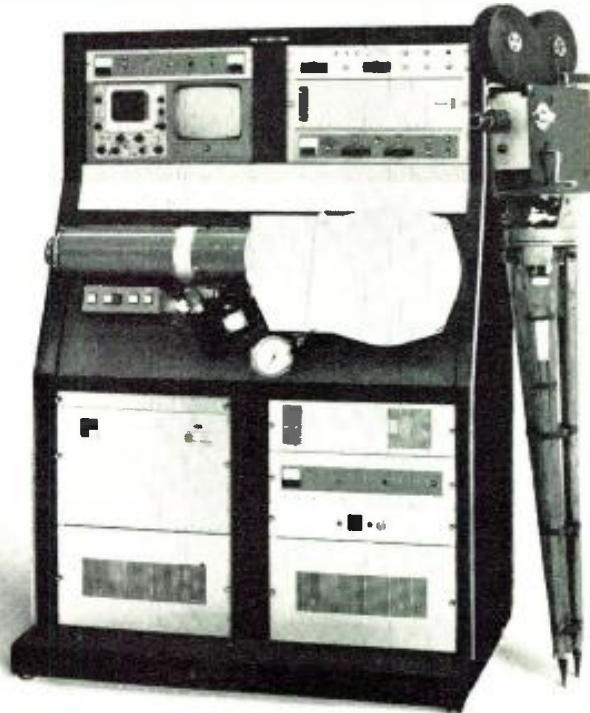
3. FCC 69-1241; FCC 69-1242.

GOOD-BYE KINE HELLO EBR-100



Television raster lines (right) enlarged from 16mm film frames. Lower: EBR-100 recording on 3M fine-grain (less than 0.1 micron) electron recording film. Top: kinescope recording on television recording film. Line-to-line spacing in both pictures is approximately 0.00058 inches or 14.7 microns.

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employs direct electron bombardment of the film, eliminating phosphor granularity, face-plate halation and camera-lens losses and distortions.

The 3M Brand EBR-100 far surpasses the conventional kinescope in reproduction quality and in the ability to produce consistently good films. It opens new horizons for TV taping and mass film distribution for educational and training purposes.

The EBR-100 is a machine that every major TV studio, dubbing center, film lab and government communications center will want to employ. Easy to install, completely self-contained.

Direct beam monitoring provides simple,

positive adjustment of exposure and gamma. Secondary electrons imaging the film target verify that focus, size, and linearity are correct. You can choose between a direct positive or a

film negative with the flick of a switch. The system also is switchable from US standard 525-line to European 625-line requirements.

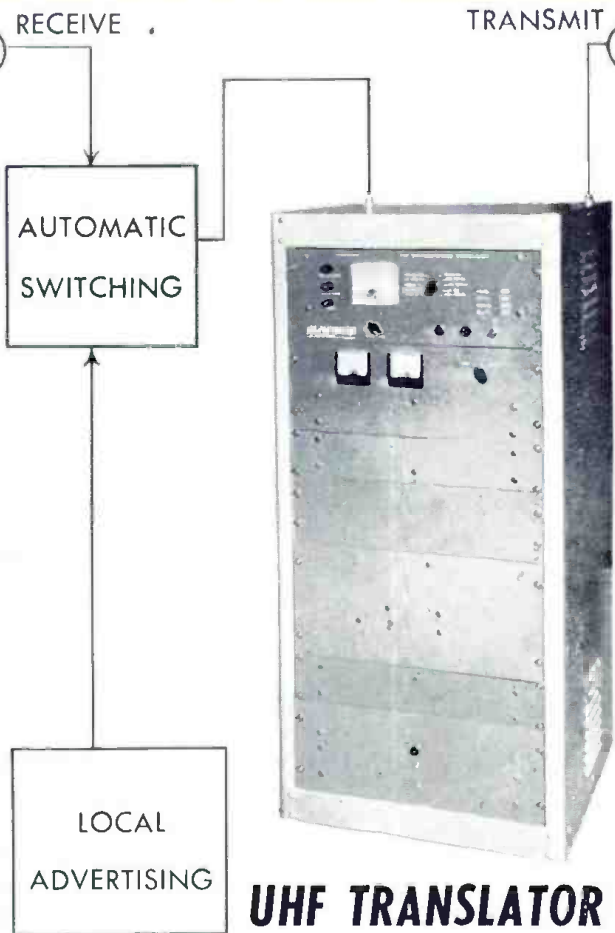
The EBR-100 records on low-cost fine grain film. Overall resolution exceeds 1000 lines. The film uses conventional processing and is shown on standard 16mm projectors.

The unit is 68 inches tall, 46 inches wide, 34 inches deep, weighs approximately 1000 lb. and costs about \$55,000. Optical or magnetic sound is available at extra cost.

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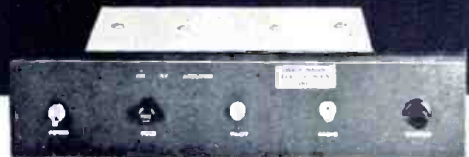
The CATV operator may now receive the signal at the head-end and microwave it to a distant reception point from which it may then be carried by cable to the subscriber's home. The Commission commented:

While distant signal operations in major TV markets pose serious public interest questions . . . (we) now seek to encourage CATV entry into major cities on the basis of carriage of local signals, program origination and possibly other services. We are aware of the costs of program origination . . . and would be reluctant to have the costs of underground construction bar or delay such entry or curtail program origination efforts. In addition, the underground conduits are usually under the control of the telephone companies, as indeed is general the case for above-ground cable construction where pole attachment agreements or lease arrangements are necessary. We think that CATV should have available the alternative of radio links which would enable it to construct its own facilities independent or largely independent of the telephone companies.

The Commission has thus authorized the proposed radio distribution service in the 12.7 to 12.95 GHz band. The radio distribution portion would operate with vestigial sideband amplitude modulation emission for the visual signal, and frequency modulation for the accompanying sound, using a channel 6 MHz wide for each relayed television signal. The Commission specifically provides also that the proposed radio distribution service should encompass transmission of television program material originated by the CATV operator (and by others on leased chan-

Continued on page 55

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The Ampex BR-15 is the first: functionally symmetrical (and truly bi-directional) recorder for broadcasting.

Its big 14-inch reels and bi-directional capability make it ideal for automated operation. And you can choose speed pairs from 15 ips to 15/16 ips.

Identical motors connect directly to dual capstans that pull the tape across identical playback heads. A motor for each direction. Separate playback heads for identical performance.

Two additional motors provide reel take-up, whichever way you go.

All four motors are servo-controlled for even

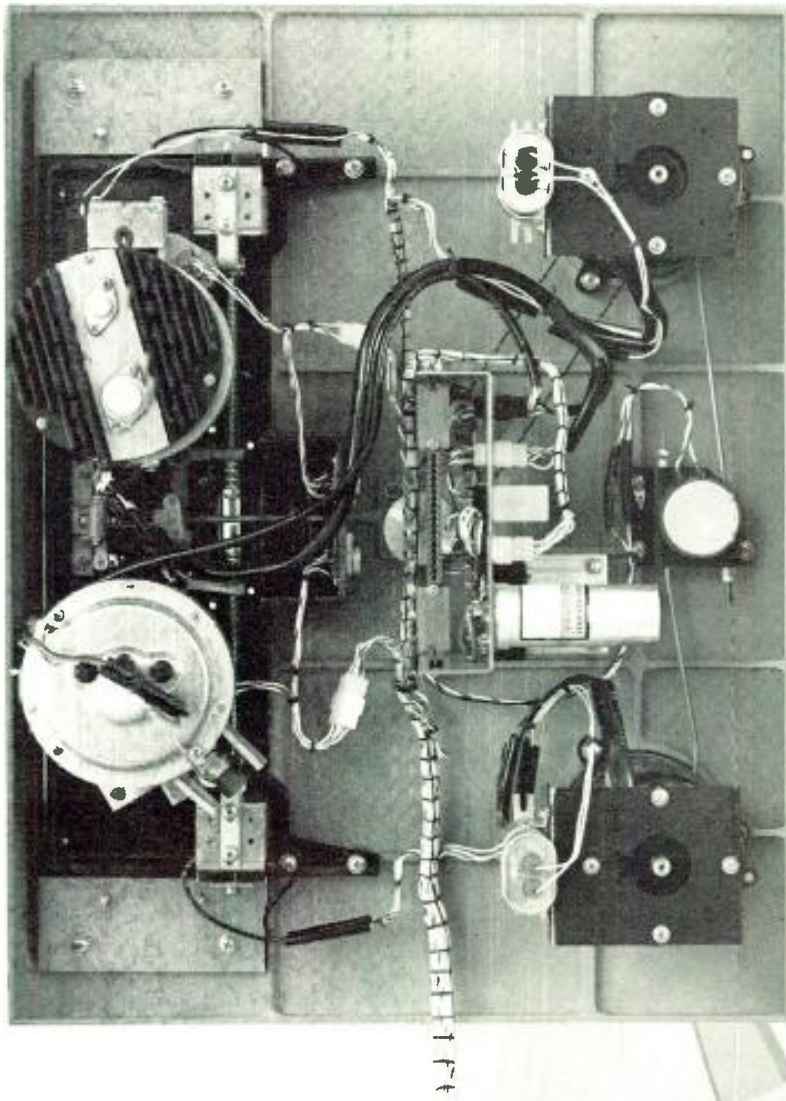
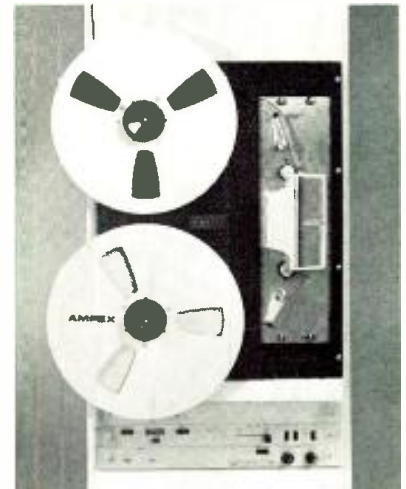
tape tension and exceptional tape speed accuracy. ($\pm 0.3\%$ throughout the reel).

Other features include extra fast start for precise cueing. "Joystick" control for variable fast forward and rewind. A digital tape counter. And a simple, uncluttered design inside and out. The rack mount modules, including electronics, are only $1\frac{3}{4}$ " high. They're easily interchanged so maintenance is simple and downtime is short.

For full specifications and information on how a BR Series recorder will fit into your system, call our Professional Audio Products Sales Manager: (415) 367-4400 (collect).

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Homemade quad board at K-101 and special Ampex 1/2-inch quad machine originate quadcasts in Bay Area.

QUAD-THE NEW SOUND IN FM STEREO

Quadrasonic stereo is the latest thing on fm. Right now, stereo stations have to pair up for a simultaneous broadcast, and no decision on experimental quadcasts has come from the FCC. To those of us who groaned and perspired through the original fm-stereo melee, it's history repeating itself, itself, itself, itself.



CALL IT ANYTHING you want — quadrasonic, four-channel stereo, surround sound—they all mean the same thing, another dimension in stereo broadcasting that is rapidly capturing the imagination of audio buffs across the country. Not too many people have had a chance to hear quad stereo yet.

Music is available only on specially prepared four-channel tapes and is broadcast occasionally on paired-up fm stations in Boston, New York and San Francisco at this writing.

Quad adds a new dimension to stereo by placing two additional channels at the rear of the listening room, facing forward. The rear speakers for the most part supply reverb channels—the original reverb in the hall used for the recording. If the take is made in a studio, the reverb can be added artificially, or the rear channels can be part of a special, spatial-effects mix. Some pieces of classical music—precious few of them—have been written for split orchestras, with orchestral elements at the rear of the hall. In compositions like these, quad lets the listener hear the music as the composer had intended it to be heard. Trouble is, when we hear such music in quad, it sounds al-

most artificial and gimmicked up. We're just not used to hearing music this way.

For now, the only quad stereo available is on tape—just as the only available two-channel stereo programs were on tape back in 1956. The only companies manufacturing four-channel playback equipment for 1/4-inch reel-to-reel tape are Telex/Viking, Teac and Crown. The 3M Company demonstrated a quad machine during last October's AES Convention, but it used the preamps of another recorder in an obviously jury-rigged demo. But the capability is there.

Ampex has specially modified a 1/2-inch machine for quad for use in the San Francisco broadcasts, and the same machine can play 1/4-inch quad tapes. Again, the capacity is there, and quad heads are readily available from such specialists as Nortronics. If a station wants to make its own quad machine, this too is possible. An add-on quad head from Nortronics for a Magnecord 1020, for example, costs \$110. Patch in two more preamps, and you're in business.

Next step will probably be consumer-oriented tape equipment. Kenrich Purchasing's Van Sintchak plans to market conversion kits for his company's line of Japanese-made stereo cassette recorders. And the cassette machine may ultimately be the ideal vehicle for quad in the home, since basic equipment cost is so much lower than for conventional open-reel tape.

Much of the quad story is analagous to the

stereo situation in 1956-57. There is talk about a practical four-channel disc that uses a single groove. Fm stations are pairing up to broadcast fm/fm quad. The FCC is considering two proposals for experimental broadcasts of all four channels on the same carrier. Names like William Halstead and Murray Crosby are mentioned prominently—they both have made proposals for compatible quad broadcasting.

Current broadcast practice is for two fm stations to tie together with a pair of high-quality telephone lines. One station transmits two channels; the other sends the other two. The listener must set up two complete stereo fm systems in his living room. This is obviously a stopgap measure which will continue to be used until experimental one-station broadcasts get the FCC nod.

From the listener's viewpoint, quad adds a new dimension to recorded sound. Many industry observers feel that the difference between quad and ordinary stereo is at least as great a step as two-channel was over mono. The added channels give an extra quality of depth and spaciousness to the music, enveloping the listener completely—hence the name "surround sound."

For the broadcaster, the situation is anything but clear. The only broadcasts to date have been restricted to two-station simulcasts: WGBH/WCRB in Boston, WNYC/WKCR in New York and KSAN/KPFA in San Francisco/Berkeley. KSAN/KPFA just had one quadcast, followed a month later by two other Bay Area stations—K-101 and KRON. This initial pairing of broadcasters follows no apparent economic lines. In Boston, WGBH is an educational fm-er, while WCRB (Waltham, Mass.) is commercial. In New York, WNYC-FM is city-owned non-commercial, while WKCR is Columbia University's station. In Frisco, KSAN is commercial (Metromedia) and KPFA is not (Pacifica Foundation). K-101 and KRON are both commercial, although KRON seldom sells time. The deal here was also strange—K-101's owner Jim Gabbert bought the needed time on KRON.

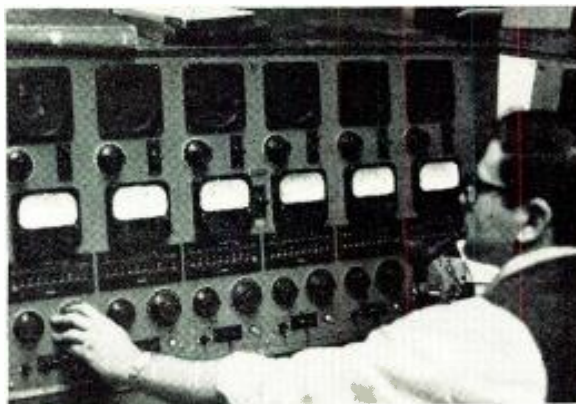
In New York, programs are prepackaged into a one-hour format—Harry Maynard's "Men of High Fidelity," which features guest stereo experts as well as key musical excerpts. Lately, the musical excerpts have taken precedence since they're all in quad, and quad's the thing in New York. The weekly (Sunday) show is repeated twice a week in midafternoon, giving stereo dealers a chance to demonstrate quad in their showrooms. In general, the advent of quad is looked

on as a dandy way to sell stereo equipment. But there are skeptics among the experts—possibly the same skeptics who felt that two-channel stereo had little to offer in 1956.

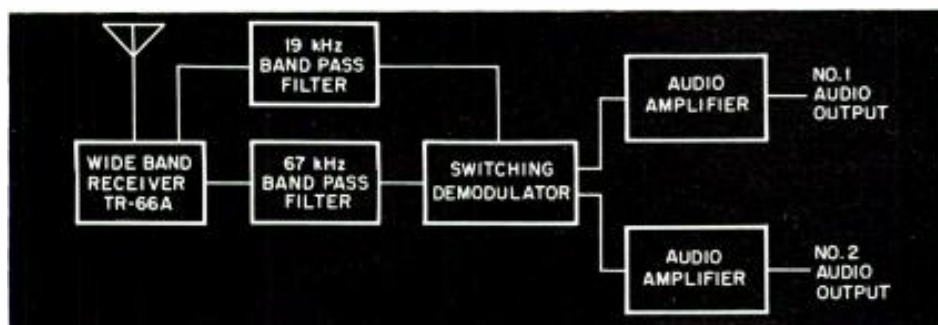
In spite of skepticism, in spite of the obvious gimmickry that recording companies will resort to in their sales promotion efforts, quad stereo is an important development and represents the next big step in the fm broadcasting industry. Obviously, the only thing that will make quad go as a viable medium is a workable, compatible method of broadcasting all four channels on a single fm station. One method that has been suggested by William Halstead uses 8-kHz-wide channels for the rear left and right. The two are centered on subcarriers of approximately 69 and 92 kHz. This technique eliminates any possibility of the station carrying an SCA channel, since the lower sideband of the lower-frequency channel intrudes deep into the SCA frequencies.

The upper sideband of the 92-kHz channel looks frightening at first—it extends right up to the limit of the 200-kHz-wide fm channel. However, Halstead and his associate, Leonard Feldman point out that laboratory tests with a panoramic spectrum analyzer have shown that 4-channel stereo signals extended no farther at the edges of the channel than do the modulation products of the present 2-channel stereo system with 100% modulation. By reducing modulation percentage of the 2-channel stereo signal (as must be done by stations carrying SCA), it's possible to squeeze in two more channels of stereo information with no spillover. All that happens is a slight degradation of signal-to-noise ratio—roughly 1.5-dB loss for each 10% reduction of modulation.

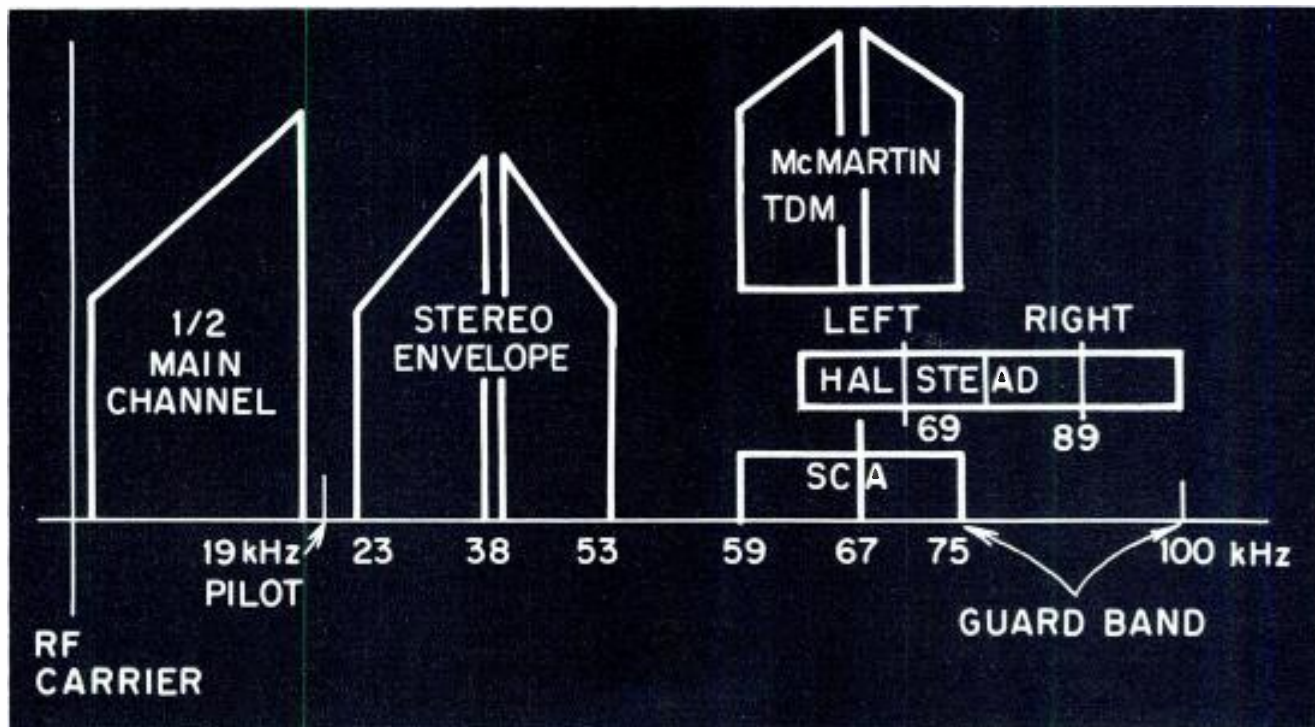
Spurred by FM Guide publisher Harry May-



BM/E Photo



Antique board (above) with multi inputs lends itself readily to quadcasting at New York's WNYC-FM. Rear channels are carried by Columbia University fm-er WKCR. (Left) Block diagram of quad rear-channel receiving system in TDM technique proposed by McMartin Industries. System uses 19-kHz pilot to sample two matrixed channels in the receiver.



The fm channel as it's shaping up in the quad battle. Both proposed McMARTIN system and Halstead's fm quad system leave no room for SCA operation. McMARTIN idea is to use time-division multiplex, while Halstead uses 10% modulation.

nard's total commitment to quad, New York City owned WNYC-FM has asked the FCC to advise on procedures for experimental quad stereo broadcasting.

The FCC initially replied that consideration of any such request would be contingent on proof that there would be no interference with other stations on adjacent channels in the same geographical area. There should also be no interference with the quad station's own 2-channel broadcasts says the FCC.

Since WNYC-FM uses Gates equipment, Halstead has asked Gates to do some lab tests to provide the FCC with experimental data. Ideally, these tests should show how low-level fm subcarriers of 69 and 92 kHz are impressed on the main carrier. These data will supplement information already developed by Halstead and Feldman and earlier tests run by Moseley Associates. So far, test results have been very satisfactory.

Other names familiar from a decade ago are mentioned prominently. One of them is Murray Crosby, who has toyed briefly with the idea of developing a quad system. Crosby developed one of the first compatible stereo/mono fm systems back in the fifties. Ultimately, his system was rejected by the FCC because it made no provision for an SCA channel. His matrix was incorporated in the Zenith/GE system that the Commission approved in April, 1961, but it took Crosby eight years of court battles to get a royalty award. In the meantime, his firm went bankrupt. Latest industry word is that Crosby has decided against getting involved with quad and taking another bath.

McMartin's time-division-multiplex (TDM) system, filed with the FCC in December, uses one subchannel in what is now the SCA channel area with two 8-kHz channels sharing the same 16-kHz bandwidth. The time-shared space easily accommodates both channels which are sampled at a rate

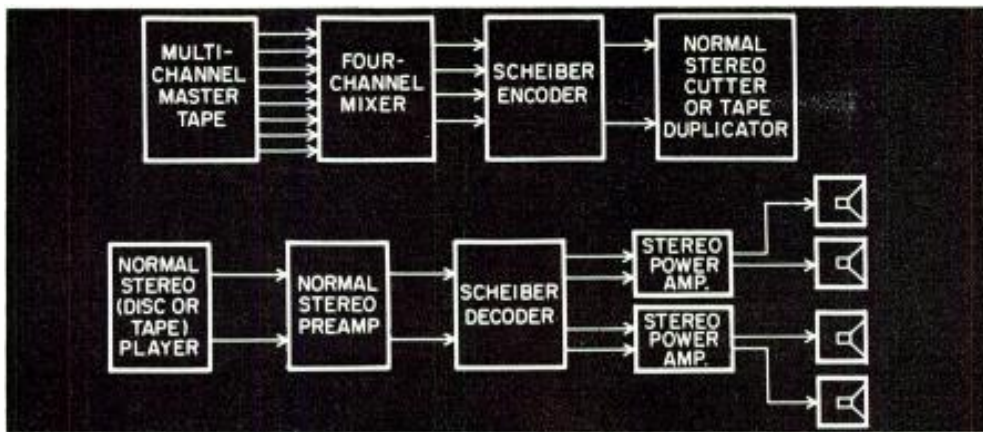
of 19,000 bits per second. This part is easy—the sampling rate is locked into the 19-kHz stereo pilot signal. Amplitude modulation is used. Although the McMARTIN system uses a 67-kHz subcarrier, it can't be received by conventional SCA receivers. Conversely, SCA transmissions won't be picked up by a quad receiver—the SCA is fm; the quad is a-m.

Naturally, such a system—or any other quad system (except for Scheiber's) kicks out the SCA channel. But that isn't necessarily so bad. Many fm stations are making a healthy profit now and the SCA channel revenue need no longer be the difference between making and losing money. Also, the first stations to go quad will have a decided competitive advantage over other fm-ers—just as the first stereo stations had the edge over monos.

Intimately involved with the Halstead system is Len Feldman. There's lots of antagonism between McMARTIN and Feldman's SCA Services and Kenrich Purchasing. Feldman has been manufacturing SCA detectors and receivers for any and all comers, and numbers quite a few background music operators among his customers. He has also supplied equipment for "home" use, and presumably some of his receivers have found their way into the hands of SCA pirates. Feldman was the supplier of the Lafayette SCA receivers that got the FCC into such an uproar last year. Now, Feldman looks on his company's technology as a springboard to manufacturing compatible quad receivers and adapters.

Discs Kept Under Wraps

There's been lots of smoke, but no fire so far in the four-channel disc department. The quad disc, being developed by several different experimenters, is right now a rather elusive bit of "holy



Scheiber quad disc mixes four channels into two for recording or fm transmission. Replay is through a decoder which re-creates four-channel stereo.

grail." One experimenter, Peter Scheiber, from all reports seems closer to quad disc reality than anyone else. His system is basically a multiplexing operation that moves the rear channels into the main program material, "hiding" it there. The system is supposed to work equally well for tape and fm stereo—permitting four-channel operation within the confines of the existing two stereo channels.

According to Scheiber's partner, Tom Mowry, four channels are fed into a Scheiber encoding device. Out come two audio bandwidth signals. These two channels are then recorded (or broadcast) with conventional two-channel techniques. The person not set up with Scheiber decoding equipment simply gets a full two-channel stereo program. With the Scheiber decoder in the system, the two channels are dematrixed and come out as four channels.

Scheiber is somewhat secretive about his process, presumably because his patent position hasn't yet been solidified. But if this is true multiplexing, what happens to those oh-so-high frequency audio signals when the enormous mass of a playback stylus swoops down the hapless record groove? Will this system work only with low-mass, extremely high-compliance pickups? Or if this material is matrixed in with the two-channel signals, won't there be severe IM distortion on play-

back? Or perhaps the artificially produced high-frequency harmonics will be wiped clean, depriving the disc of its quad signal? There's no apparent answer to these questions yet. We'll know more when system details are made public by Scheiber.

Lots of Quad in Storage

Quad stereo will take off one of these days and when it does, the record companies won't be caught with their pants down the way they were in 1957. Most major companies have in their vaults multi-channel masters of virtually everything they've cut for the last five or six years. Thus they can remix their eight-channel masters down to four instead of two, and have quad releases for their entire catalogs ready in a relatively short time.

Major suppliers of quad right now are Vanguard and Columbia. The Vanguard tapes are being used in Acoustic Research's demonstration booth in New York's Grand Central Station. AR recently converted from a Telex open-reel quad machine to a large-size quad cart machine made to order by Telex. The Grand Central demo room is the only place where quad is getting a continuous, daily demonstration.

Ascribing to the theory that the two rear

Quad on Discs

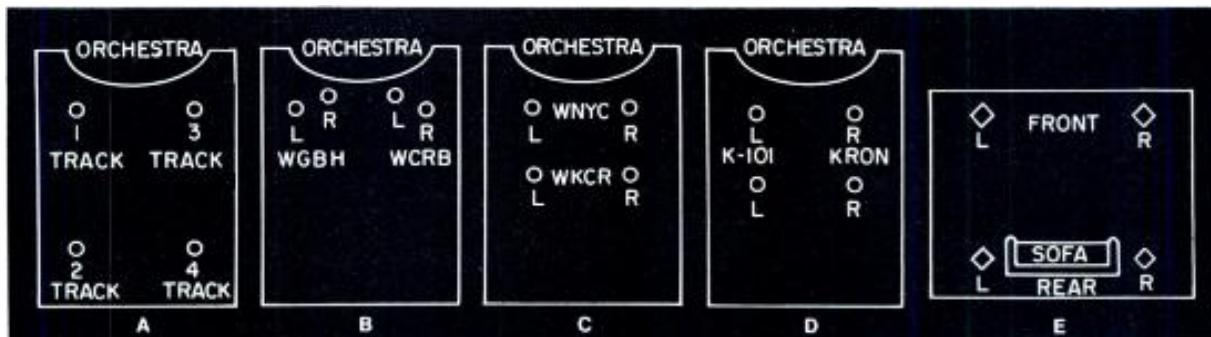
In the forefront of quad disc developers, Peter Scheiber's secretive process was slated for unveiling publicly for the first time on January 20. This was the magic date, according to patent attorneys, and a demo broadcast was scheduled for late January on Harry Maynard's "Men of High Fidelity" on WNYC-FM and WKCR in N.Y.

Industry reaction to the Scheiber disc has been spotty. Larry Klein, writing in *Stereo Review*, says, "if four channels can be easily matrixed down into two . . . then he (Scheiber) has a system that bids fair to be the system of the future." Bert Whyte, in *Audio*, says, "Did I hear four-channel stereo from a disc? Does it really work? The answer must be a qualified 'Yes.' I suspect part of Mr. Scheiber's system is based on some clever psycho-acoustical trickery . . . however

the disc stereo, at least at this stage of development, wasn't the equal of a four-channel tape."

No one who has heard the disc knows for sure if what he heard was the real thing. But what is quad at all, but a sophisticated illusion? If the disc works—even if it compromises to do it—it may be an important milestone.

In the meantime, other experimenters are working on their own disc systems. Not the least of the entries is one developed by Columbia Records, which according to the few who have heard it, doesn't do the job—at least not at this point. Tape is the meaningful medium now, and the only readily available way to get quad to the public is on fm. The discs will come, possibly sooner than anyone expects, and certainly before the FCC takes definitive action.



Idealized recording setup (A) provides surround sound. Boston split (B) gives both fm stations left and right. (C) New York split lets one station carry full 2-channel stereo while San Francisco split (D) favors neither station.

channels needn't be as wide range as the two main channels, the AR demo room uses a pair of expensive AR-3's up front. In the rear are two low-cost AR-4's. The total effect is gorgeous and has made converts out of skeptical *BM/E* editors.

The Boston Split

In the three major markets now getting quad exposure, three different stereo splits are being used—each with its own special features. The recording, in effect, is made with four microphones—two conventionally placed stereo mikes up front and two more facing the rear for hall reverb and any rear-originating sounds. How these four channels are transmitted has varied with the city.

In Boston the hall was split down the middle, with *WGBH* broadcasting left and right signals from the left side of the hall, with its left slightly to the rear of its right. *WCRB* took the right half of the hall with its right slightly to the rear of its left. The result is that a person with only one stereo fm receiver can get both left and right from a single station, even during quad broadcasts. This "Boston split" doesn't appear to offer the full, rich hall resonances possible with widely spaced pickups. Also, this unusual microphone setup was possible because of the program source—live concerts instead of commercial demo tapes. But the Boston split—more of a "curtain of sound" rather than surround sound—compromises quad quality in favor of the two-channel listener—something that shouldn't happen in the ultimate system.

The New York split more closely approximates the true surround sound. For quad broadcasts, *WNYC-FM* takes the front left and right channels, and *WKCR* provides the rear left and right. Thus, anyone listening to quad on *WNYC* only gets a full, up-front stereo sound. The *WKCR* listener gets the hall reverb, which at best can't approach good listening quality. It's the listener who teams up with his next-door neighbor, using two stereo rigs who gets full benefit from quad broadcasts.

In San Francisco, the two participating stations also provide a full surround sound split, but with a difference. The San Francisco split has left front and rear on *K-101* with right front and rear on

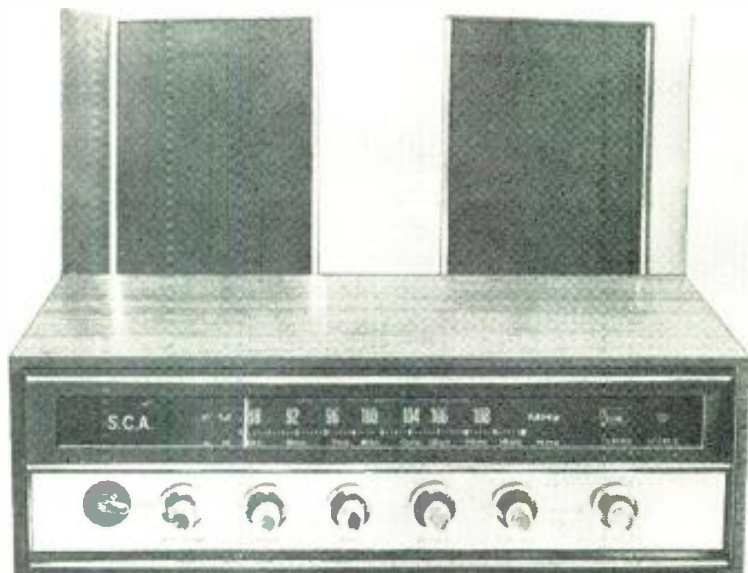
KRON. Thus neither station can provide full two-channel stereo, and neither can provide even a decent monophonic signal. In effect, the two-channel listener can get a half-mono program with hall reverb. The thinking here was that it would be much easier for stereo dealers to set up two consoles along facing walls for public demonstrations. During the first demonstration in December, 1969, an estimated 10,000 people heard quad broadcast in the Bay Area. Trouble with this sort of arrangement is that neither station can provide a full left and right two-channel stereo program for its regular listeners, nor can it even provide a good mono signal. *K-101*'s president, Jim Gabbert, says that initially emphasis will be on ping-ping pong-pong effects to help promote quad. His station's broadcasts stress gimmickry and even feature four announcers seated at a round table (with four mikes).

Era of Adapter

Out of all this will soon come an experimental broadcast authorization by the FCC. Stations will be permitted to air quad all on one channel, using the Halstead or the McMarten modulation system, or perhaps some other technique. Several manufacturers will start to produce quad adapters in limited quantities. Audio hobbyists will have to cut into their fm tuners to tap off a signal ahead of the de-emphasis network to feed the quad adapter which will feed a hastily purchased low-cost stereo amplifier. Sound familiar? If the experimentally approved system proves out to be the one ultimately written into the FCC's quad rules, it will probably come as a surprise to everyone in the industry.

For the time being, we're destined to relive the early stereo years, with vehement arguments on all sides, pro, con and maybe. There will be dozens of "perfect" techniques developed, an obscure record company will dazzle some convention with a limited edition of a quad disc, and the Commission will sit on its hands longer than necessary. Ultimately, the FCC may rule out quad entirely, since it prevents SCA transmission, but this doesn't seem likely either. The only thing we're sure of is that there's quad in our future—sooner than we may think possible. **BM/E**

Home fm stereo and SCA receiver by SCA Services was culprit in recent FCC/Lafayette flap. Toggle switch at left switched on detector circuit board for 67-kHz listening.



SCA and Piracy— What's on the Horizon?

Manufacturing SCA receivers for any and all comers is getting to be a popular pastime. But most sales continue to be to legitimate music operators, in spite of the prevalent piracy problem. There are possible cures for this illness, but then, SCA may be losing popularity.



THE BACKGROUND music industry's perennial problem is the SCA pirate, and this particular breed of criminal doesn't seem to be deterred by court rulings that mete out healthy fines. These pirates steal "closed-circuit" SCA transmissions off the air for their own profit. The

background music operator is the hardest hit by the pirate—mainly because music is the most prevalent commodity on the SCA subchannel.

What normally happens is this: The local background music operator reaches partial saturation of his potential market. The idea catches on; there are plenty of commercial establishments in the area who would like to subscribe, and are often just waiting for a salesman to call on them. Along comes the pirate, passes himself off as the legitimate franchisee, and offers the service at the same or lower prices. The customer doesn't know the difference. He signs a contract, pays his money and gets his Muzak.

There are many handy equipment sources for clandestine SCA music operators. Companies that produce SCA detectors and receivers for "home" use generally will sell to any and all comers—at

least this was the case until a few months ago. Some of these manufacturers have legitimized their operations by saying that they will not fill any orders for more than a single unit except from legal, franchised SCA operators and label their equipment with a warning.

Typical of such manufacturing operations is Wardell Smith's basement workshop. He advertises his SCA detector in kit (\$49.50) or wired (\$75.00) form and sells a fair number of these units—a vacuum-tube chassis that seems far behind the industry state of the art, but does its assigned job. Smith fills substantial orders from legitimate SCA operators, and we suspect, from illegitimate operators as well. Recognizing that there is a saturation point in this business, Smith has branched out into other areas of electronics manufacturing.

Another supplier that's fairly new on the scene is Len Feldman's SCA Services. This company figured prominently (as the supplier) in the recent flap between the FCC and Lafayette Radio. The Commission strongly urged Lafayette to discontinue its "illegal" advertising and sale of SCA receivers for home use. Actually, there was little legal footing for the FCC. Nowhere do the rules stipulate that individual sale and use of SCA receivers for home use is illegal, and there is no case on record of prosecution for such an offense.

The Commission was able to put the arm on Lafayette for one big reason—the mail-order



SA/E Photo

Newsrad's Morris Levine points to alphanumeric display that uses digital pulses transmitted on SCA.

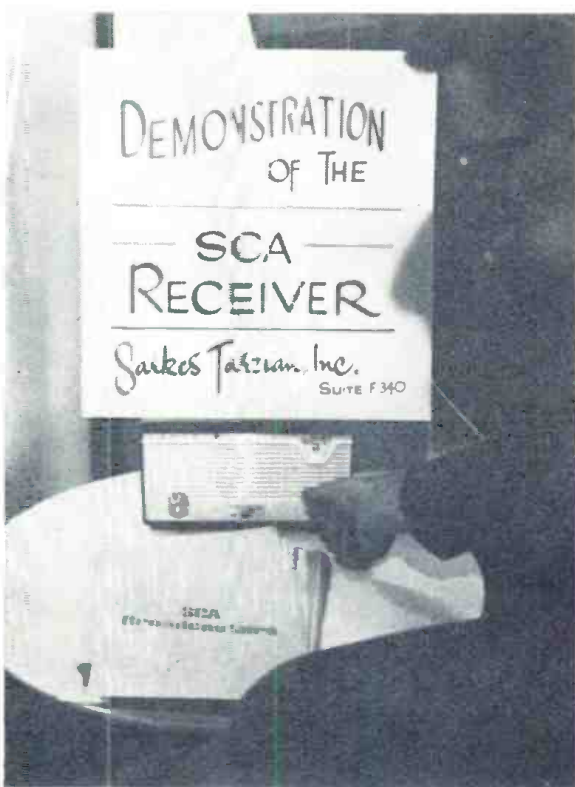


Table model SCA receiver was introduced by Sarkes Tarzian at recent NAEB convention in Washington.

house sells lots of ham and CB equipment that comes in from Japan. The FCC could easily delay type-approval for such gear so long that the company would be prevented from listing it in its catalogs. Score one for the Commission.

Trouble with the Lafayette/FCC flap is that it has given too many people the idea that this whole business is illegal. It isn't. Using SCA receivers in a public place without paying the required fee to the legitimate operator—that's the

part that's illegal. Also, the pirate who sells this service is breaking the law. Thus it's far more important to make the local business community aware of SCA piracy and to take appropriate legal action than it is to worry about hobbyists who may want Muzak in their living rooms.

Looked at another way, the SCA broadcast, which is called a "closed-circuit channel," is in the same category as ship-to-shore and other radiotelephone services that are supposed to be private. Anyone with proper equipment can receive these signals. But it is clearly against the law for such persons to "divulge the contents" of such messages or to *reap any profit* from them. The SCA pirate is reaping a profit. His customer is an unwitting and unknowing accessory in the crime, but probably won't be prosecuted unless he installed the equipment himself.

Part of the problem lies with the potential customer who simply isn't aware that there's even anything illegal going on. It's up to the individual SCA operator to carry out some kind of advertising and public information campaign both to promote his own services and to head off the pirate. Remember, that pirate gets some nice monthly checks for services that the legitimate operator is rendering.

Those New Entries

Long-established SCA equipment manufacturers regard newer entries into the field as quasi-legal, clandestine operations. This is partly due to the "home" sales made by some of these companies. It's also partly because the handful of traditional suppliers have had this field pretty much to themselves for several years. Some of the old-timers see these companies as constructing an ingenious subterfuge simply to mask their real

purpose—supplying equipment to pirate operators. But these manufacturers are not pirates, nor do they knowingly supply equipment to pirates.

There is a possible solution to the piracy problem. McMartin introduced a new "piracy protector" several months ago. This system makes the SCA signal virtually useless to conventional SCA receiving equipment. At the transmitter, a PFG-10 encoder injects an objectionable signal into the SCA program. This signal sounds something like several electronic tones at different frequencies—tones that make the music virtually unlistenable at any volume level. The PFG-10 is tagged at less than \$300, while a special adapter filter for the receiver is priced at \$5.00. Thus the piracy protection system need work no financial hardship on the SCA broadcaster. He can start adding \$5 adapters as he services old installations and installs new equipment. Once his system is entirely hooked up with these filters, the transmitter can then be altered to transmit the objectionable tones.

McMartin feels that the system cannot be easily duplicated by garage-type operations, since analysis and reproduction of the filter would require considerable lab work, and final production cost would be considerably more than \$5. McMartin also points out that the system is fully protected by patents.

One of the prime candidates for piracy protection, according to McMartin, is Newsrad. The system probably won't be used by the majority of SCA music operators—just in the major markets where piracy is more of a problem.

SCA on the Decline?

SCA as an important income source for the fm-er is definitely on the decline. Many fm stations today have little difficulty making a profit without SCA income, so this hedge against the bill collector may no longer be needed. New transmission systems—especially quad stereo (see pages 20-23)—may make simultaneous SCA transmission a practical impossibility. Quad stereo is for the broadcaster who is already secure financially and does not feel the pressing need for SCA income.

Both of the proposed systems for quad stereo broadcasting (Halstead/Feldman and McMartin) make provision for no overlap between quad and SCA receivers. The McMartin system uses a 67-kHz subcarrier, but amplitude modulates the signal. The Halstead/Feldman system uses a subcarrier at 67 kHz or nearby, but the quad receiver won't operate unless the other channel (with a 90-92-kHz subcarrier) is also present. Thus the quad stereo receiver can't be used for SCA no matter what. By the same token, it's unlikely that an SCA receiver will be able to do much with the quad broadcasts.

One or two fm stations carrying SCA background music can pretty well saturate a given major market area. For other stations in the market to make any money at all with SCA, some



Aimed at franchised SCA operators. Mini receivers by SCA Services (above) carry special label (below) on back to warn of possible illegal applications.

WARNING

ILLEGAL FOR COMMERCIAL USE UNDER SECTION 605 U.S. CODE, TITLE 47, UNLESS AUTHORIZED

CAUTION

TO PREVENT ELECTRIC SHOCK, DO NOT OPEN
NO USER SERVICEABLE PARTS INSIDE. REFER
SERVICING TO QUALIFIED SERVICE PERSONNEL

other use for this subchannel must be found. Newsrad is one such use. Using special receiving equipment aboard TWA jetliners, the system provides a short summary of earthbound news for the air traveler who is about to land at a major airport. Presumably, this brings the traveler up to date on late-breaking news that happened while he was in transit.

Newsrad is also playing with another SCA service—one that would transmit digital information. The company has developed a technique that uses coded audio tones on an SCA subchannel and is now testing the system. General manager Morris Levine explains that the digital system is used with an electromechanical readout in conjunction with a computer. Applications may include transmission of stock information to outlying brokerage houses, or new price information to supermarkets.

Big question here is whether the FCC will permit an SCA service which transmits only digital information. This is a moot point, since the Rules define SCA transmission as material of a broadcast nature or a control signal tone.

Other anticipated uses include medical information, facsimile and broad-area radio paging. Some of these methods are still subject to Commission approval. Certainly, the big money-maker now looks like quad stereo, and stations are waiting for some kind of sign from the FCC on quad. This year should tell the tale. **BM/E**

How to Promote Fm

By Marlin Raymond Taylor

Promotion has played a role in the development of virtually every successful fm-er in the country. It has been done in many ways—at times in ways not even resembling promotion.



PROMOTION IS the one function in a broadcast station that is most often ignored, put off, or not even thought about. Why? It's the one activity that isn't required for routine station operation. Your engineers must keep the equipment operating, you must put programming on the air and keep it there and you must sell time in order to produce revenue for paying salaries and other expenses. But you aren't required to tell people about your station and its programming, nor is promotion needed to accomplish any of the above functions.

Nevertheless, promotion is related to these various areas of the station. When done properly and effectively, it becomes closely associated with programming, engineering and sales.

What does promotion have to do with engineering? If your equipment is in poor condition, transmitting a signal with low fidelity, poor stereo, or hum and noise, then promoting the station to persons with good stereo systems is a waste of effort and money. You'd be wasting your time just as much if you devoted promotional efforts to reaching listeners beyond your reliable service area, or if you limited your campaign to the center of your metropolitan area when your signal reaches 40-60 miles out.

Recently someone asked about a successful fm station I had been with. Had programming played a role in its growth, or had the station's success been created totally by its extensive promotion? The answer should be obvious. Promotion can be used to "hypo" your audience temporarily, regardless of what you are programming. But new listeners won't stay with you if you are offering inferior programming.

What promotion should do is make the listening public aware of your station and its programming and create enough interest in your product to get a trial tune-in. Therefore, if your programming is poor or isn't designed to interest a reasonably large number of persons in your service area, your promotion will be wasted. A gain in audience is almost impossible under these circumstances. In fact, if your program format

does not contain one or more "hooks" your promotion can hang on, it's unlikely that prospective listeners will find anything interesting.

To answer the question more fully, programming is an important factor in the successful promotion of a station. At one station, an analysis of the various rating services surveying the market showed that the audience remained strong during report periods, when promotion was minimal. Promotion was used to attract and interest prospective listeners and to build the image of the station, but it was up to the programming to hold the audience once it was created. The station relied on a well defined and carefully controlled format to achieve a professional sound, avoiding meaningless gab and other rubbish that tends to clutter so many radio stations.

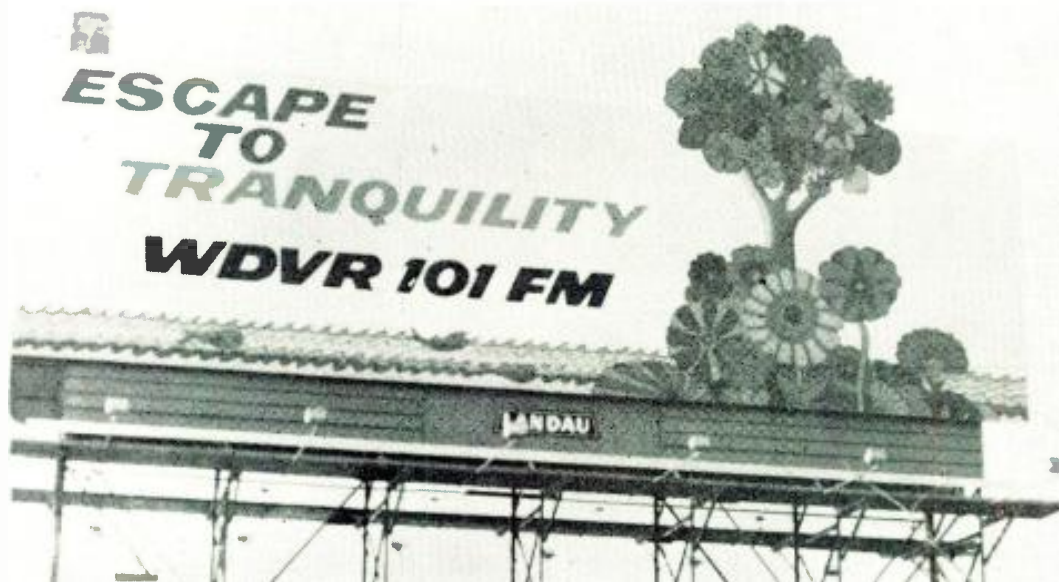
Fm stations have probably put more effort into sales promotion than audience promotion. But a good audience-promotion campaign can reap benefits for your sales department while increasing listeners. After all, aren't the advertising agency personnel, business executives and store owners part of the public you are seeking as listeners? The more these people see your call letters, the more they will readily believe your sales story about audience size and the response to advertiser messages.

When promotion is related to the sales department and to helping increase sales, it must be realized that most successful fm stations have put themselves in competition with *all* radio stations, both a-m and fm. In the advertising community *fm* has come to mean *those stations which promote the least*. It's no longer practical (if it ever was) to try to justify advertising buys on your station with "I'm an fm station." This is supposed to mean that fm listeners are much better than a-m, even if there are only 10 of them out there. In New York it is common to hear agency buyers for large local-regional accounts say "We didn't buy any fm stations this time," or "We had only \$300 left over, so bought just one fm." Meanwhile, the specialty a-m stations—black, Spanish-language—are nearly always considered and in most cases bought with fairly substantial budgets. Buyers know the specialty stations reach a segment of the market.

Fm Is Radio

What is the answer for an fm-er? Become a radio station. You already are—it's just that you haven't learned to think that way. Saying you're

Marlin Taylor is general manager of WRFM(FM) New York City.



Billboards are big help in promoting station's image to would-be listeners. Rotating board location also helps.

"an fm station, which isn't being bought this year" is an easy crutch to justify your less-than-beautiful P&L statements. Sure, you're an fm station, just like your sister stations on the other band are a-m. But this chiefly tells potential listeners where to find you on their radio. Technically, you're way ahead. You have stereo, an fm exclusive and superior frequency response. Both are important today when hi-fi store managers tell of the many women bringing their husbands in to buy components and consoles, quite the opposite of the past two decades. With all that interest, you should be ready to give the a-m boys a run for their money. Note that the status symbol even in ghetto homes is no longer the traditional TV set, but rather a stereo system.

If you are not selling successfully, it's probably because you are not communicating with prospective advertisers. They don't know the benefits to be derived from reaching your station's audience. That's where promotion should come in. As said earlier, your programming and what your station has to offer to listeners, such as stereo, are the keys to good audience promotion. At the same time, promotion should impress these points upon prospective advertisers. You are showing that you are a radio station programming to a certain segment of the population. After that, if you are charging a fair price, it shouldn't matter to your sales prospect what type of radio station you are, unless you make it an issue. But until all fm stations start acting like radio stations, time buyers will continue not to buy "any fm this time." What they're really saying is that your audience isn't large enough to be bothered with, or that you haven't shown them why they need your audience. ("We'll get them anyway by buying the big a-m stations.")

In most cases, the fm station owner or general manager must play the key role in promotion. Very few fm stations are big enough to justify a full-time promotion manager. Therefore, promotion is a part-time job for one or more persons that have other full-time responsibilities. Timing and continuity are important in the effective promotion and continued development of your radio

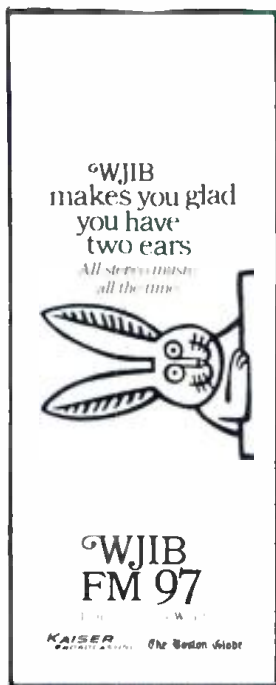
station. It is evident that the manager who is truly concerned with the long-term growth and success of his station is constantly working to improve the image of the station through promotion and community relations activities. This doesn't mean that he plays classical music because the city fathers think better of him for it. Rather he defines what his station stands for to those in his target audience. Plus he insures that his program quality remains high so his listeners remain loyal.

If an award were made to fm's number one promoter, it should go to Jerry Lee, president of WDVZ, Philadelphia. Jerry has involved his station in one or more promotional activities on a nearly continuous basis since it began broadcasting in 1963. There aren't too many likely or worthwhile promotional methods that haven't been used in some form by WDVZ in the past six-and-a-half years. This was not done out of necessity to keep the station's existing audience, as WDVZ's programming has remained at a high level with strict commercial limits—to this day not more than six spots per hour.

Audience Growth Pays Off

While some may consider WDVZ's promotional expenditures extravagant, I doubt that more than a couple of promotional efforts could be singled out as not paying for themselves in audience growth and/or increased business. Considering that the station's 1969 cash billings were well over one million dollars with a healthy percentage of profit, it appears that the station's years of promotion have paid off rather handsomely. To quote Jerry: "Promotion, like a good salesman, is not really an expense, but an asset."

Let's look at some of the various methods open to radio stations for promoting themselves. One of the first ways always thought of is the newspaper. But if you take the Starch reports your sales department uses in selling against newspapers and read them, maybe you'll have second thoughts. If you still want to use newspaper to promote your station (which is not a bad idea if



Clever newspaper ads help get the message across, as with this Boston stereo station.

you can get the space on a reciprocal arrangement), develop a concept that allows you to effectively merchandise your ads. During its development years, WDVR used a small number of full-page ads instead of more frequent smaller ads, so that each achieved a far greater impact. Some of the ads were straight audience promotion, with others directed to the business community. It was always assumed that no one read the newspaper. Therefore, a list of several hundred persons the station wanted to read the ad was supplied to the newspaper in advance. The paper mailed a copy of the first edition to each person, so all received the paper on the same morning it was printed. At the same time the station mailed a special announcement to each person inviting

him to look at the proper page in the morning paper.

A practice I question is why radio stations place their newspaper ads on the radio-TV page. Who reads that page? TV watchers, that's who! Isn't it more practical to use the pages read most by your target audience? Use the financial pages for promoting a good-music or classical format, especially if you carry stock-market news regularly. Use the food and fashion pages if you're trying to reach women.

A good promotional method, but one where costs add up fast, is direct mail. A similar, lower-cost but somewhat less reliable one is door-to-door distribution. This system is best used in urban, non-apartment areas for things like contest coupons, radio listening questionnaires, or other items of value or interest to the recipient. Another method of getting station material directly into the home is through a bank or department-store charge statement mailing.

Use Billboards

A large category is outdoor. This usually means billboards, which outdoor companies call 24-sheet or 30-sheet posters and painted, rotating bulletins. Posters are the most common in this category and the painted type is largest. Rotating simply means that as part of a long contract, the board will move to a new location every two to three months. There are various sizes and shapes of junior billboards, including those found in bus and railroad stations. These differ from market to market. As part of outdoor I also include bus and taxi posters, which in most markets can be found both inside and outside the vehicles.

In some cities advertising benches can be found at bus stops and in front of supermarkets. Gordon Potter, manager of KWST in Los Angeles, has been making good use of benches throughout his vast, mobile market. Several years ago a station in a medium-sized city began placing its own benches through arrangements with the city government and property owners. The station made its own benches, thanks to a jack-of-all-trades chief engineer who did the construction at the transmitter shack. The station was later sold and the new owners dropped the idea. This method is a perfect vehicle for client merchandising, providing bench signs for advertisers during their air schedules, then using them to promote the station at other times.

If there is one key to the successful, effective use of the various forms of outdoor advertising, it is getting your call letters and message across with an absolute minimum of words and artwork. In this medium a person gets only a brief glimpse of your advertisement, except inside a bus or taxi.

Not to be forgotten in promotion is our sister medium of television, which can be very costly, even on a reciprocal basis. It is unlikely that any a-m station would want to do business with you, although WDVR, which is an adult music station,

and KYW, the Westinghouse all-news station in Philadelphia, have aired announcements for each other. Another outlet for your promotion could be the city-wide or regional magazine in your area, and also to be considered are the regional editions of some of the national magazines.

One method of promotion proven effective for an fm station is the dial card. While this idea was first used as far back as 1950, the first large scale printing and distribution of the card (listing all area stations, their frequencies, and noting those broadcasting in stereo) was by WQVR in mid-1963. In the ensuing years the station distributed nearly two million cards. The idea has since been adopted by KWSR in Los Angeles and WJIB in Boston, plus a few other stations around the country. Last summer at WRFM, we launched a promotional campaign to support our new maximum adult music, minimum talk format. It included the widest circulation of dial cards to date—more than one million cards were distributed through more than 2000 locations within a 50-mile radius of Manhattan in a five-month period. The card was printed in three editions due to the number of stations in the metropolitan area and the large area over which they were to be distributed.

The WRFM audience more than doubled in the period following the initial dial card distribution and has become one of the top-rated New York City fm stations and a station of major importance for the first time in its 16-year history.

Reaction to and interest in this item that started out as a station promotion piece is now such that it has become an entity unto itself, developing its own popularity, image and word-of-mouth publicity. I estimate that one in four dial cards picked up actually gets to an fm radio and that one in five of these arriving creates a "listening test" tune-in for WRFM.

Speaking of word-of-mouth publicity, that's the one promotional method I haven't covered. It's inexpensive, but unfortunately it's one that no station should rely on. Few stations are lucky enough to get word-of-mouth working for them on any large scale. Yet if it can be motivated, you have a dynamic, potent force going in your

behalf. WJIB, owned by Kaiser Broadcasting and the Boston Globe and managed by Peter Taylor, is one of the nation's most successful fm stations, yet just over two years old. The station has never done any extensive promotion, and in fact has done nothing that could be called a true promotional effort. None has seemed necessary. Word-of-mouth went to work for WJIB within a matter of days after its first broadcast and created a spectacular growth.

What message do you want to deliver to the listening public? What is your target audience, or what type of people do you want as listeners? The answers to these questions will determine which medium will be the most effective for you. The next question will be how to use that medium to achieve the maximum benefits.

Stations like WJIB, Phoenix's KRPM, and the old KPEN (now K-101) in San Francisco, have one thing that is missing from many stations: strong rapport with listeners. It's seldom thought as promotion or image building, but rapport can be most beneficial if developed properly. At WJIB, Peter Taylor spends several hours every week writing personal letters to listeners who've written the station. KPEN accomplished it with special programs where co-owner and engineer Jim Gabbert answered listeners' questions about hi-fi equipment. The station also had open house events and once ran a hi-fi components show that was popular.

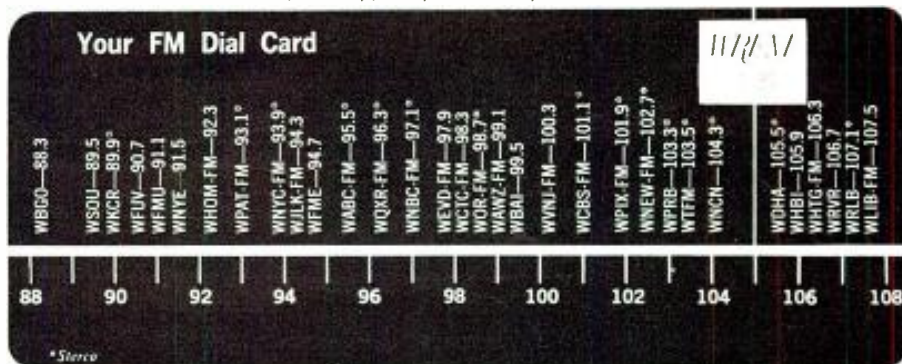
Successful and effective promotion definitely evolves from a total commitment and effort by management to develop an outstanding radio station in all respects—quality programming, hence large audience/ratings, plus sales revenues and profits. A recent NAB survey found that seven of every 10 fm stations with an a-m sister now present separate programming 50 to 100 percent of the broadcast schedule. The same was true of no more than two out of 10 just five years ago. With this great proliferation of fm programming, a station must develop a definite identity and image in order to survive and succeed. This is where promotion comes in. Do it well, do it enthusiastically, and compete on an equal footing as a radio station. **BM/E**

Fm dial card widely distributed where fm listeners are likely to shop, are promoted by this bus ad card.

**Want your own
FM Dial Card?**

**Pick one up free
at your local Hi-Fi
radio dealer.**

**... or write to
WRFM Stereo 105
New York 10022**



WRFM Stereo 105

105.1 on your fm dial
in stereo 24 hours a day.

Dial-A-Channel CATV System

A radically different CATV system has been developed in England; it works just like the telephone system does. Program selection is made at an exchange, and only the program you're watching is delivered to your home.

By R. P. Gabriel

LARGE-SCALE MULTI-CHANNEL capability is one of the goals set by the President's Task Force on Communications Policy. Its report said, in part:

"For our goals to be satisfied on a significant scale, a low-cost multi-channel capability may be required . . . although the precise number [of channels], which depends on local conditions and needs, cannot now be specified."

A significant contribution toward these aims is Rediffusion's high-frequency, remote-selection CATV system which is now being tested in England. The subscriber merely dials the program he wants to watch, just as he would dial a telephone number. The concept is not new; what is new is the practical and economic method of constructing a system of this kind.

Hf Systems

For many years Rediffusion has been operating (in the United Kingdom and Hong Kong) CATV systems which are significantly different from the US type. The basic system, which now serves 800,000 subscribers, uses a single channel in the 5-10 MHz range for all programs. Each program is carried to the subscriber on a separate

R. P. Gabriel is technical director of Rediffusion International Ltd.

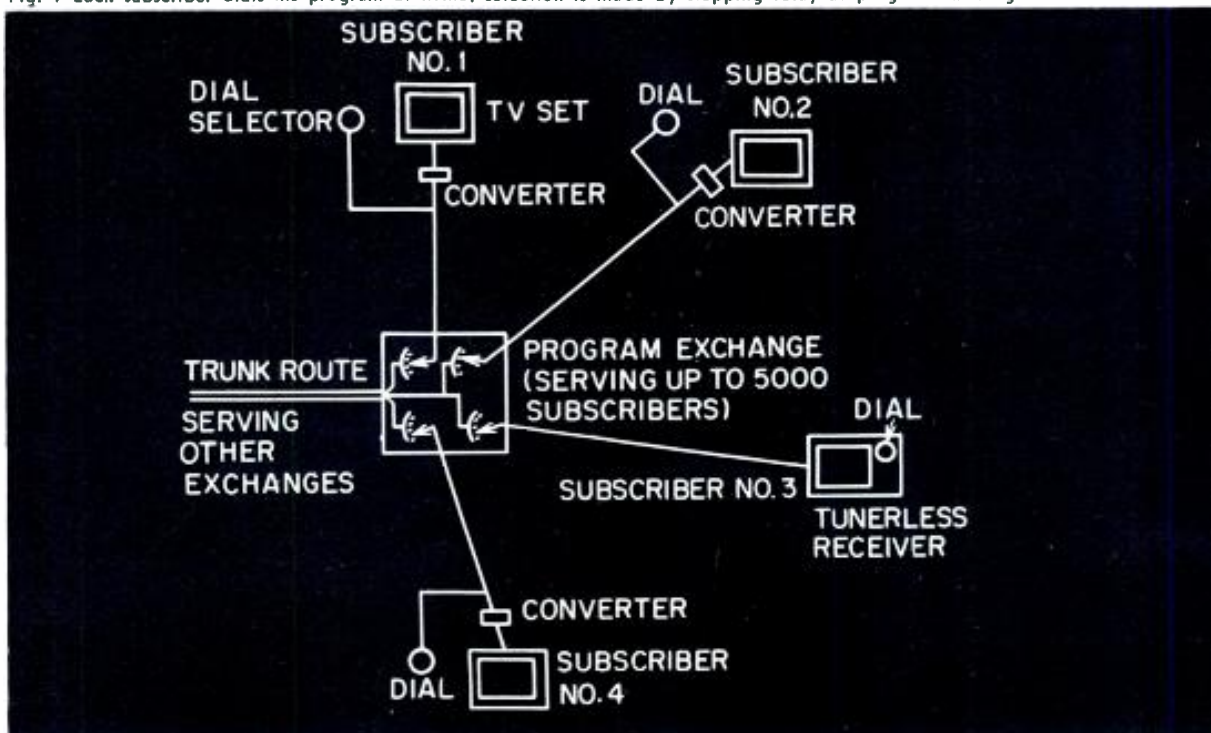
circuit. In the United Kingdom, where only four program channels are available, the distribution cables provide six circuits, leaving two for future expansion. The cables are not coax, but are balanced pairs, both for economy's sake and the small size which such pairs make possible. They're balanced to reduce mutual interference to a satisfactorily low level.

The hf system is readily adaptable to the dial-a-program technique. Each pair in a multi-pair cable is allocated to a separate subscriber to provide a private connection to the exchange as shown in Fig. 1. In the house, the signal is heterodyned by a fixed-tuned, set-top converter to an unused vhf channel and fed to the receiver antenna terminals.

You need a conventional tuner-equipped receiver for off-air reception, but the Rediffusion system obviates the need for a tuner. Accordingly, hundreds of thousands of tunerless monochrome receivers have been built and are now in use in the UK and Hong Kong. The receivers cost about 30 percent less than off-air types. Since there can be no tuner faults, the failure rate is about two-thirds of normal.

In the UK and Hong Kong systems, sound is transmitted via fm for the benefit of the tuner-equipped receivers. Sound is also transmitted at audio frequencies for the tunerless receivers, in

Fig. 1 Each subscriber dials his program at home; selection is made by stepping relay at program exchange.



which it is fed directly to the audio amplifier. This enables those receivers to accept a sound-only program. It also makes an additional feature possible: certain video programs may be transmitted without fm sound, and the sound i-f trap switched out of the circuit of certain receivers. Then wideband video signals may be transmitted, such as high-quality color pictures for medical purposes.

Feeder Cables

The remote-selection system uses a special type of feeder cable known as "Qwist." Each subscriber line is one Qwist and consists of four conductors, or two pairs. The larger pair, which carries visual and aural rf, and audio, consists of twin 0.018-inch conductors. The smaller pair carries dial control pulses, and its conductors measure 0.016 inch. The two pairs are placed across each other. Fig. 2 shows the cross-section of a 12-pair (six-Qwist) cable. Such a cable serves six subscribers. It has an outside diameter of 0.41 inch, and an attenuation of 1.5 dB per 100 feet at 10 MHz. Each pair is well balanced and Qwist-to-Qwist crossview is very low. A bunch of coaxial cables with the same attenuation has about twice the cross-sectional area and costs about twice as much.

A total length of 500 yards of multipair cable may be used between the program exchange and a junction box from which individual Qwists are routed to subscribers. These individual Qwists are normally up to 100 yards long. But, if it's desired to serve a remote subscriber, the Qwist may be extended for five miles or so with single-channel line-powered repeaters, which are spaced at about 3/4-mile intervals.

Given a normal cable length of 600 yards, each program exchange can serve an area of about 1/10 of a square mile. Such an area may contain about 300 homes in a suburban area or, perhaps, 4000 homes in the densest part of a city. However, there is nothing to prevent the area being split up into sections smaller than 1/10 of a square mile, if this is more convenient.

Program Exchange

The subscriber's dial controls a switch in the program exchange to select the desired program. The switch operates under severe conditions: Coupling at 10 MHz from all unwanted to the wanted program must be negligible; at the same time, since each subscriber requires one switch, it must be inexpensive. A switching system design using reed relays operated by a permanent magnet and a simple rotary stepping mechanism was picked for the system. Performance is satisfactory and a cost of \$25 for a 36-position unit is a realistic production figure.

In order to halve the number of reed switches required, both rf and audio are switched in the unbalanced mode. They're converted by baluns to the balanced mode for application to the

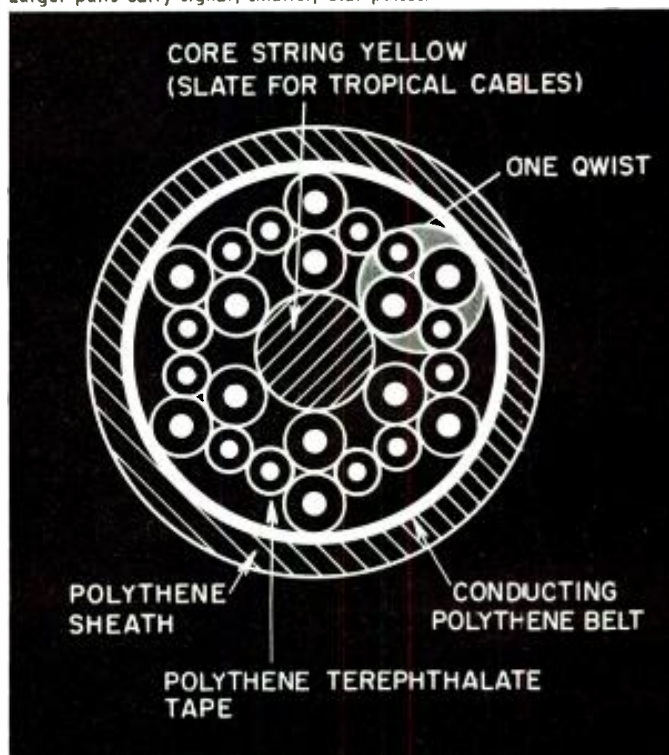
Qwists, as shown in Fig. 3. Each switch is mounted on a printed-circuit board provided with edge connectors so it can be plugged into the circuit as subscribers are connected, thus reducing initial investment.

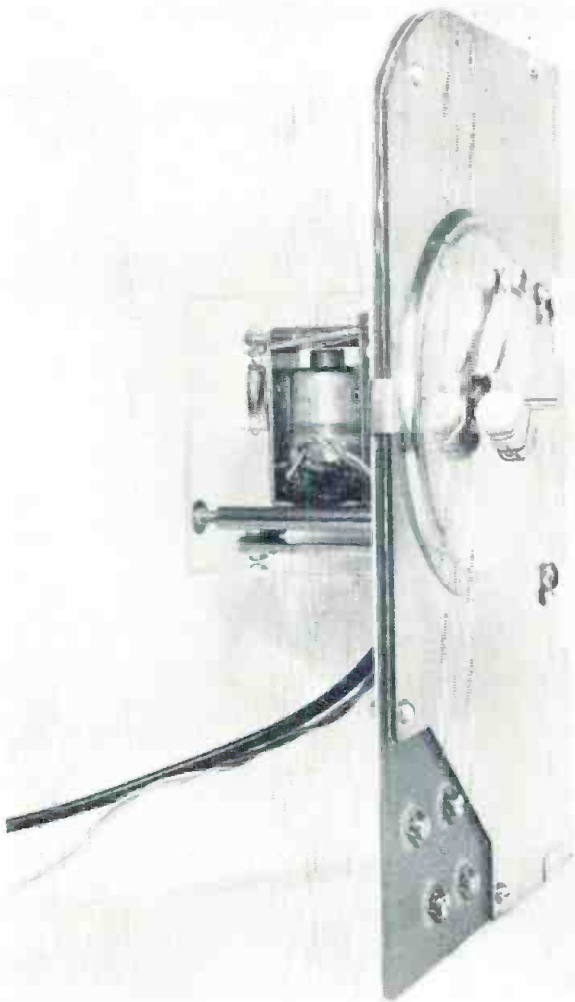
The program-exchange equipment is assembled into basic units, each providing for a choice of 36 programs by 336 subscribers. A second unit can be added for access to 71 programs, one position being lost in the transfer between units. A third unit expands excess to 106, and so on. Alternatively, if the exchange serves, say, 3300 television receivers with 36 programs, 10 units are grouped together.

Maintaining a uniform signal level for all subscribers is another problem. The sending voltage at the exchange is much higher for the most distant subscribers than for the nearest. To assure that this voltage difference does not add to the problem of crossview in the exchange, the busbar system is divided into a number of different sections. Each section carries a progressively lower voltage and serves a group of subscribers progressively nearer to the exchange. Each section of the busbar system is connected to its neighbor by hybrid transformers. Thus a disturbance on a line connected to one section is not reflected back to affect other sections.

Each subscriber line is fed through the two resistances shown in Fig. 3, which insure that a short or other fault on one line has a negligible effect on other subscribers—even those fed by the same busbar section. In conjunction with the low impedance of the busbars, the series resistors make sure that the output signal level doesn't change by more than 1 dB between the extremes

Fig. 2 This 12-pair, six-Qwist cable serves six subscribers. Larger pairs carry signal; smaller, dial pulses.





Subscriber dial shown with cover removed. It's very much like a telephone dial.

of none and all subscribers selecting the same program.

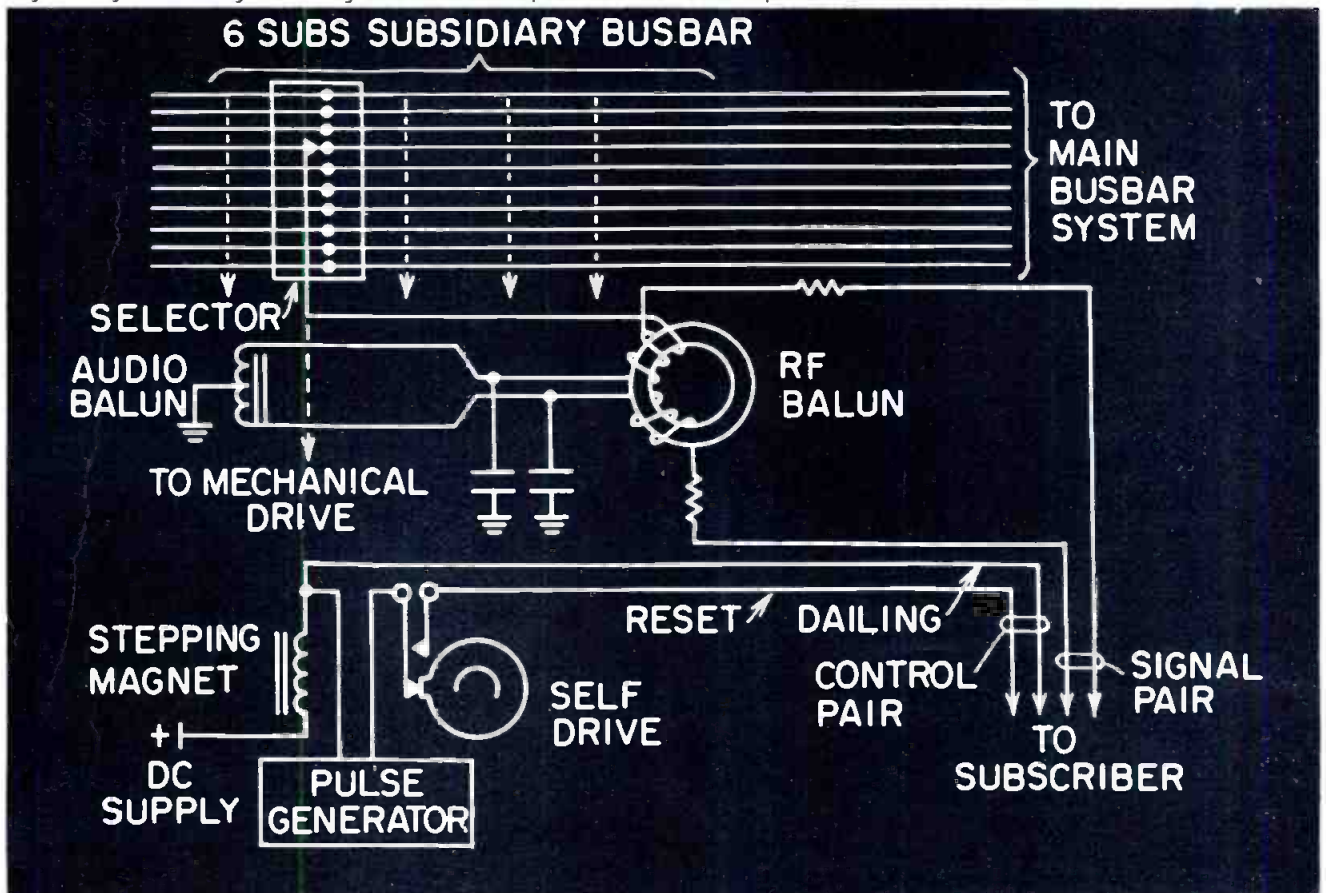
The subscriber's dial unit contains a reset button which returns the selector mechanism to its zero position.

Trunk Network

The program exchanges are fed by a primary distribution network, which may use microwave, wideband or single-channel cable. The simplest and cheapest method is a separate coaxial cable for each program, with the signal at the subscriber delivery frequency. Thus only amplifiers are required in the exchanges. If a single wideband cable carries all programs, frequency-changing equipment is necessary. Its cost usually wipes out the saving made on the cable.

In this system, the number of receivers served by each program exchange varies. At one extreme is the small exchange, contained perhaps in a pole-mounted box, serving 10 or 20 receivers. In this case, the length of trunk route is nearly as great as the total length of feeder cable in a conventional CATV system. Connections from the program exchange to the receivers are almost entirely drop wire, and there's little opportunity to use multipair cables—the cheapest form of signal distribution. There are also many points which must be visited for maintenance, and for connecting and disconnecting subscribers and changing programs available to them. If the number of programs carried by the system is increased, additional channels must be established

Fig. 3 Program exchange switching is done as shown, unbalanced, which requires fewer switch contacts.



by adding cables over long trunk lines, at perhaps an average of 10 yards per subscriber.

At the other extreme, with one exchange serving an area of 1/10 of a square mile, you obtain the full economic advantage of the cheap multipair cables. There are few maintenance points, and trunk length falls to perhaps one or two yards per subscriber. Clearly, the more programs the system handles, the more it pays to increase the length of the distribution cables and reduce the trunk length—reducing the number of program exchanges. For a total of 20 to 40 programs, the exchange area of about 1/10 of a square mile offers a reasonable compromise between the various conflicting factors. But practical experience will probably indicate the need for flexibility. Larger areas are probably more practical and economical than smaller.

Two-Way Operation


In the ordinary close-in installation, there are no repeater amplifiers between the program exchange and the subscriber's premises. This means each subscriber can originate programs and feed them into the system at the program exchange. Subscriber-to-exchange (incoming) programs can be carried on an alternate frequency, adjacent to that used for exchange-to-subscriber (outgoing) programs. When the incoming program signals

arrive at the exchange, they can be diverted by filters at the switch, then heterodyned to the outgoing frequency. Thus any subscriber can feed any other, or all.

While private, residential subscribers may seldom originate programs, the system is capable of accepting signals from any point, and is therefore quite flexible. The FCC has encouraged local origination and common-carrier services in its recent CATV rule making. The Rediffusion system enables schools, churches, local sports arenas and halls, social service agencies, and many similar local groups to feed programs into the system from nearly any point. Because the cables are always there for outgoing programs, there is no need to set up a special and costly microwave or coaxial link back to the main program distribution center.

Selected Audiences


In each subscriber selector switch at the program exchange, reed switches may be easily disconnected or removed. Thus subscriber access to programs may be limited as desired, and certain programs may be available only to selected audiences. This feature could be used for subscription programs, or to limit private material to professional persons, such as medical doctors or law-enforcement personnel. **BM/E**




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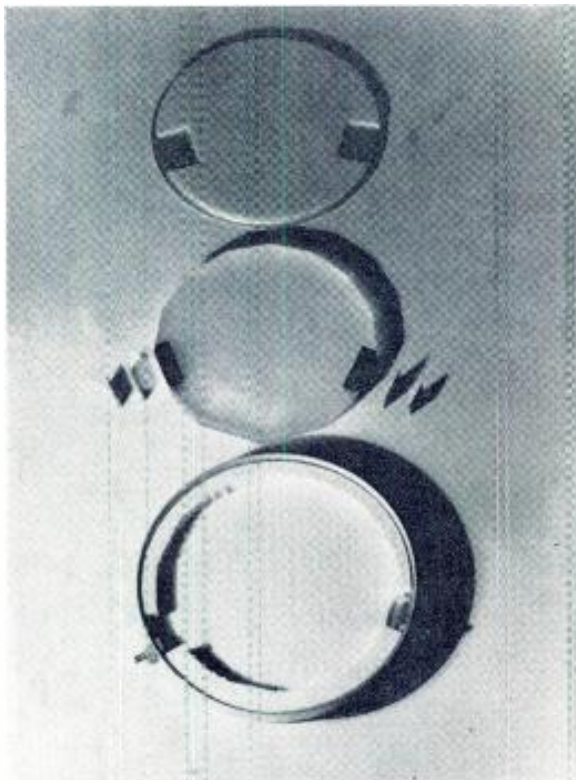
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The Artificial Delay Line: A Must for TV Processing

By Richard H. McLean

Widely used in electronics, artificial delay lines are invaluable in modern color TV broadcast studios where precise phase delay is needed to assemble video pictures from several sources.



Disassembled 700- μ sec quartz delay line with offset transducers. Quartz plate is in center.

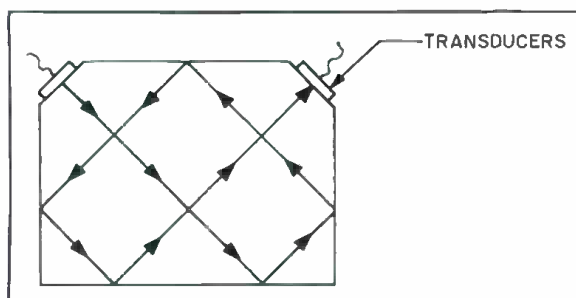


Fig. 1 Typical pattern of glass delay line. Signals enter left-hand port, leave on right.

COAXIAL CABLE has been commonly used in television broadcasting to obtain a fixed delay of the video signal. Cable is bulky, though, and its delay can't be easily varied. More practical and popular today are artificial delay lines, some

Richard H. McLean is manager of video products at Andersen Laboratories, Inc., Bloomfield, Conn.

of which are variable. They make possible such production aids as vertical aperture correctors, tape dropout correctors, zero-delay switcher amplifiers, character-edging systems, switcher phasors, comb filters and VTR time-base correctors. Artificial delay lines are also indispensable in such large systems as all-electronic TV standards converters and automatic remote synchronizing systems.

Several types of artificial delay lines, and their functions, are: electromagnetic (for replacing cable delay for timing); electrically variable (for automatic phasing and time-base correction); glass (for one TV scan line delay); and fused quartz (for long delays up to one TV field).

Most popular is the 1H (one line) delay of 63 microseconds. By storing one line of video, many useful processing or corrective functions can be accomplished.

A 63- μ sec delay, equivalent to the impossible length of nearly eight miles of cable, is efficiently packaged in a small box no larger than a pack of cigarettes. How? By converting electrical energy to acoustical energy and back again, through thin transducers operating at 30 MHz or so.

Generically called "ultrasonic delay lines," these devices are made from plates of glass (or fused silica) $\frac{1}{4}$ to $\frac{1}{2}$ inch thick. Generally, the major dimensions are determined by the amount of delay required. The reciprocal of sound velocity in fused quartz is 6.75 μ sec/inch, and in zero temperature coefficient (ZTC) glass, 10 μ sec/inch. Therefore, a 63- μ sec glass line path of 6.3 inches is compressed in the geometric pattern shown in Fig. 1. Large fused quartz lines, several milliseconds long, are made of quartz slabs with many facets (reflective surfaces) around a general diameter of up to 21 inches.

A typical, uncompensated 1H delay line performs this way: total delay is 63 μ sec \pm 10 nsec; center frequency is 30 MHz and bandwidth is 12 MHz within 1 dB; attenuation is 60 dB and spurious frequencies are 40 dB down from the main.

With specs like these, the delay line calls for something to be added to process the video signal. Incoming video must be modulated up to the i-f carrier of the delay line, then demodulated for video output. The block diagram of a 1H video delay module is shown in Fig. 2.

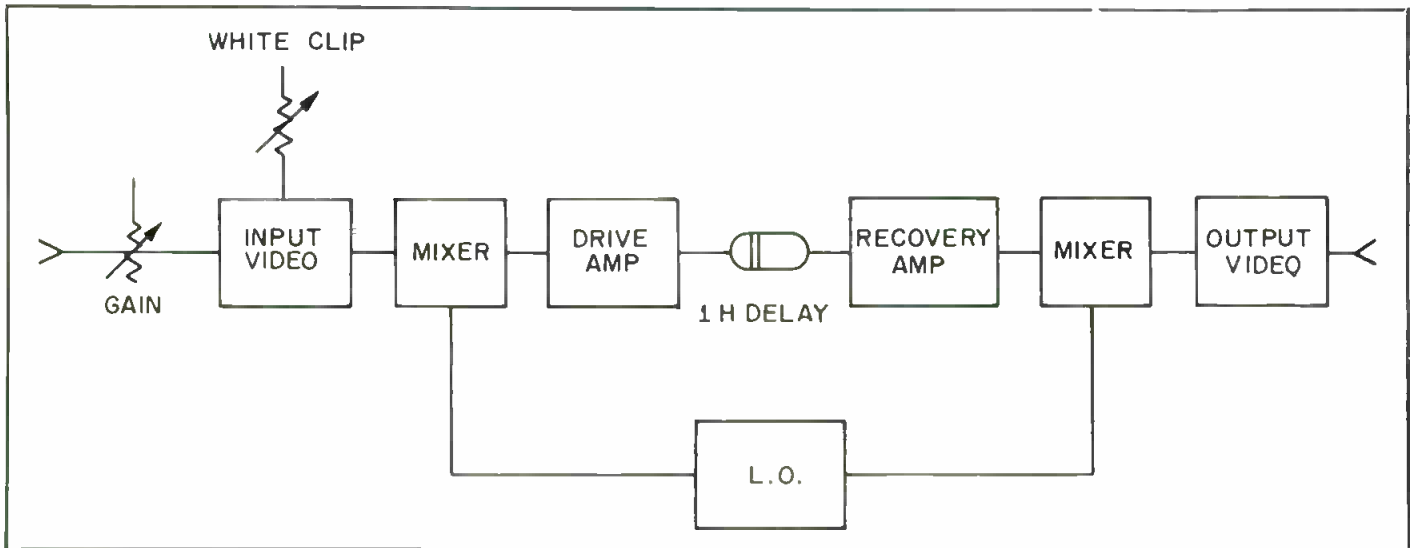


Fig. 2 To provide delay of 63 μ sec, video is converted to rf at 30 MHz and fed to delay line, then recovered.

Until recently, if you used a 63- μ sec delay module, you had to live with a spec tradeoff: either a good signal-to-noise figure (50 dB) and a poor differential phase/gain figure ($10^\circ/10\%$); or vice versa (35 dB s/n and $2^\circ/2\%$ differential phase/gain).

Recently though, improved delay lines with low loss and high modulation capability have made possible the production of high-quality delay modules. The line's presence in the loop is not discernible and doesn't degrade video performance. Typical specs are 50 dB S/N, $1^\circ/1\%$ differential phase/gain.

ZTC glass is normally used in such a module. ZTC is very stable and requires no oven as does fused quartz, which is used for longer delays. ZTC has a temperature coefficient of $+.05$ ppm/ $^\circ$ C.

Long Delays

Fused-quartz delay lines have been used in radar gear since the late 1940s. Delays of 3.5 to 4.0 msec are common and have been used in large quantities by the military. Only recently have broadcasters become aware of the existence of such devices. The acoustic method of storing a full field of video has made possible a new

generation of television equipment.

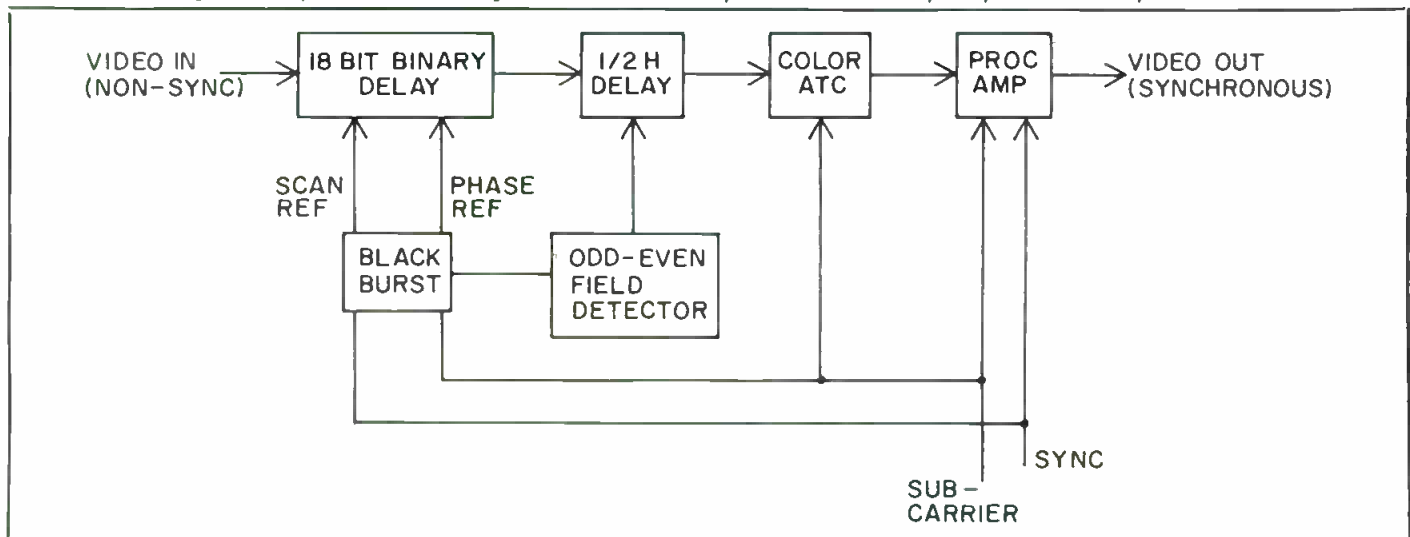
The field-store TV standards converter is a good example. It selects segments of delay lines and stores video, making it possible to convert European video (625 lines, 50 fields, PAL or SECAM color) to American video (525 lines, 60 fields, NTSC color) and vice versa. (See "Unscrambling those European Colorcasts," *BM/E*, July, 1969, p. 30.) Accompanied by sophisticated processing electronics, oven-enclosed ultrasonic delay lines provide the most stable and trouble-free performance in this service.

Another use for acoustic full-field stores is a system to instantly and automatically correct any incoming remote feed, using station sync as a source, while simultaneously eliminating the need for closed-loop feedback. A series of electromagnetic and acoustic delay lines, binarily related in multiple increments, provides the storage media as well as the resolution, to correct non-synchronous feeds from any remote location. The block diagram of Fig. 3 illustrates the principle.

Cable Simulators

In order to delay video for approximately one microsecond, more than 600 feet of coaxial cable is required. Additionally, passive equalizing net-

Fig. 3 Non-synchronous incoming video is automatically timed to station sync by this remote synchronizer.



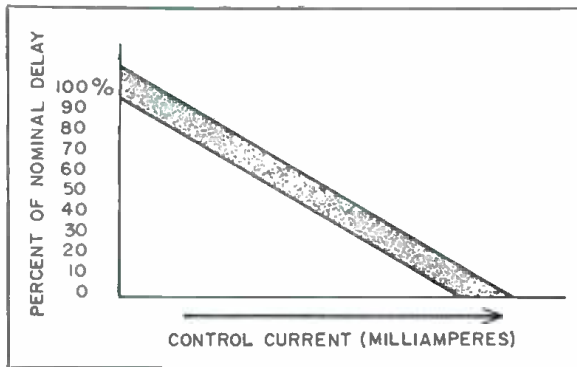


Fig. 4 Action of variable delay line in which control current is varied through winding on inductor.

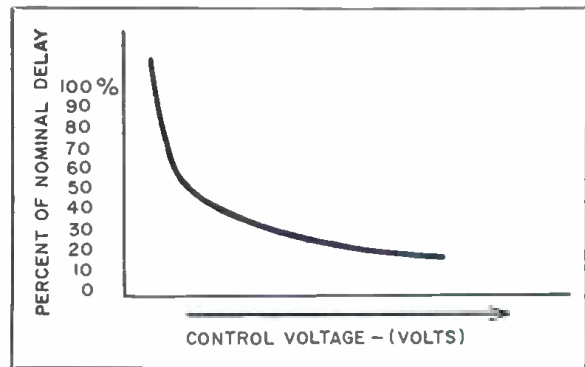


Fig. 5 Delay line variation when both inductor current and varactor voltage are varied.

works must be used, which demand an amplifier to recover signal loss. In the delay-line industry, such delays are considered small; the same job can be done with lumped-constant electromagnetic units.

Coax has been used for years to route video around a studio from source to termination. In a color signal, the subcarrier at each termination is usually out of phase, and is often phased in with an additional length of cable. A subcarrier phase shift of 300° requires some 180 feet of cable. You have to attach connectors to carefully measured lengths, which may then require equalization and amplification.

It's much easier to phase in the 3.58 MHz subcarrier with lumped-constant delay line, which is smaller and more convenient to use. Fixed delays are available in almost any incremental amount. Delays which are continuously variable over a full cycle of 3.58 MHz are also available, fully equalized, with zero loss. These variables are finding increasing use where frequent changes in path lengths are experienced.

Finally, electrically variable delay lines are used where automatic phase control is needed. Typical applications are time-base correctors in

VTRs and closed-loop phase control in color cameras. (See also "Phase Correction Holds Colors Steady," *BM/E*, September, 1969, p. 37).

An electrically variable delay line is very much like a simple LC network; inductors are series-connected with shunt capacitive elements (varactors). There are three methods of varying the delay:

- Each inductor includes a second (control) winding, which is connected to an external current source. Increasing current I_L through this winding decreases the network impedance and shortens the delay time, as shown in Fig. 4. The disadvantage of this method is that the total delay range is small.
- An external voltage E_C is applied across each varactor. Increasing this voltage increases the network impedance and shortens the delay time. But the relationship between E_C and delay is very nonlinear and therefore impractical.
- Simultaneously increasing both voltage E_C and current I_L shortens the delay line at approximately constant impedance. The relationship is nonlinear (Fig. 5) but not as bad as for E_C alone. If you need linearity, you must compensate in the control circuit.

BM/E

Delay-Line Applications

VTR dropout corrector: Dust particles, tape imperfections and other random error sources can cause video information to be partially lost during tape playback. In this application, video is continuously delayed by one line. Whenever a dropout is detected, the imperfect line is rejected and the previous line repeated.

Comb filter: Often a sharp color transition, as on the edges of lettering keyed into the picture, causes a 3.58-MHz Y/C beat which is visually annoying. A comb filter minimizes such a beat by limiting luminance/chrominance bandpass overlap. But the trap (notch filter) generates unwanted frequency components. By using the comb filter and a 1H delay through summing circuits, Y is added and C is phased out.

Vertical aperture corrector: In a two-line system, vertical aperture equalization of each line is done by comparing it to the line above and the line below. The resultant difference signals represent

vertical detail that is later added to the main signal to sharpen vertical transition.

Zero studio delay: If you want to feed the output of one switcher into another (e.g., subcontrol into master control room), ordinary pulse-timing methods aren't adequate. The solution is to eliminate switcher delay (typically 1 to 5 μ sec) by storing the signal for a time equal to one line less the switcher delay. Back-timing through a processing amplifier then puts the remote switcher output exactly in sync with the input (although one horizontal line late). Simple phasing then results in a new point source of video.

Video letter edging: An inserted or keyed character usually requires a dark border to distinguish it from a moving background. By delaying the insert one line, a top border is generated. A second one-line delay creates a bottom border. Side borders are generated by increasing the size of the matte insert background.

Veni, Vidi, Vidicue

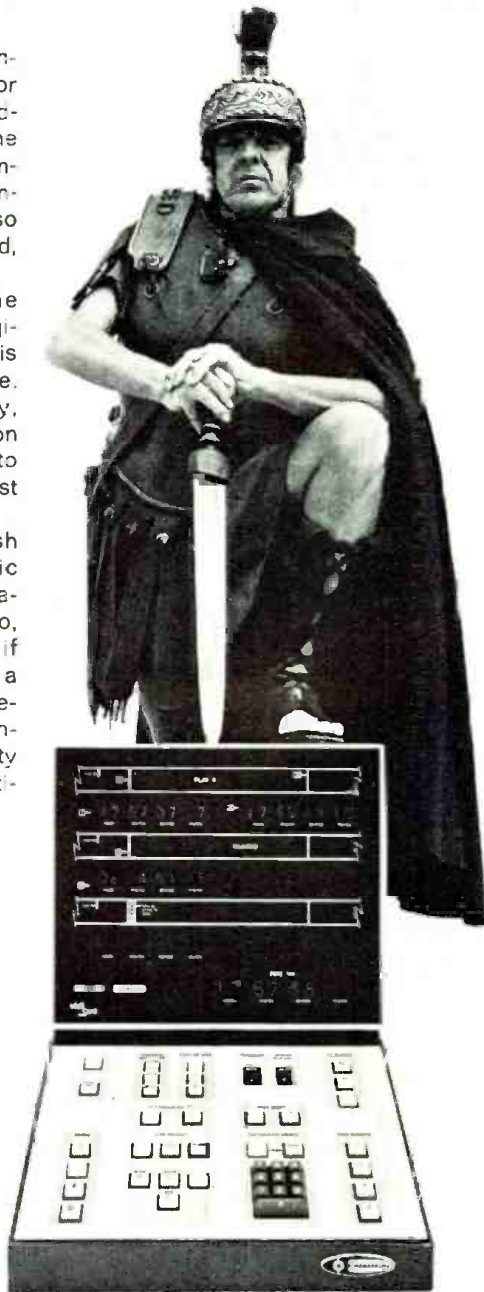
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Audio mixer

Solid-state four-channel mixer called the Stereo Producer has been introduced by Gates Radio Company. Although designed primarily for recording work, it is useful for other services not requiring a complete speech-input console. Transformer-balanced inputs on each channel of



the console include: six microphones into two faders and ten turntable, cartridge, or reel-to-reel recorders into two faders for each stereo channel. At the console output there are high-gain program amplifiers that furnish 600-ohm balanced outputs at ± 8 VU after an isolation pad. For monitoring loudspeakers, amplifiers rated at 1.5 W are provided.

Circle 290 on Reader Service Card

Standby power source

Kato Engineering Company's new variable frequency motor-generator, driven by dc motor and designed with solid-state controller, may come in handy where more expensive mechanical drive arrangements aren't required. Size and weight factors found in coupled double frame units



are reduced by mounting dc motor and ac generator in a common frame enclosure with rotors on common shaft. Units can have the output power and voltage proportional to the speed or frequency—the illus-

trated unit is rated at 15 kW, 220 V, 60 cycle output with frequency variable from 40-70 Hz, powered by a 25 hp drive motor; but units can have a broad range of voltages or can have an oversize motor maintaining constant rated power output throughout the frequency range. The controller first converts the ac voltage to dc and automatically controls the magnitude of the voltage, causing the motor to operate at the selected speed. Speed regulation within two percent can be supplied as an accessory.

Circle 277 on Reader Service Card

Compact CCTV studio camera



Viewfinder mono TV camera from Ampex, Model CC-450, uses $\frac{3}{8}$ -in separate-mesh vidicon pickup with 50-gauss focus field. Camera features recessed 5-in finder and automatic light level control. Designed for random interlace, cam can be easily converted to 2:1 EIA RS-330 output by adding one circuit board. Resolution is 600 lines at center and 400 lines at corners. S/N ratio is 40 dB and weight is 15 pounds (less lens). Price: \$995 without lens.

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Gooseneck mike

HK-113 omnidirectional microphone has flexible gooseneck attached to



base containing push-to-talk and lock switch. Can be wired for remote control. Will work into low and high impedance amplifiers. Suggested list price: \$42.00 each. RCA/Electronic Components, Commercial Engineering.

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No crystal is used in the SCA Services Company FMX-1 tuner. The main channel tuning is done with a varactor which is stabilized with a regulated power supply and amplified AFC. Front end has four FETs for minimum cross-modulation. The i-f system uses four ICs, producing full limiting at less than 5 μ V rf input. Subchannel circuit uses a quadrature detector, and audio circuit contains a reed muting switch to kill audio in the absence of a signal. Available with either 300 or 72 ohms rf input impedance. Cost is less than \$100.

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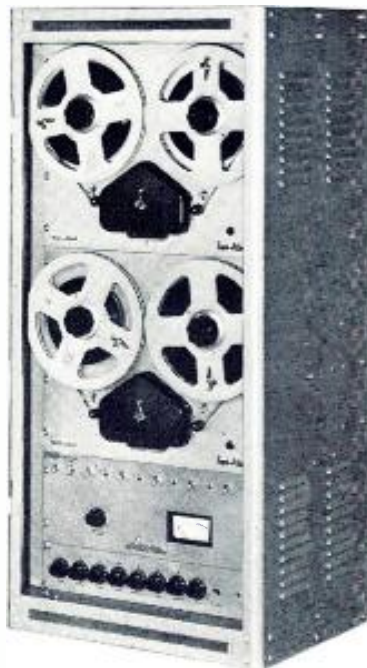
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A four-to-one zoom lens adjustable from 22.5 to 90 mm, the model RC-ZL1 by GBC has an aperture



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Circle 300 on Reader Service Card

Electronic digital clock

Model BPC-101C digital clock from Broadcast Products is low-cost (\$395) instrument suitable for use as clock, stop watch elapsed-time indicator in many studio applica-



tions. Six-digit display shows hours, minutes and seconds. Internally, integrated circuits provide high reliability. All operational controls are front-panel mounted, including start, stop and reset. Unit is available in aluminum case or for rack-mounting.

Circle 296 on Reader Service Card

Stereo pan pot

Model H-122 Phantom Positioner is low-cost version of pan pot used by



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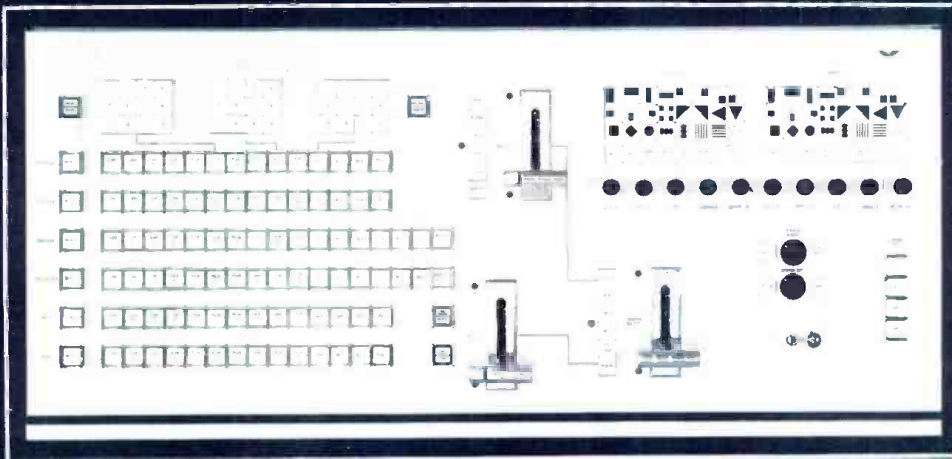
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recording studios. Mono source (microphone, tape playback, tuner, etc.) can be positioned left, center, right, or any combination thereof in two channel stereo. Input is low-level, low-impedance or high level high impedance, both unbalanced, while outputs are 15 k Ω each channel at about 1 V. Gain is 60 dB, with 60 dB S N, less than 1 percent THD. Power supply is self-contained 9-V battery. \$59.95 from UltraAudio division of Oberline Inc.

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TV cam head

Pneumatic pedestal and camera head for color TV cameras features 50° tilt capability. H.T.S. Mark II cam head is distributed in U.S. by Tele-



vision Equipment Associates. Unit has a cast aluminum base and cantled wheel assemblies to compensate for dirt or uneven floors. Steering wheel rises with camera head to facilitate camera movement and change of direction. Trimming weights accommodate weight imbalances during use. Pedestal will accept up to 500 lb. Price is \$1000.

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Hand-held CB transceiver

Sonar model T-6 transceiver has 5-W input power, 6-channel coverage, crystal control, adjustable squelch, ANL, and built-in meter for modulation and battery test. Unit uses self-contained rechargeable nickel-cadmium batteries. Jack provided for public-address work; antenna is center-loaded for efficiency. Price: \$99.95.

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Continental model 50-191-3 (275-300 W capacity) and Dual Conti-



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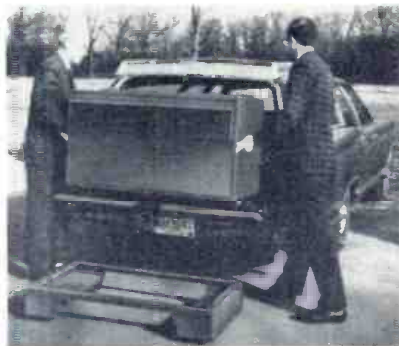
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mental model 50-202-3 (550-600 W capacity) provide reliable 117 Vac from 12 Vdc. Stability of these inverters by Terado Corp. is 60 ± 0.25 Hz. Units come with remote control and heavy-duty 15 ft copper leads. Circle 276 on Reader Service Card

Transportable TV production gear

Consisting of ETV/CCTV type equipment, ETS II-M system by



Raytheon Learning Systems Co. includes two cameras and a control console. Cameras are Raytheon models 606 (non-viewfinder) and 706 (viewfinder and zoom lens). Console contains a switcher/fader with four non-composite and two composite

inputs; an audio mixer with a VU meter and two microphones; and two 9-in. video monitors. Unique feature of system is electronic pointer which allows emphasis on picture areas. Price of system is \$8500. Circle 307 on Reader Service Card

Wireless talkback

Completely self-contained wireless rf headphone/microphone is the RH-27 from Sharpe Audio Division of Scintrex Inc. Unit does not require licensing as power output is less than 100 mW. Useful for portable talk-



back for workers who must move around yet keep in constant touch with control point.

Circle 279 on Reader Service Card



NEW FAIRCHILD REVERBERTRON

Model 659 FAIRCHILD Reverbtron is the newest addition to the world-famous FAIRCHILD Reverbtrons. Superseding all other artificial reverberators within its price range, the new 659 reproduces for broadcast or recording purposes, in a compact system, the same natural, real-life reverberation effects as the world's finest acoustic chambers.

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channel with a range of adjustment to ± 15 db • S/N is 10 db over previous models • Effective for input levels as low as -30 dbm; output levels up to $+18$ dbm • Transformer isolated input and output impedance is 600 ohms or 150 ohms balanced or unbalanced • All electronics are on easy plug-in P.C. boards • All signals are metered • Controls have continuous mix facilities • Compact: only $22\frac{3}{4}$ " high x 19" wide x 10" deep.

*U.S. Patent #3436674

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Cart system

"Instacart," the newest addition to the International Good Music line of automated audio control equipment, offers random access to any of 48 or more audio cartridges. Other features include manual or remote control, ability to have unlimited number of different an-



nouncements per minute and multiple simultaneous outputs. It also has the optional capability of recording as well as playing back and of having multiple audio outputs. Standard configuration is in four stacks of

12 cartridges, rack mounted. Overall width is 19 in., depth 18 in. and height 17½ in.

Circle 280 on Reader Service Card

Production strobe light

Large-area strobe lighting unit, System 700, made by Unilux Inc., is for synchronous use with all cine and TV cameras. Strobe stops action, producing ultra-sharp images on film or tape, regardless of motion. Sys-



tem is especially useful in production for commercials, special effects in shows and educational tapes using stop slow motion videodisc. Strobe maximum flashing rate is 250/sec; each flash duration is 50 microseconds. Output is 250 footcandles over 300-sq.-ft. area. Price is \$6900 for basic system.

Circle 297 on Reader Service Card

Tape recorder

Model 11-1-P monaural full-track Pilotone tape recorder is fully transistorized with five heads, three speeds and seven-in. reel capacity. Included in the recorder are an electronic tape speed governor, servo tape tension mechanism, automatic overload limiter and separate level controls for mixing mike and line inputs. Weighing 9½ lb, it is portable and climatized to operate with maximum reliability at all temperatures between plus 15 degrees to plus 115 degrees F. \$699.00.

Circle 293 on Reader Service Card

Uhf wavemeter

SN-2 WAVE/DIP meter and marker oscillator that operates in frequency range of 400 to 1150 MHz has been introduced by Melsey Corporation. The 6 in. 10½ oz. unit provides continuous tuning directly calibrated to better than one percent by the use of a 30-in. steel tape. In addition, it can function as a signal generator and can measure inductance, capacitance and relative Q and field strength. \$185.00.

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Frost cutter

FC-24 frost cutter from Vermeer Manufacturing Company is designed to dig and trench through frozen ground and hard rocky soil. It fea-



tures a high-speed cutting wheel with carbide tipped cutting teeth that opens a trench 5 in. wide and 24 in. deep. Hydraulic brakes included.

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Videotape recorder

Ampex Model VR-5100E closed circuit, helical scan videotape recorder is priced at \$2350 and features a servo capstan control that is said to enable editing from any video signal source. Specs include: A low impedance mike connection; horizontal resolution of 300 lines; bandwidth of 3.0 MHz; and video signal-to-noise ratio of 42 dB. Tapes recorded on this unit can be played back on any other Ampex one-inch helical recorder. Recommended particularly for educational applications.

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NAMES

IN THE NEWS

Vincent T. Wasilewski, president of the NAB, has received full board support for another two years in office.

Dr. Peter C. Goldmark, CBS Laboratories president, has announced the appointment of **Langdon A. Cook, Jr.** as general manager, professional products manufacturing and marketing.



Richard A. Hood Charles R. Dougherty

Richard A. Hood has joined Kaiser CATV as chief construction engineer.

Charles R. Dougherty has been appointed to the position of manager, product planning market development for Signalite Inc.

John Pilman, formerly with American Electronics Laboratories Inc. has joined Belar Electronics Laboratory Inc. as a development engineer.

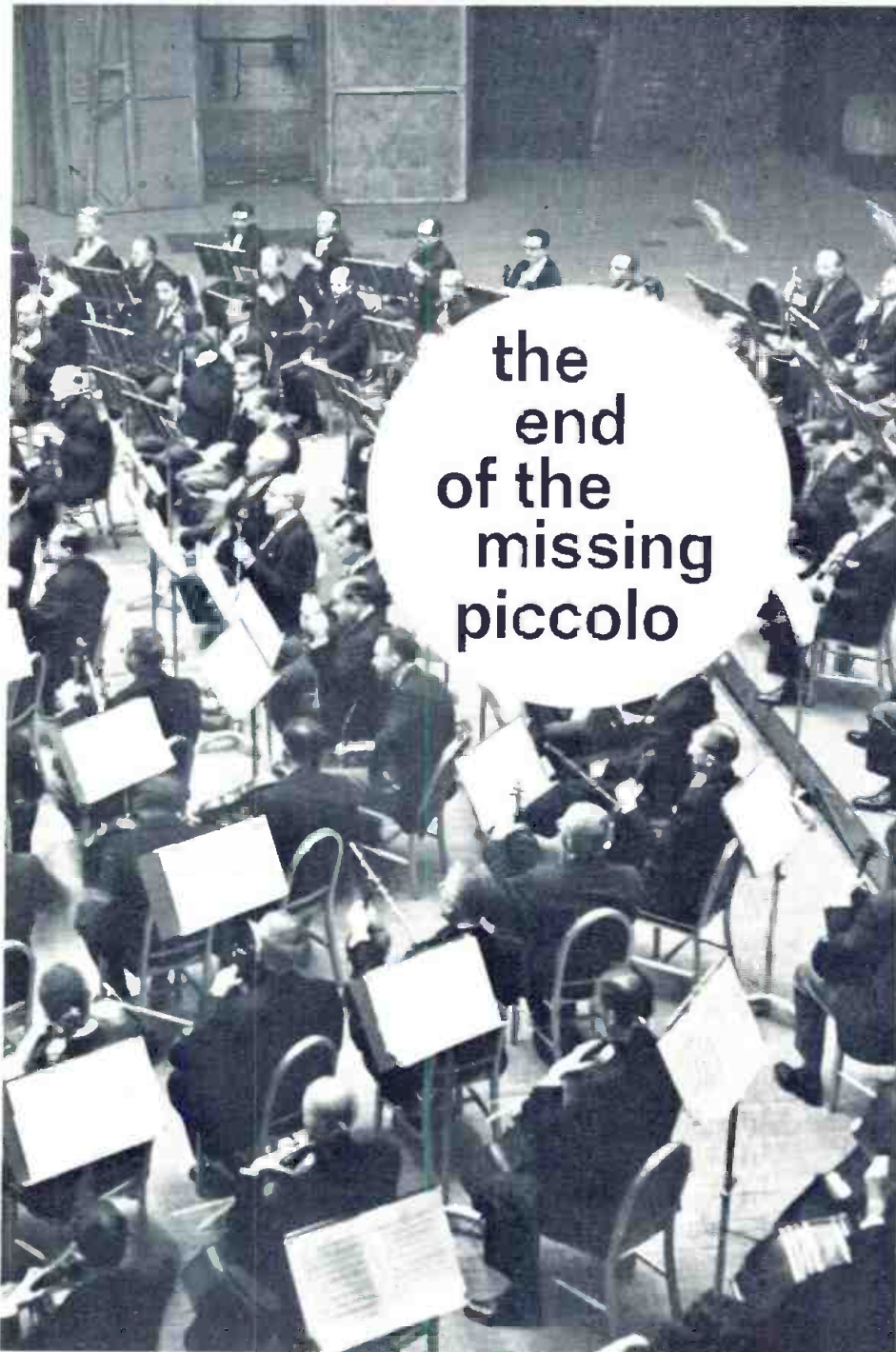
Eugene R. Hill, director of engineering, has been elected a vice president of Kaiser Broadcasting.

Dr. Arnold Pike has been appointed manager, educational products for Superscope Inc.'s recorded tape division.

Alex H. Kuhn has been promoted chief engineer of WPLY Radio, Plymouth, Wisc.

Kenneth F. Miller has been named chief engineer of JFD Electronics Corporation components division.

As of January 1, **Ron W. Irion** was to be director of broadcast management for the NAB, succeeding William L. Walker who resigned to enter the brokerage/consulting field.

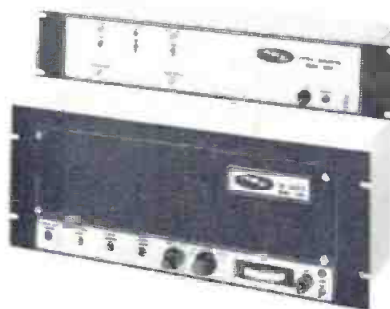


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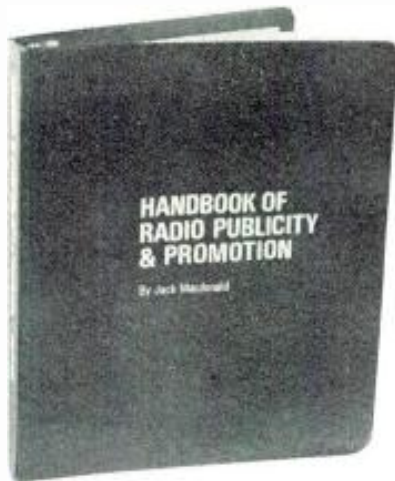
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The difference between a really successful radio station and one just a step or two above the mediocre is usually publicity and promotion—either the lack of it, or the wrong approach. Countless stations plod along year after year with just barely noticeable 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.

Promotion is the keyword—the basic reason one station excels over another, all else being equal. Promotion is an important part—an integral part—of today's radio. Using the right approach you can give listeners a reason to tune in, a reason to keep listening, and at the same time make your station more sales-worthy.

True, few stations can afford a full-time staff of promotion experts, so here's the answer—a comprehensive handbook of hundreds of unique, exciting individual promotions, contests, stunts, station and personality promos, etc. In each case, complete "nuts and bolts" details—how it works, copy details, prizes, sponsors, tie-ins—are included to enable you to adapt the idea to your own station format or sound. The author doesn't merely describe a promo or contest with a paragraph or two—he presents a synopsis of practical information, then provides complete instructions on how to plan it, sell it and program it.

Covering 9 basic categories, the all-encompassing, audience-building contents include contests, outside stunts, fun promotions, special station promotions, promotions for special days, weeks, and months (categorized month by month), station anniversary promotions, on-air themes, plus general station and personality promos.

Additional Sections are a source of fresh new ideas, offering quickie humor material, station IDs, humorous show openers, and much, much more.

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The Fun Promotions Section covers a variety of unusual techniques for seasonal and year-round use involving names, traffic safety, secretaries, husbands, wives, superstitions, wards, cleanup time, weather etc.

Section four offers tested and proven special station promotions designed to involve all facets of community activities and endeavors.

Section five contains special promotions for every month of the year, as well as a variety of station anniversary promotions.

Sections on general station and personality promos suggest ways to accent news, weather, and other programming specialties, plus various techniques of calling attention to your on-air people. Also, the humor material will help add pizzazz to DJ shows and to program openings and closings.

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Focus on CATV

Continued from page 10

ham, Washington. Great Lakes Community TV has been ordered in an initial decision by FCC Hearing Examiner Isadore A. Honig to cease and desist from further violation of Section 74.1103(e) of the rules by failing to provide program exclusivity for WTOM-TV, Cheboygan, Mich.

Commission CATV authorizations have included: authorizing Valley Cablevision Corporation, operator of a system at Rochester, Indiana, to carry the distant signals of nine television stations; authorizing Home CATV Company, Inc., Barnwell, S.C., to operate a system in Barnwell in the Augusta, Georgia, television market, ranked 99th under the interim procedures of the FCC's proposed new CATV rules; and authorizing Aberdeen Cable TV Service, Inc. and TV Signal Company of Aberdeen to begin operation of their proposed CATV systems at Aberdeen, South Dakota, as requested in their amended proposals.

As for other CATV actions, the FCC has directed Trans-Video Corporation, Mission Cable TV, Inc., and Pacific Video Cable Company of El Cajon, California, operators of systems in the San Diego TV market, to file quarterly progress reports for one year as of last January 15 on their technical systems' performance.

In another action, the Commission prohibited Buckeye Cablevision, Inc., owner and operator of a Toledo, Ohio, CATV system, from carrying or delivering to its subscribers the signals of Detroit-Windsor TV stations on any feeder or distribution cable which hadn't been constructed and placed in operation on or before February 2, 1968. The FCC said, however, that delivery of Detroit-Windsor signals from feeder and distribution cable built after February 2, but completed and in operation on or before December 24, 1968, to subscribers whose service began on or before December 24, 1968, may be continued.

In two other actions, the Commission denied the request by WJRT-TV, Inc., former licensee of WJRT-TV, Flint, Mich., that the Flint Cable TV Company, operator of a system at Flint, be prohibited from carrying the TV signals of the Detroit and Windsor, Ontario, Canada, TV stations.

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February, 1970 — BM/E

FCC ACTIONS

Forfeitures of \$2000, \$1500 and \$1000 have respectively been asked of Howard W. Davis, licensee of KMAC and KISS-FM, San Antonio, Texas, H-W Radio Inc., licensee of WGHQ and WGHQ-FM, Kingston, N.Y., and Canyon Broadcasters Inc., licensee of WCKD, Ishpeming, Mich. The \$2000 forfeiture was recommended by Hearing Examiner Charles J. Frederick for "retributive reasons and to assure a stricter compliance and a more diligent and less casual attitude of the licensee in the future"; the \$1500 forfeiture was recommended due to "willful or repeated violations of Part 73 of the Rules"; the \$1000 violation was cited "for noncompliance with the terms of its station license in that it operated one hour past the sign-off time specified in its license during the months of November and December, 1968."

Following a complaint by Topper Corporation, Elizabeth, N.J., a toy manufacturer, against the ABC Television network and Mattel, Inc., of Hawthorne, Calif., a competing toy manufacturer, the Commission has requested information from ABC Inc., N.Y.C., on its Saturday morning "Hot Wheels" series. "There is," the Commission said, "sufficient basis for concluding that more of the program than the formal commercial spots should be logged as commercial matter."

Renewal of licenses of WTOP-AM FM and TV, Washington, D.C., has been granted to the licensee, Post-Newsweek Stations, Capital Area, Inc. At the same time, the Commission informed two petitioners who had requested denial of the renewal that they hadn't advanced "adequate reasons" to deny the applications.

Requests for waiver of the sponsorship identification requirements of Section 317 of the Communications Act to permit operation of a Public Service Distribution Plan by the Arkansas Broadcasters Association, and a Noncommercial Sustaining Announcement Program by the Wyoming Association of Broadcasters have been granted by

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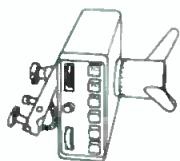
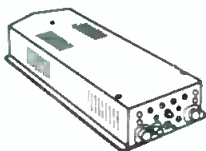
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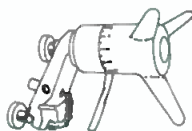
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the Commission. (Section 317(d) authorizes the Commission to waive identification requirements when the Commission determines that an announcement isn't required in the public interest.)

Voluntary assignment of license of WEBH-FM, Chicago, from Buddy Black Broadcasting Company to Rich Communications Corporation and voluntary assignment of the license of WNMP-AM, Evanston, from Semroe Broadcasting Company to Cummings Communications Corporation, have been granted.

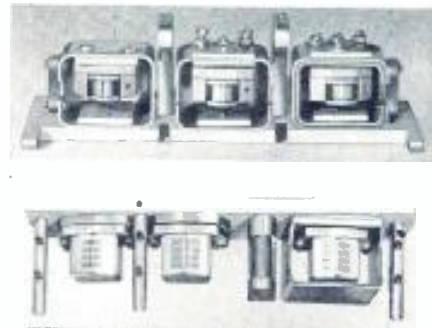
Petitions filed by John F. Banzhaf III to revoke or deny renewal of licenses of eight TV stations—WSBA-TV, York, Pa.; WLWI, Indianapolis; WCCO-TV and KMSP-TV, Minneapolis; KATU, KGW-TV, KOIN-TV and KPTV, Portland—have been denied.

Acting under the directive of the U.S. Court of Appeals for the District of Columbia Circuit of June 20, 1969, the Commission has vacated its grant of June 28, 1968, of the application by Lamar Life Broadcasting Company for renewal of license for WLBT, channel 3, Jackson, Mississippi, and has invited other applicants to file within 60 days for regular authorization to operate on channel 3. In the same action, the Commission accepted for filing an application by Civic Communications Corporation for channel 3, which had been tendered for filing on March 12, 1969, and dismissed as moot Civic Communication's petition for waiver of the rules for acceptance of its application and related pleadings.

A request for stay filed by Karin Broadcasting Company, which is made up of a majority of the employees of Radio Thirteen Eighty Inc. (RTEI), interim operator of former standard broadcast station KWK, St. Louis, and directed against Commission action which approved the joint agreement of eight applicants for the former KWK facility, has been denied "in all respects."

A petition by WPIX Inc., licensee of Television Station WPIX, channel 11, New York, for permission to amend its renewal application to include additional information on its efforts to ascertain community needs and interests and a

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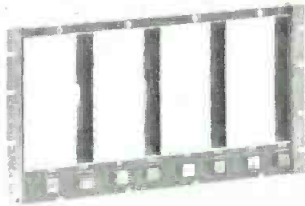
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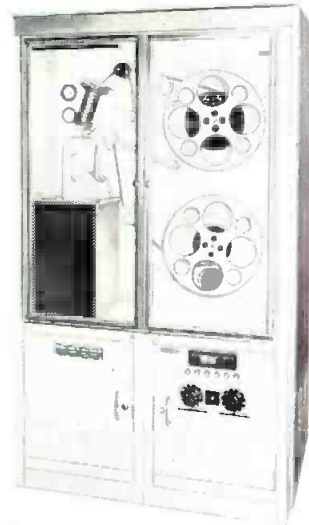
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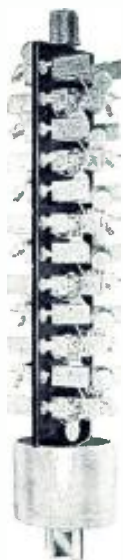
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change in ownership of its preferred stock, has been granted.

Application of Scranton Broadcasters Inc., licensee of WDAU-TV, channel 22, Scranton, Pa., for a new uhf translator to serve Williamsport, Pa., on output channel 74, has been granted. The Commission waived the separation requirements of Section 74.702(c)-(4) of the rules to make the grant.

Applications for transfer of control of Atlantic Coast Broadcasting Corporation of Charleston, licensee of WTMA-AM-FM, from Charles E. Smith to Turner Communications Corporation, and of Smithco Broadcasting Inc., licensee of WMBR-AM, Jacksonville, Fla., via transfer of control of Atlantic Coast Broadcasting Corporation of Charleston to Turner Communications Corporation, have been granted.

As ordered by a U.S. District Court, the Commission has conditionally certified under Section 1071 of the Internal Revenue Code, that the sale of WBTW (TV), Florence, S.C., from Jefferson Standard Broadcasting Company

to the Daily Telegraph Printing Company is "appropriate to effectuate" the Commission's 1964 multiple ownership policy.

An application filed by Oregon Broadcasting Company, licensee of KOBI-TV, Medford, Oregon, asking review of a decision by the FCC Review Board granting the application of Liberty Television, Medford, for a construction permit for a new TV station to operate on channel 8 in Medford, has been denied.

Application of Capital Cities Broadcasting Corporation, licensee of WPAT (AM), Paterson, N.J., for license authorizing an increase in nighttime MEOVs has been granted.

Application for transfer of control of Knorr Broadcasting Corporation, licensee of WKNR AM-FM, Dearborn, Mich., from Nellie M. Knorr, executrix of the estate of Frederick A. Knorr, and other stockholders to Johns Communications Inc. has been granted at a consideration of 100 percent of the stock—\$5,500,000.

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FCC Rules

Continued from page 18

nels), as well as broadcast signals, subject to regulations adopted in the *First Report and Order* in Docket 18397.

Conclusion

That CATVs now have the right to microwave their own programming in the CAR Service raises an interesting question: Will the Commission permit CATV systems to interconnect via microwave? In authorizing use of the CAR Service for CATV originations, the Commission (in Docket No. 18397's *First Report and Order*) has reserved the right to review interconnection of CATV systems by microwave—to establish regional or national CATV networks—on a case-by-case basis. In other words, the Commission reserves the right to prohibit interconnection whenever it appears that CATV's use of microwave will injure conventional off-air television.

This extension of the Commission's *First Report and Order* is potentially an economic and technical boon to the CATV operator and manifests further erosion of the FCC's anti-CATV rules. The judicious use of microwave facilities now permitted by the Commission may allow the expansion of many existing CATV facilities and provide hours of trouble-free service to CATV subscribers. **BM/E**

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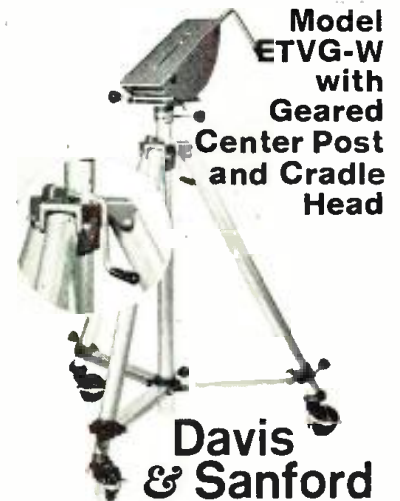
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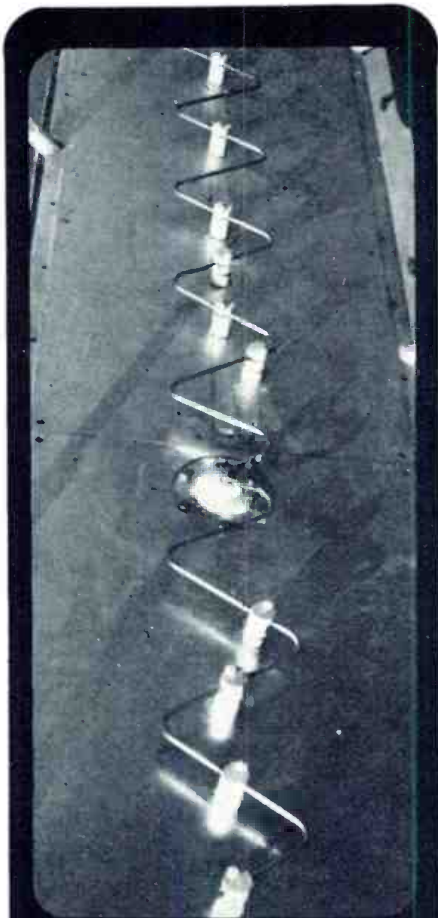
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An amplifier featuring 30 dB gain and capability of polarity reversal is described in the Video Distribution Amplifier Data Sheet from Electronics Development Corporation. (201)

Image orthicon television cameras for industrial and laboratory CCTV systems are described and illustrated in a new bulletin by Westinghouse Electric Corporation. (202)

The use of a pulse generator in frequency-domain testing and a way of using a computer-controlled frequency synthesizer in a closed-loop, adaptive test system, are highlights of Monsanto Company's "Metricist No. 8" publication. 206

In "The Program Subcarrier Multiplex Brochure," Electronics Development Corporation describes a system for multiplexing one or more 15 kHz program channels for simultaneous transmission with color TV signals in microwave or telephone carrier equipment. 205

"Broadcasting and Social Action: A Handbook for Station Executives," a 78-page, full color special issue of the NAEB's bimonthly "Educational Broadcasting Review," is illustrated by inner-city elementary students at the Morgan School, Washington, D.C. Features include a large bibliography, essays by and 60 case histories about broadcasters who have experimented successfully with programming for the disadvantaged. From 1-9 copies, \$3.95 each; from 10-25 copies, \$3.45 each; 26 or more copies, \$3.25 each. Write: Educational Television Stations, 1346 Connecticut Ave., N.W., Washington, D.C. 20036.

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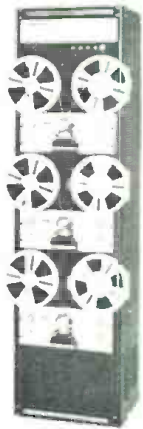
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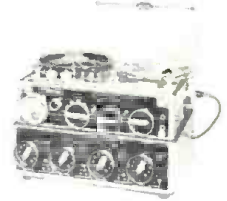
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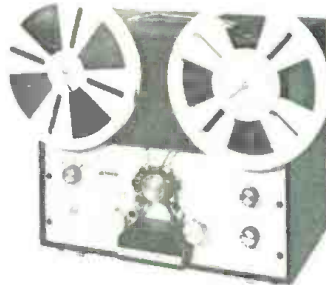
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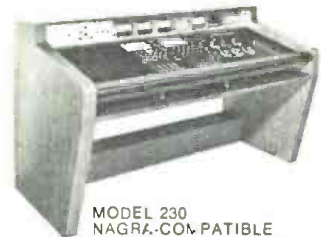
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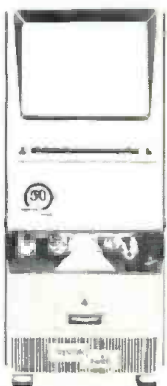
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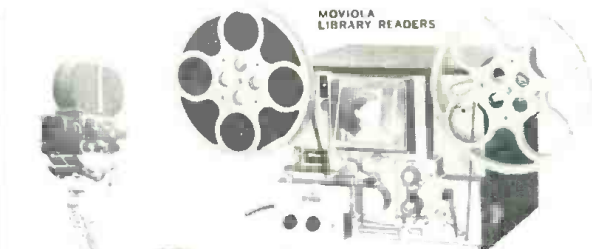
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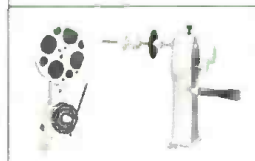
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Bert Weiland
WERD Radio
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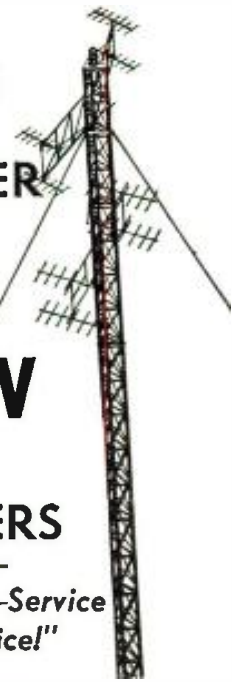
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FROM THE EDITOR

Fairness for All

Introspective journalists have been trying to tell us for several years that objectivity in news reporting is a delusion. If we protest that we are impartial commentators, we're usually put down as being devoid of human passion. Now the subjectivists have an ally high in government circles—Vice President Agnew, who has declared that we are not only subjective but biased as well.

With our integrity under earlier attack by George Wallace and now by Mr. Agnew, and apparently affirmed by the silent majority, we can no longer indulge in the pleasures of self-analysis. We must now defend our virtue and find a new posture that will gain us respect by the public and by Washington officials. The risk in not doing so is unfounded public cynicism and possibly loss of license to broadcast.

Regaining respect should not be too difficult. All we need to do is practice and demonstrate *fairness*. If we behave as professional news reporters, this quality will mark us. To a large extent it already does. Herbert J. Gans, a sociologist from MIT writing in the *New York Times Magazine*, January 11, 1970, says that professional newsmen are detached outsiders (to a remarkable degree) and not ideologists, not reformers.

It's the partisans on the airwaves with a cause to promulgate who obscure professional behavior. They are incapable of being fair because their lives are dedicated to something other than reporting reality. The broadcasting industry in the past has had a sorry record for fairness because it has not separated professionalism in reporting from a vague freedom-of-speech issue.

The Supreme Court has spoken on that issue and we go along with its decision. If controversy is not ducked through cowardice and if fairness is not equated with equal time, broadcast journalism can serve the public's interests. Holders of licenses who plead only narrow gospels should have their hour, but let them share their air rights with other voices—and if free speech is not thus served, let there be dedicated some channels truly accessible to the disfranchised.

Although we believe that fairness is the rule of professional newsmen, journalists and the journalistic process should continually be critiqued. Professor Gans points to the constraints that limit TV news by virtue of the nature of the medium. Dramatic film clips are more interesting than talking faces; action shots are picked for audience interest. People are more interesting than concepts and the act of confrontation gets more air time than the issue itself. Balance suffers. Only highlights get treated in a 22-½ newscast; some news never gets considered because the staff was too small to cover it.

Broadcast newsmen are part of the American middle-class culture and accept its values. They are no more liberal than other professionals, but more so than most laymen. It's from this context that the industry must strive for fairness.

James A. Lippke
Editor

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3. Are you responsible for more than one station or facility? Yes No

5. Your signature _____ Title _____ Date _____

6. The address below is correct

7. For Address Change — Give OLD Address below

NAME _____ TITLE _____

STATION or CO. _____

STREET _____

CITY, STATE, ZIP _____

Firm Name _____ Business Address _____ City _____ State _____ Zip _____

Is this your business address?
 Yes No
 If not your business address, please give us your business address below so that we can avoid sending duplicate copies.

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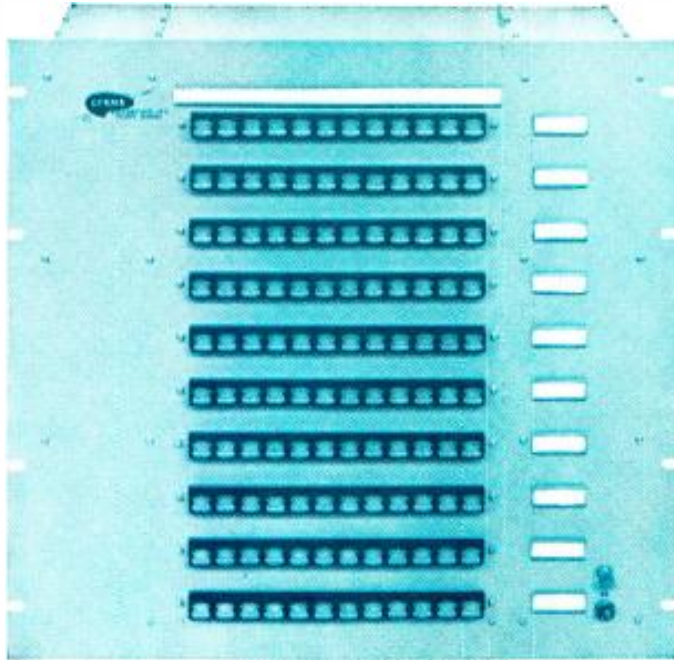
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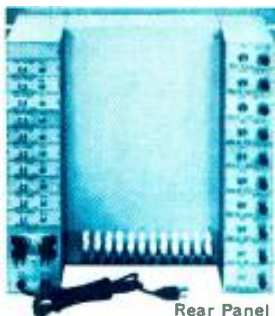
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(Patch Cable Eliminator)

Now you can forget about messy patch cables and the tedious task of re-patching to change distribution. DYN AIR's Series-X Switchers provide pushbutton distribution of either 6 or 12 inputs to as many as 12 outputs. A high degree of input-to-output isolation allows any input to be switched to any or all outputs without loading the source.

Series-X Switchers are also available for simultaneous switching of video and audio, further simplifying distribution. All isolation amplifiers are silicon solid-state and full-broadcast quality. The audio and video amplifiers and the power supply are all plug-in modules which may be easily removed from the switcher for maintenance. A 12-MHz bandwidth and excellent differential gain and phase characteristics assure quality color performance.




Rear Panel

Wouldn't a Series-X Switcher solve some of your distribution problems? Write today for full details.

Circle 141 on Reader Service Card

TYPICAL BASE PRICES			
Capacity	Video Only (Base Price)	Video and Audio	Panel Height
6 in, 3 out	800.00	1,520.00	7.0
12 in, 3 out	900.00	1,620.00	7.0
6 in, 6 out	1,400.00	2,540.00	12.25
12 in, 6 out	1,575.00	2,715.00	12.25
6 in, 9 out	2,000.00	3,560.00	15.75
12 in, 9 out	2,250.00	3,810.00	15.75
6 in, 12 out	2,600.00	4,580.00	21.0
12 in, 12 out	2,925.00	4,905.00	21.0

Other input/output configurations available. Options include lighted pushbuttons, bridging inputs, and sync-mixing.



DYN AIR Electronics, Inc.
ELECTRONICS, INC. SAN DIEGO, CALIFORNIA
 6360 Federal Blvd., San Diego, Calif. 92114
 Telephone (714) 582-9211

Have you seen "Video Switching Techniques"? Yes No
 Have you seen "Video Transmission Techniques"? Yes No
 Please send information concerning Series-X Switchers

NAME _____ TITLE _____
 COMPANY _____
 ADDRESS _____
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LEARNING TO OPERATE A CONVENTIONAL COLOR VIDEO CAMERA TAKES THREE MONTHS. LEARNING TO OPERATE OURS TAKES THREE MINUTES.

The reason for this astounding discrepancy lies largely in the differing number of operating controls to be mastered. The conventional color video camera has thirty or more. Ours—the new Sony DXC-5000—has just three.

What's missing is all the controls associated with the endless setup procedures and readjustments called for by changes in light levels and color temperature. For the DXC-5000 has completely automatic gain control and color temperature compensation. Even apart from these automatic features, the DXC-5000 is a marvel of simplicity. Thus it uses two tubes instead of four to produce a high-

quality picture: one tube for luminance, the other to generate all three color signals, red, green, and blue. And because the camera has relatively few parts, it's reasonably priced, extremely compact, and weighs a mere 29 pounds.

And what are the DXC-5000's three controls? Vertical registration, horizontal registration, and electronic focusing. As many controls, it so happens, as it takes minutes to learn to operate the camera.

We suggest you take the full three-minute course at your Sony color video camera dealer.

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