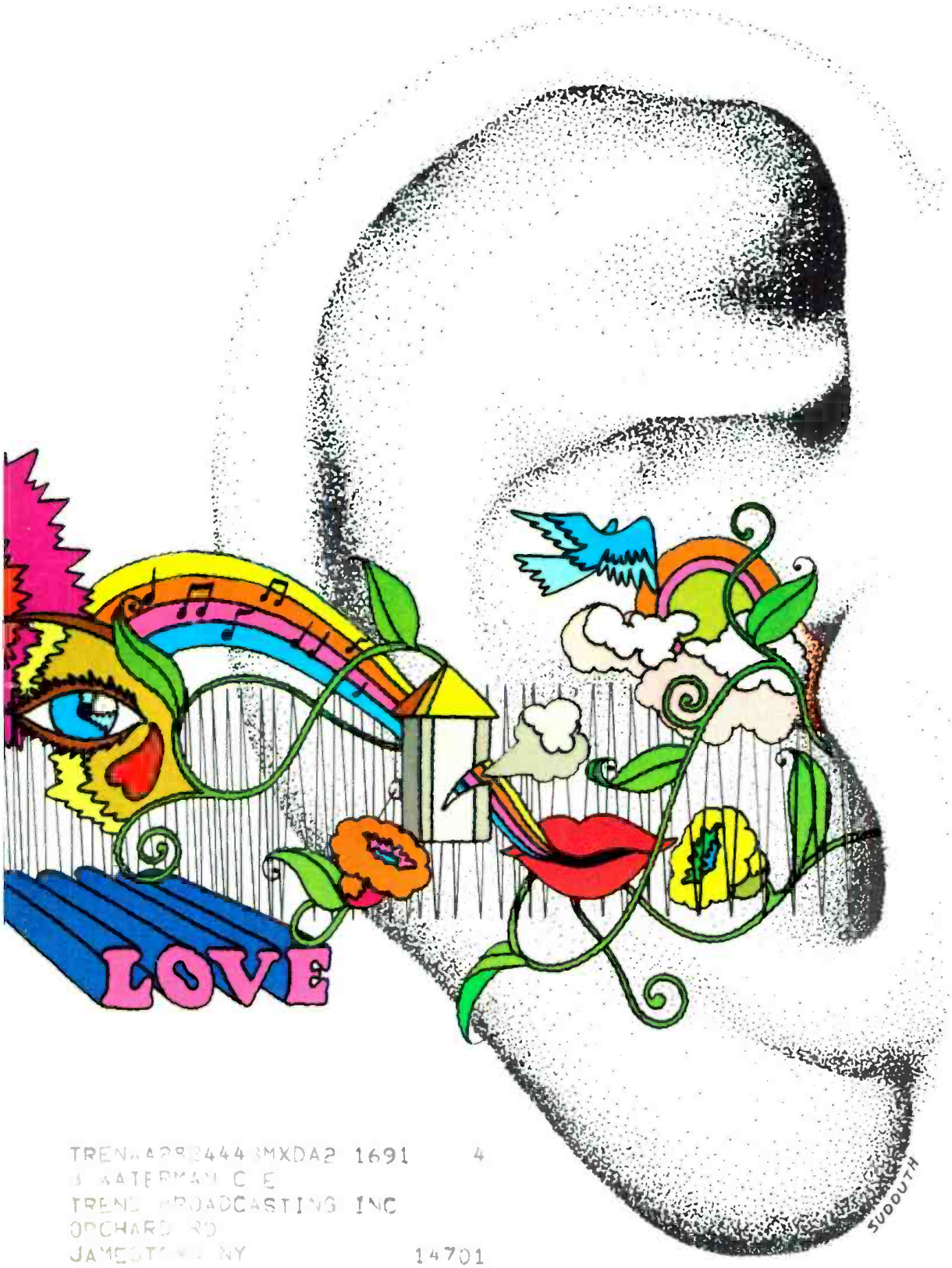
A MACTIER PUBLICATION / FEBRUARY 1971

BM/E

BROADCAST MANAGEMENT / ENGINEERING



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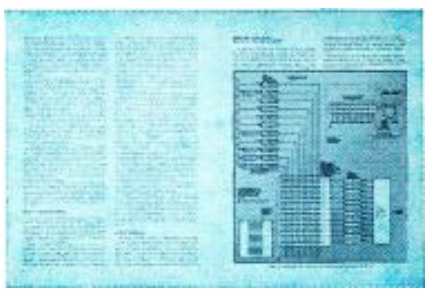
If you're wise, you won't purchase a demodulator until you read this free paper.

You learn a lot while spending five years and several hundred thousand dollars in a research and development program. And, when you tell your story, wise people listen.

DYNAIR has included a wealth of original information about demodulators in an 8-page paper called "Facts About Television Demodulators." We think that you will find it very informative, particularly if you are planning a system which involves the pickup of off-the-air signals.



At first thought, it would appear to be a relatively basic design task to engineer a demodulator. Logically, it is often related to the tuner, IF and detector portions of a standard television receiver. However, it is one thing to design a demodulator which is acceptable for driving an ordinary viewing monitor and entirely another thing to design a demodulator which will be acceptable for testing purposes or for the regeneration of broadcast quality television signals. The demodulator portion of even the most sophisticated commercial television receiver would prove highly inadequate for applications such as those mentioned earlier in terms of sensitivity, stability and the amount of distortion introduced in the process of demodulation.

Until recently, the only available demodulators were of vacuum-tube vintage. These were designed years ago for monochrome applications; however, the complex NTSC color signal and its critical phase relationships require a much more sophisticated approach.

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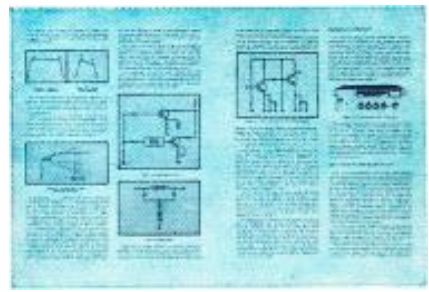
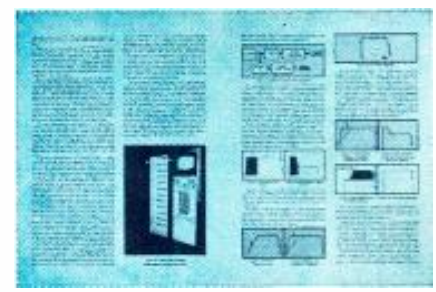


Circle 100 on Reader Service Card



in designing the first quality solid-state color demodulator. The product is also briefly described, along with the many problems it will solve for the cable systems and broadcast engineer.

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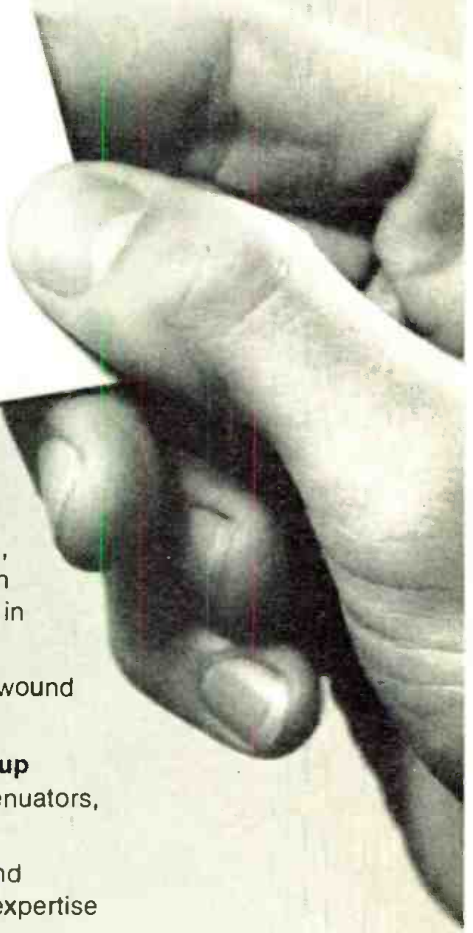

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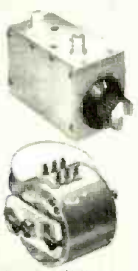
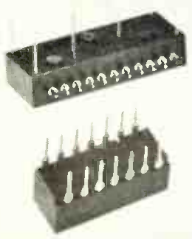
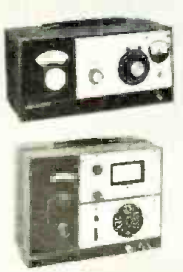


Audio/Video and RF Attenuators



Delay Lines



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Precision wire wound Resistors and Networks

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FEBRUARY 1971/VOLUME 7/NUMBER 2

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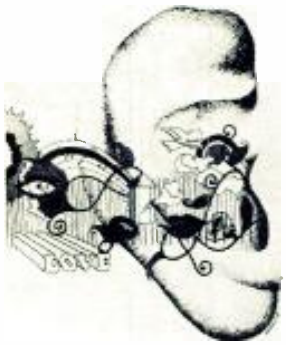

Cover: The variety and sound of life: FM, by Sudduth.

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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 AM, FM, and TV broadcast stations; CATV systems; ETV stations, networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others: $15.00 one year, $25.00 two.

Controlled Circulation postage paid at Duluth, Minn.

MANAGEMENT:

What's in **BM/E** for managers? Don Kennedy's success story, page 19. He got a 30-fold return on his FM investment in ten years. . . . Ray Nordstrand's report, page 19. He built his fine arts station into the biggest revenue producer in Chicago FM. Both men give point-by-point details. . . . A **BM/E** rundown on the FCC's AM and FM financial statistics, page 20, gives you something to compare your own figures with. . . . What else interests you? Binaural sound, page 20, is fully compatible, today, and gives two channels the sound (almost) of four. . . . **FCC Rules** (page 10) goes into the problem of fraudulent billing. . . . An automatic color camera arrives (page 23).

ENGINEERING:

What's in **BM/E** for engineers? Results of an NAFMB survey (page 14) demonstrate the popularity of FM equipment types across the country. . . . Two compatible quad discs have been developed, FCC-approved experiments in FM quadcasting have begun, and **BM/E's** usual close coverage of four-channel brings you up to date (page 16'. . . . Marconi's new automatic color camera may save set-up time and simplify color balancing; it'll be at NAB, but why wait? See page 23. . . . Binaural recording, page 20, can make the most effective use of two-channel sound—right now—and it's compatible. . . . Also, don't forget the new equipment, page 27.

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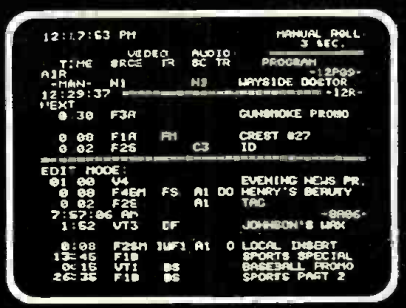

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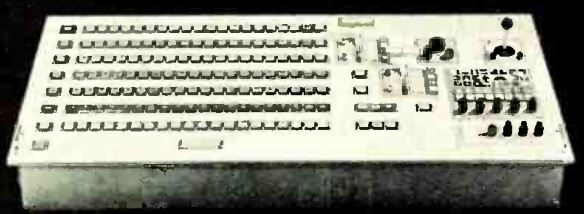

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BROADCAST INDUSTRY NEWS

Public Dividend, Commercial Substitution and Distant Importation Excoriated. What Next for CATV?

Authors who get nothing but rejection slips often develop an inferiority complex. If this were always true the FCC authors of that sterling bit of prose familiarly known as either the Public Dividend (PD) plan or the Commercial Substitution (CS) plan (officially tagged Second Further Notice of Proposed Rule Making, Docket No. 18397-A) would drop dead from mortification.

Reams of comments on the PD/CS plan have been filed. The CS portion has no takers except for the NCTA. The PD five percent fee was embraced, with reservation, by some CATV interests as a suitable price to pay for being able to import distant signals into major markets. Most, including broadcasting interests, rejected both notions including distant importation.

Lee G. Lovett of Pittman Lovett Ford Hennessy and White characterized the PD plan before the California CATV Convention recently as the Commission's "maiden voyage into the area of major social reform." He saw the effort as a marked departure from the traditional regulatory functions into a "current ultimate in endeavoring to serve the public."

The reason for the PD plan on the part of the FCC, in Lovett's view, is that the Commission basically feels CATV fails to perform a meaningful social purpose. If this were not its view, Lovett reasons, they would not have asked CATV to bargain away ten percent or more of its revenues to support ETV and copyright holders, to substitute commercials for the gain of the local uhf station, to provide free channels, and to perform other social purposes such as local origination.

The comments filed to date indicate that CATV owners themselves do not want to be legislated or regulated into social responsibilities. The CATV industry by and large views the FCC proposals on multi-channel capability, provision for two-way services and demands for origination as premature. Basically, all that cable really wants is a chance to move in the major markets in exchange for compulsory copyright fees.

Those who fear CATV expansion as injurious to free broadcasting have submitted volumes of information to scare the FCC back into its posture of broadcaster protectionism. The Association of Maximum Service Telecasters (MST) zeroed in with an attack on the FCC July 1970 staff study "The Economics of the TV-CATV Interface" which suggests that the reduction in audience viewing due to CATV carriage of four distant signals would not be more than 13 to 20% in typical three- and four-station markets.

MST says the FCC staff assumptions are erroneous because dilution will be greater than that predicted for two reasons: *1* most CATVs will carry more than three local, three independent plus one ETV signal (3+3+1)—they will also carry other overlapping Grade B signals; *2* many viewers in the outlying districts of a local station's ADI will be receiving additional off-the-air signals from adjoining markets.

Furthermore, MST says, for communities lying beyond the 35-mile zone, CATV systems will be free to carry unlimited distant signals and can be expected to do so.

The FCC staff study assumed a floor of at least 74% audience for local stations in CATV homes. MST says the share could be easily 60% or less, even if full, same-day non-duplication protection prevails.

Such a low base would mean unprofitability for many stations (perhaps as many as 215) MST said, and would therefore threaten free TV. It also claimed the FCC's staff assumption that CATV will penetrate only 25% of a community in three or four years and not more than 50% in the long run is erroneous. MST says 60% might be expected.

MST also argued that uhf will not operate under the handicap (tuners, power, etc.) assumed by the FCC and will not be helped as much in the local area as claimed.

However, Kaiser Broadcasting, a big uhf operator, saw cable as a very definite aid to local uhf and the public. But Kaiser was afraid of unlimited importation of TV signals as a means of stimulating cable growth. Rather, it proposed a direct *CATV subsidy* as a means to growth and suggested the TVA as a model.

The NAB urged that all proposals for unlimited CATV importation be dropped. It urged that meaningful regulation on importation by CATVs of radio signals be adopted to protect them from "unequal" competition. It also said program exclusivity of local TV stations had to be maintained.

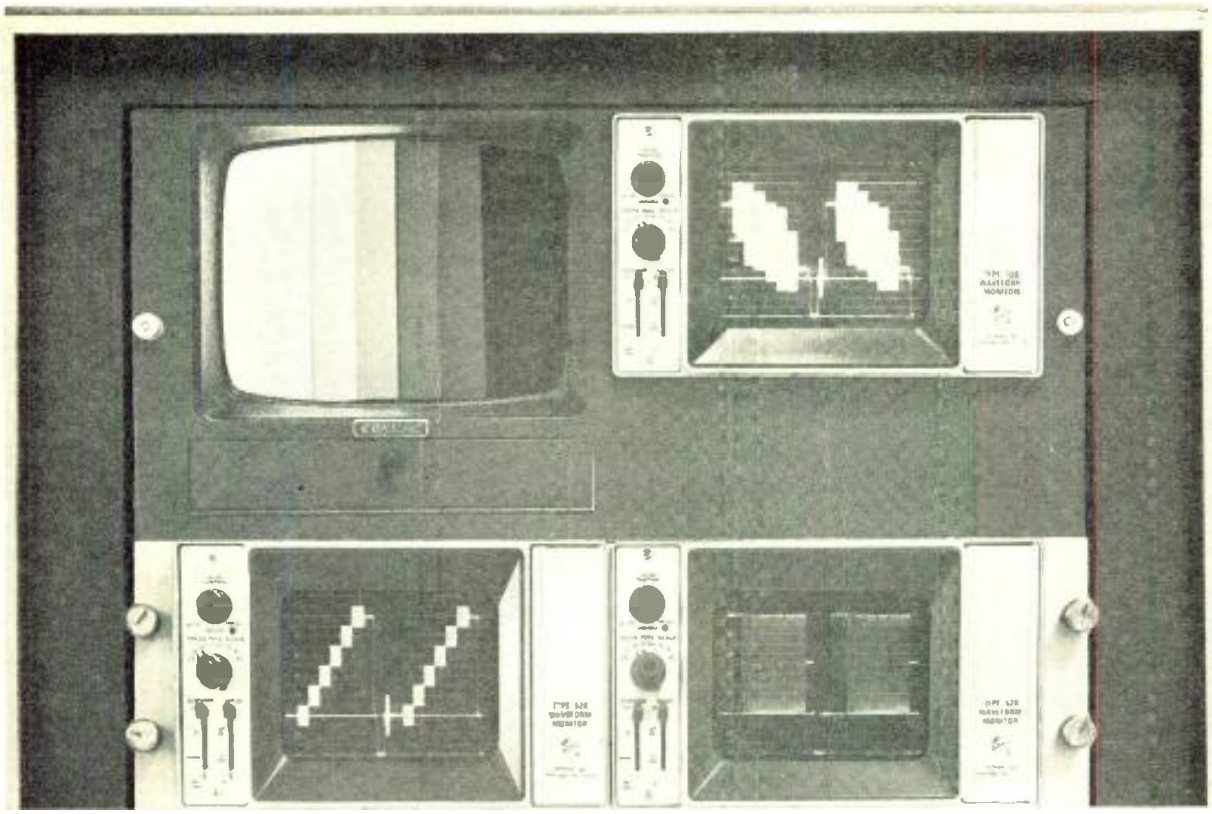
The NAB took a dim view of the public's interest in public affairs programming and said local programming effort by stations would be undercut if distant signals were available for viewing.

Copyright protection is essential, everyone agrees. Copyright owners told the FCC that CATV operators in the top 75 markets should negotiate for programs as do broadcasters (compulsory licensing should apply to smaller markets). The fee of 0.7% per station was generally argued as insufficient.

The more conservative formula of 3+1+1 was found acceptable for smaller markets by many and both MST and NAB said this should be the basis of adequate service everywhere including the major markets. If a new local independent station came on the air at a later time, it should be substituted for the distant one.

What will the FCC do in the face of all of the conflicting and contradictory evidence and advice it has received? Will they rethink the whole situation as suggested by Kaiser and others? Lovett, in his California speech, suggested as one of several alternatives (*CM/E*, Dec. 1970, p. 3), a new allocation table taking into account CATV.

He points out that the present table of television allocations includes only vhf and uhf. CATV could now be directed to serve as a third outlet for local expression. Under this plan, according to Lovett, a grid of uhf's throughout the U.S. could be plotted to provide service to rural areas as well as urban areas. Uhf stations could be assured of viable operation by assigning each uhf station to enough CATV systems (even beyond the uhf's service area)



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

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

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to give the uhf a cost per thousand that would be competitive with vhf. Lovett says such a plan would give all rural and urban areas adequate service via CATV and off-air reception and would eliminate any question of unfairness to uhf.

The editors of *TV Digest* suggest the final solution will probably turn out to be a "judgment call" involving political and social decisions made by the Commission, Congress and the courts.

Some savants are now saying the copyright issue will not be settled by Congress in 1971. The FCC implies in Docket 18397-A that it will take action even if a Congressional resolution is not forthcoming "after an appropriate period." There does seem to be concurrence behind one FCC possibility to take place now without waiting for Congressional action: Thaw the freeze to the extent of allowing 3+1+1 signals in all markets immediately, leaving copyright fees to be negotiated between the copyright holders and CATV operators.

Commission gets rolling

FCC activities are beginning to pick up as Thomas J. Houser starts his (possibly short) term, which may be only the six months of Robert Wells term which Wells left behind when he began his own full term. The scheduled replacement of Houser by Representative Charlotte Reid (R, Ill.) has lost some of its original certainty, now being rated as merely probable. Some of the smaller items the Commission has gotten out of the way in the last month:

- Committee assignments have given Robert Wells responsibilities in Defense, Interagency Civil Defense, and Interagency Emergency Planning; Dean Burch heads committees for Space, Telephone and Telegraph, and the International Association of Regulatory Utility Commissioners; for Robert E. Lee, assignments are to the Radio Technical Commission for Aeronautics, and the Interagency Group on International Aviation; assigned to H. Rex Lee is the Educational Communications Committee; to Robert T. Bartley goes the Radio Technical Commission for Marine Services.
- Filing deadlines for comments have been extended—to April 16, 1971 for comments on the one-to-a-market (Docket 18110) proceeding; to May 17 for comments in the

Continued on page 37

How do you pick up sound without noise?

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Model RE50 omnidirectional dynamic $120 list. Model RE85 lavalier dynamic $133 list. Less normal trade discounts.

Introducing two microphones that aren't "microphonic". That are unexcelled for hearing air-borne sounds, but shrug off contact noises. The new hand or stand RE50 and the lavalier RE85 dynamics.

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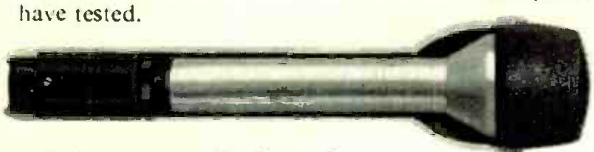

Let's look into the RE50 first. A cutaway shows that inside each RE50 nestles the familiar 635A, case and all. It's shock-mounted at top and bottom to the outer case. Even the connector is isolated from the actual microphone. And the problems of mass and resonance have been worked out (with the aid of our computer) so that contact noises and cable rustling never reach the Acoustalloy* diaphragm.

The result is remarkable isolation from all but air-borne sound, even in hand-held applications where microphone movement is uncontrolled. And when you add the extra protection of the built-in Acoustifoam* blast and pop filter, this is one of the quietest omnidirectional microphones you can find. Yet response, output level, and polar pattern are essentially the same as the 635A (one of the most popular professional microphones of all time).

But if noise can be a problem with hand-held and stand microphones, it is a plague to lavalier types. Clothing rustle, cord noise, and accidental contact with hard surfaces are common troubles. Except with the new RE85. Again, we have created a microphone within a microphone. But we've gone even farther. A special low-noise grille, for instance. And even the hard, smooth paint finish was chosen to reduce small rubbing noises.

The result is virtually noise-free operation even with inexperienced performers. And at no expense to sound quality. Like all E-V lavaliers, output of the RE85 is peak-free and natural. Each RE85 comes complete with neck cord, tie clip, and a belt clip to help control the cable. The RE50 is supplied with a Model 300 stand clamp.

Both the RE50 and the RE85 are now available at your E-V microphone headquarters. In this noisy world, it's a relief to know that help has quietly arrived.

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Fraudulent Billing

In 1965, the Federal Communications Commission adopted rules specifically prohibiting fraudulent billing practices by AM, FM, and TV station licensees.[1] As then formulated, the rules were directed specifically at "double-billing." The practice consists of misrepresentations to a manufacturer, distributor, advertising agent, or other party, that the quantity, content, or amount charged for cooperatively sponsored advertising was different from that actually agreed upon by the station and the local advertiser.

The Commission noted that most "double-billing" is designed to deceive and defraud manufacturers into paying a larger share of a local dealer's cooperative advertising expenditure than that originally stipulated in agreements with local dealers. But the Commission also stated that some manufacturers have reimbursed a dealer for a cooperative advertising bill which the manufacturer *knew* to be inflated or ficticious. Such a scheme violates the Clayton and Robinson-Patman Acts.[2] These acts make it unlawful for a manufacturer or distributor engaged in commerce to give discriminating discounts, rebates, or advertising allowances to its dealers. If such violations are found to exist, the Federal Communications Commission will refer its findings to the Federal Trade Commission for appropriate action. It is obvious that participation by a broadcast licensee in a scheme to violate a Federal statute reflects seriously upon the licensee's qualifications.

1965 Rules

In essence, the 1965 rules provided that "No licensee or . . . station shall knowingly issue to any local . . . advertiser any affidavit . . . which contains false information concerning the amount actually charged by the licensee for the broadcast advertising for which such affidavit . . . is issued, or which misrepresents the nature, content or quantity of such advertising."

1970 Amendment

To make the rule more clearly applicable to *all* fraudulent billing situations, an amendment has recently been adopted.

Prior to May 1970, the fraudulent billing rules were primarily directed, as noted above, to "double-billing" situations. However, early in 1970 a broadcast licensee filed a petition for rule-making to amend the fraudulent billing rules. The intent was to prohibit the issuance of "bills" or statements by licensees misrepresenting (a) the time or the day on which spot announcements were broadcast or, (b) the number of announcements which were broadcast. It was asserted that such provisions were necessary to cover *all* situations and ban the issuance of *any* fraudulent bills.

In adopting the amendment, the Commission declared:[3]

> We agree with . . . the strong public interest factors supporting the prohibition of misrepresentation by licensees in any and all billing practices. Any such misrepresentation certainly reflects adversely on the qualifications of a licensee and, to a degree, on the industry as a whole. The public interest, convenience and necessity clearly require reasonable ethical business practices . . . specifically on the part of individual broadcasters.

The new rule and its sanctions

The amended rule regarding fraudulent billing practices is found in Section 73.1205 of the Commission's Rules, and reads as follows:

> *Fraudulent billing practices*—No licensee of a standard, FM or television broadcast station shall knowingly issue to any local, regional or national advertiser, advertising agency, station representative, manufacturer, distributor, jobber or any other party, any bill, invoice, affidavit or other document which contains false information concerning the amount actually charged by the licensee for the broadcast advertising for which such bill, invoice, affidavit or other document is issued, or which misrepresents the nature or content of such advertising, or which misrepresents the quantity of advertising actually broadcast (number or length of advertising messages) or the time of day or date at which it was broadcast. Licensees shall exercise reasonable diligence to see that their agents and employees do not issue any document which would violate this section if issued by the licensee.

The Commission has imposed harsh sanctions on those broadcasters who violate this rule. For example, stations WPGA and WPGA-FM, Perry, Georgia, were recently ordered to forfeit $7,500 for willful and repeated violations of the fraudulent billing rule.[4]

A $10,000 forfeiture was imposed on another licensee for fraudulent billing practices, broadcasting a lottery, and several other violations. However, the Commission ominously noted that the fraudulent billing violations alone justified the forfeiture.[5]

Licensees also face the possibility of license revocation for fraudulent billing practices. Therefore, all broadcasters are admonished to carefully avoid any billing practices which might be construed as fraudulent.

Continued next page

1. Report and Order, Docket No. 15396, October 20, 1965.
2. 15 U.S.C. 13.
3. Memorandum Opinion and Order, RM-103, May 13, 1970; 19 RR 2d 1506.
4. Perry Radio, Inc. 16 RR 2d 524 (1969).
5. Lawrence Broadcasters, Inc. 14 RR 2d 1 (1968).

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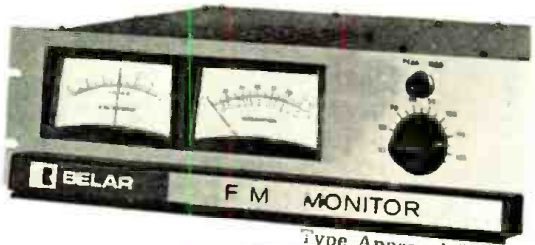

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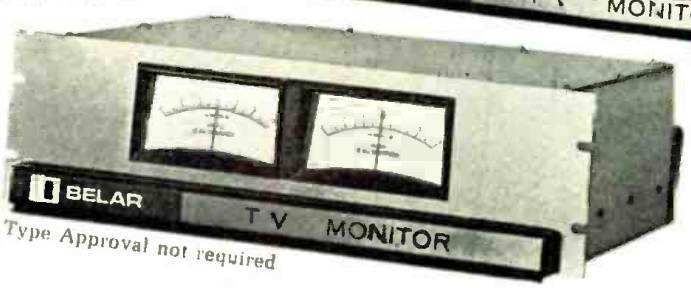

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Circle 105 on Reader Service Card

The Commission, in Public Note FCC 70-513, has set forth examples of various (but not all-inclusive) fraudulent billing practices. Some of these examples follow:

1. A licensee issues a bill or invoice to a local dealer for 50 commercial spots at a rate of $5 each for a total of $250. In connection with the same 50 commercial spots, the station also supplies the local dealer or an advertising agency, jobber, distributor, or manufacturer of products sold by the local dealer, another affidavit, memorandum, bill, or invoice. The latter document indicates that the amount charged the local dealer for the 50 spots was greater than $5 per spot.

Interpretation: This is fraudulent billing. The inflated bill tends to deceive the manufacturer, jobber, distributor or advertising agency as to the amount actually charged and received by the station for the advertising.

2. A licensee issues a bill or invoice to a local dealer for 50 commercial spots at $5 each. The bill, invoice or accompanying affidavit indicates that the 50 spots were broadcast on behalf of certain cooperatively advertised products. However, some of the spots did not advertise the specified products. Instead, they were used by the local dealer solely to advertise his store, or to advertise products for which cooperative sponsorship could not be obtained.

Interpretation: This is fraudulent billing, even though the station actually received $5 each for the 50 spots. By falsely representing that the spots advertised certain products, the licensee has enabled the local dealer to obtain reimbursement from the manufacturer, distributor, jobber or advertising agency for advertising which was not actually broadcast.

3. A licensee sends, or permits its employees to send, blank bills or invoices bearing the licensee's name or call letters, to a local dealer or other party.

Interpretation: A presumption exists that the licensee is tacitly participating in a fraudulent scheme which enables a local dealer, advertising agency or other party to deceive a third party as to the advertising rate actually charged by the licensee. The local dealer can thereby collect more advertising reimbursement than that specified by the agreement between the third party and the local dealer. It is the licensee's responsibility to maintain control over the issuance of bills and invoices in the licensee's name, to make sure that fraud is not practiced.

4. A licensee submits bills or invoices to an advertising agency, station representative, or other party indicating that licensee's rate per spot is $50. However, the licensee actually receives only $5 or $10 per spot in actual payment from the agency, representative or other party. The licensee claims that the remaining 80 or 90 percent of its original invoice has been deducted by the agency as "commission" and therefore no "double billing" is involved.

Interpretation: This is fraudulent billing. The agency discount does not customarily exceed 15 percent. Therefore, supplying agencies with bills and invoices which indicate that the licensee is charging several times as much for advertising as he actually receives, constitutes participation in a fraudulent scheme.

5. A licensee submits a bill or invoice to a local dealer or other party for 50 commercial spots at $5 each for a total of $250. However, the bottom of the bill or invoice carries an addendum, so placed that it may be cut off without leaving any indication that it had been attached. The addendum specifies a "discount" to the advertiser based on volume, frequency or other consideration, so that the amount actually billed at the bottom of the page is less than $5 for each spot.

Interpretation: The preparation of bills or invoices in such manner seems designed primarily to enable the dealer to deceive a cooperative advertiser as to the amount actually charged for cooperative advertising. This practice raises a presumption that the licensee is participating in a "double billing" scheme.

6. A licensee submits a bill or invoice to a local dealer for 50 spots involving cooperative advertising of a certain product or products at a rate of $5 each, and actually collects this amount from the dealer. However, as a "bonus" the licensee "gives" the dealer 50 additional spots in which the product or products named on the original invoice are not advertised. Thus the dealer actually obtains the benefit of 100 spots in return for payment to the station of the $250 billed for the 50 cooperative spots.

Interpretation: If the 50 "bonus" spots were broadcast as the result of any agreement or understanding, expressed or implied, that the dealer would receive such additional advertising in return for contracting for the first 50 spots at $5, the so-called "bonus" spots were, in fact, a part of the same deal. This means that the licensee, by his actions, is participating in a scheme to deceive and defraud a manufacturer, jobber, distributor or advertising agency.

7. A local appliance dealer agrees to purchase 1,000 spots per year from a station and thereby earns a discount which reduces his rate per spot from $10 to $5. During the course of the year, the dealer purchases from the station 100 spots which advertise both the dealer and "Appliance A" and for which the dealer pays $5 per spot. Since the station's 100-spot rate is $10 per spot, the dealer asks the station to supply him with an invoice for the 100 spots on behalf of "Appliance A" at $10 per spot. The dealer claims that if the appliance manufacturer had purchased the 100 spots, or if the dealer himself had purchased only these 100 spots within the course of a year, the $10 rate would apply. Therefore the dealer argues that the manufacturer should be required to reimburse the dealer at the $10 rate.

Interpretation: This practice constitutes fraudulent billing unless the dealer can provide satisfactory evidence that the manufacturer of "Appliance A" is aware that the dealer actually paid only $5 per spot because of the volume discount.

8. A licensee issues a bill or invoice to a dealer for commercial spots which were never broadcast.

Interpretation: This practice, prima facie, involves fraud, either against the dealer or against a third party which the dealer expects to provide partial reimbursement for the non-existing advertising.

9. A licensee knowingly issues a bill or invoice

Continued on page 35

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THE WORLD'S BEST SOLID STATE STEREO GENERATOR

POSITIVE PROOF

WILKINSON ELECTRONICS SG1E

* 60 db separation . . . . . 50 Hz-7500 Hz
* 55 db separation . . . . . 7500 Hz-10000 Hz
* 50 db separation . . . . . 10 KHz 15 KHz
* FM Noise – 75 db . . . . . Cross Talk – 60 db

COMES COMPLETE WITH POWER SUPPLY – REQUIRES ONLY 3½" RACK SPACE.
ONLY ONE FRONT PANEL ADJUSTMENT. REMOTE STEREO ON/OFF FUNCTION.
PRECISION BUILT BY INSTRUMENT MAKERS – TRULY BUILT TO LAST FOREVER.

THE WORLD'S BEST SOLID STATE FM EXCITER

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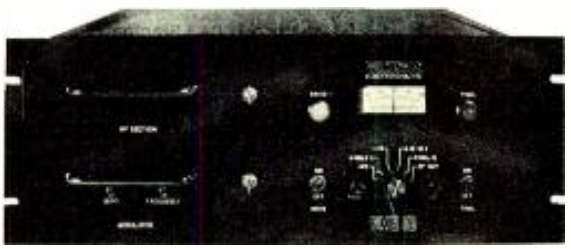

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* Frequency response ± ¼ DB 15Hz-350KHz.
* FM Noise Level – 75 DB below 100% Mod.
* Harmonic Distortion – 0.3%.
* Type Modulation – Direct FM.
* Power Output – Adjustable to 18 watts.
* Modulation capability – 200%.
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FCC TYPE ACCEPTED – POWER SUPPLY INCLUDED – REQUIRES 7" VERT. SPACE
IMMEDIATELY USABLE IN ANY TRANSMITTER – DRAWER CONSTRUCTION FOR ACCESS:
SHIELDED BY BOTH STEEL AND ALUMINUM. COMPLETELY METERED. ADJUSTMENT FREE.

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Circle 106 on Reader Service Card

Most Popular FM Equipment

NAFMB survey reveals popularity of various brands of gear from microphone to antenna.

ATTEMPTING TO GATHER current data on FM station technical facilities, the National Association of FM Broadcasters queried FMs around the U.S. during 1969. Questionnaires were sent to about 300 members of NAFMB, and nearly half responded.

Survey results are based on 140 respondents. Not every participant answered completely in every category of inquiry.

Not all known equipment manufacturers are mentioned —only those whose equipment is currently in use by reporting stations. Much older equipment is still in use; therefore brand names in some cases reflect companies that have since consolidated or gone out of business. All responses are tallied exactly as reported by station personnel.

Two questions concerned automation and stereo. Of 140 respondents, 59% are fully or partially automated; 82% are broadcasting in stereo.

Results of other questions follow. Note that in some cases, the data base exceeds 140. For instance, 140 stations use a total of 337 turntables.

Control-room-microphones
Base: 161 responses
Electro-Voice 38%
RCA 32%
Shure 9%
Altec Lansing 8%
Less than 5%: AKG, Collins, Gates, Neumann, Norelco, Sony.

Studio microphones
Base: 124 responses
Electro-Voice 40%
RCA 33%
Shure 10%
Altec Lansing 7%
Less than 5%: AKG, Collins, Neumann, Norelco, Sony.

Turntables
Base: 140 responses
Gates 26%
QRK 18%
Rek-O-Kut 12%
RCA 9%
Collins 8%
Fairchild 8%
Less than 5%: Garrard, McCurdy, Metron, Marantz, Presto, Russco, Sony, Sparta, Thorens.
Average 2.4 turntables per station.

Turntable pickup arms
Base: 141 responses
Gray 38%
Rek-O-Kut 24%
Shure 16%
RCA 9%
Less than 5%: Euphonics, Fairchild, Garrard, Gates, GE, Pickering, Sparta, Stanton.

Turntable pickup cartridges
Base: 130 responses
Shure 57%
Pickering 14%
GE 13%
Less than 5%: Euphonics, Gates, Gray, Neumann, RCA, Stanton.

Turntable preamps
Base: 140 responses
Gates 31%
RCA 19%
Collins 12%
Shure 9%
Less than 5%: Altec, Bauer, Fairchild, GE, Gray, Heathkit, ITA, McCurdy, McIntosh, Marantz, Round Hill, Russco, Sparta, Spotmaster, Thorens.

Reel-to-reel tape machines
Base: 140 responses
Ampex 57%
Scully 18%
Magnecord 12%
Less than 5%: Concertone, Crown, Lee, Norelco, Presto, RCA, Revox, Roberts, Sony.
Average 4.5 machines per station.

Cartridge tape machines
Base: 140 responses

Gates/ATC	52%
MaCarTa	11%
Spotmaster	11%
Tapecaster	8%

Less than 5%: Ampex, Collins, IGM, KRS, Moulic, RCA, Schafer, Sono Mag, Sparta, Viking.
Average 3.2 machines per station.

Audio consoles
Base: 205 responses

Gates	36%
RCA	20%
Collins	14%
Sparta	12%

Less than 5%: Altec, Ampex, Bauer, Bogen, S. Davis, GE, "home brew," ITA, McCurdy, Raytheon, Western Electric.

Monitor amplifiers
Base: 214 responses

RCA	20%
Gates	14%
McMartin	7%
McIntosh	7%
Heathkit	6%
McCurdy	6%
S. Davis	5%
"Home brew"	5%

Less than 5%: Altec, AMD, Bell, Channel Master, Clarion, Collins, DuKane, Dyna, EICO, Electro-Voice, Fairchild, Fisher, GE, Harman-Kardon, Lafayette, Langevin, Raytheon, Realistic, H. H. Scott, Spectra Sonics, Stancil-Hoffman, Thordarson, Truetone.

Monitor speakers
Base: 361 responses

Electro-Voice	27%
KLH	14%
Jensen	9%
RCA	7%
Altec Lansing	6%
Acoustic Research	5%

Less than 5%: Allied Radio, Argos, Audax, Bozak, S. Davis, EMT, Fairchild, Fisher, GE, Harman-Kardon, KRS, JBL, Marquis, Quam, H. H. Scott, Speco, University, Western Electric.

Remote-control systems
Base: 61 responses

Gates	30%
Rust	21%
Moseley	20%
Schafer	13%

Less than 5%: Collins, Continental, McMartin, RCA.

Frequency monitors
Base: 135 responses

McMartin	46%
Hewlett-Packard	18%
Belar	16%
GE	7%
Gates	6%

Less than 5%: Collins, Doolittle, General Radio, RCA.

Modulation monitors
Base: 139 responses

McMartin	40%
Collins	20%
Belar	14%
Hewlett-Packard	8%
RCA	6%

Less than 5%: Doolittle, Gates, GE, "home brew."

Studio-transmitter links
Base: 27 responses

Moseley	70%
Marti	15%

Less than 5%: GE, Microwave Associates, RCA, Raytheon. Note: Of 131 respondents, 18% use Telco lines between studio and transmitter.

Transmitters
Base: 132 responses

Gates	30%
RCA	30%
Collins	21%

Less than 5%: AEL, Bauer, CCA, Federal, GE, ITA, Rust, Standard Electronics, Western Electric, Westinghouse. Note: Of 121 respondents, 11% have an alternate main or auxiliary transmitter.

Transmission lines
Base: 137 responses

Andrew	63%
RCA	26%
Prodelin	6%

Less than 5%: Communication Products, Electronic Research, Phelps-Dodge.

Horizontally polarized antennas
Base: 103 responses

RCA	38%
Collins	16%
Jampro	16%
Gates	12%
Andrew	11%

Less than 5%: Alford, Co El, Electronic Research, Shively Labs, Teletronics.

Vertically polarized antennas
Base: 44 responses

RCA	25%
Gates	20%
Jampro	20%
Collins	18%

Less than 5%: Alford, Andrew, Electronic Research, Shively Labs, Teletronics. Note: Of 121 respondents, 13% have an auxiliary antenna.

Air Your Gripes!

Two survey questions invited respondents to be specific about their problems and desires. The first: Are you happy with your present technical setup? If not, please explain. Some replies:

- Antenna parts are rated much too low for currents.
- Unhappy with high-frequency spillover.
- Prefer better transmitting equipment; reliability is poor.
- Have problems with cross-talk from main channel into SCA.
- Lack of quality control on part of pre-recorded tape supplier.
- Antenna icing in winter.
- No spare transmitter.

The second question: If you could have but one technical wish as an FM broadcaster, what would it be? Some replies:

- Better average modulation in stereo while keeping dynamic range.
- Better and longer life stereo styli.
- Better RF protection for equipment; that manufacturers test equipment in high RF fields before marketing.
- To see a more stable, dependable transmitter made, or locate one if such is available.
- More accurate and quickly read frequency and modulation monitors which could be checked by means an ordinary station would have available.
- A foolproof horizontal-vertical antenna system which wouldn't produce "picket fence" effect in hilly terrain.
- Quality stereo cartridge machines.
- Automatic logging and unattended transmitter.
- More attention to grounding procedures by manufacturers.
- That equipment manufacturers keep up-to-date schematics and records of each field installation; thus field problems could be discussed in detail with the manufacturer.
- A competent source of engineering assistance available for routine and emergency problems at a realistic cost.

Quad Discs Vie for Industry Approval

Compatible quad disc systems are beginning to appear at a prodigious rate. Most of them seem to work rather well, but different approaches make varying demands on available equipment. Say what you will about ping-ping/pong-pong demos, the clincher has got to be that motorcyclist who makes circles around the listening room.

By Walter G. Salm

IT HAD TO HAPPEN. There've been rumors galore and unsatisfactory demonstrations, but it's finally here—a compatible quad stereo disc that really works. It all started with the mysterious quad disc invented by Peter Scheiber—the disc that was talked about plenty but heard seldom. At last March's AES meeting in New York, the Scheiber disc was finally demonstrated to the engineering fraternity (see *BM/E*, May, 1970) and it bombed.

In the meantime there have been lots of developments in other, non-psychological techniques. Unlike Scheiber's *psycho-acoustic* record, other systems now vying for industry attention all reproduce four discrete channels in some way, some better than others.

The major demonstrations and test pressings in the last few months have come from two quarters —JVC (Nippon Victor) and Electro-Voice. Another Japanese firm, Sansui, has also announced a system, but virtually no details are available. Part of the problem is the same as caused the mystery initially surrounding the Scheiber system—patent protection. No one wants to divulge too much about his technique until he's sure of his own patent position, and that takes time. The fact that quad disc systems are now tumbling from the trees like so many overripe avocados points up the wealth of ideas and the staggering amount of potential technology available today, so much unlike the fledgling stereo situation of nearly 15 years ago.

Unveiled simultaneously at the Fall AES Convention in New York, the JVC and Electro-Voice systems both work well, although we have yet to hear that dazzling ping-ping/pong-pong demo that performs so fantastically on four-channel tape—the racing motorcycle making circles around the listening room. This may be due to the relatively low degree of channel separation between the front channels and their rear counterparts. One fact is essential to all compatible disc systems: A certain amount of front-to-rear "spillover" is not only permissible, it's necessary.

The JVC system uses a frequency-modulation technique that is very reminiscent of Jerry Minter's stereo record of a decade and a half ago. The rear channel information is matrixed (front minus rear) for both left and right, which reduces substantially the amplitude of required program material.

But channel separation is simply a matter of degree, points out Len Feldman, co-developer of the Electro-Voice system. The 8 to 10 dB of front-to-back separation offered by the E-V system is more than adequate for any kind of stereo, he feels. The oft-quoted figures of 32 to 40 dB separation are admirable, says Feldman, but totally unnecessary. The Electro-Voice demonstrations certainly seemed to bear out this contention.

Walter G. Salm is a public relations and publications consultant whose specialties include audio and broadcasting.

JVC's entry in the quad contest was demonstrated at last AES convention. Disc-playback adaptor includes a pair of VU meters, compatibly plays back both four- and two-channel stereo recordings.

FM record grooves

But examined more closely, it's possible to see serious differences between the JVC and E-V systems and possible controversy over which one is preferable, if indeed either one is. The JVC system uses frequency-modulated record grooves. The matrixing circuit used for recording accepts four discrete channel inputs and produces four signal channels. These signals (where channels 1 and 3

are left and right front, 2 and 4 are left and right rear) are:

- Channel 1 plus channel 2
- Channel 3 plus channel 4
- Channel 1 minus channel 2
- Channel 3 minus channel 4

The last two outputs, the subtracted channels, modulate a subcarrier in a frequency range above the audio spectrum, and are mixed with the first two information channels. The whole business then goes to the cutting amplifier and to a specially designed cutting head. The resulting record groove bears little resemblance to a conventional stereo groove. The wide modulation excursions are greatly reduced, and the groove walls contain finely grained ripples that represent the high frequencies recorded there.

Playback requires a special pickup head with extremely high compliance and very wide frequency response. It must respond faithfully to signals as high as 45 kHz. Further, any playback with a conventional stereo pickup would wipe those high frequencies off the record, and most likely impair the two-channel reproduction as well. Playback also requires a special decoder, which presumably includes a demodulator circuit pair as well as dematrixing circuitry.

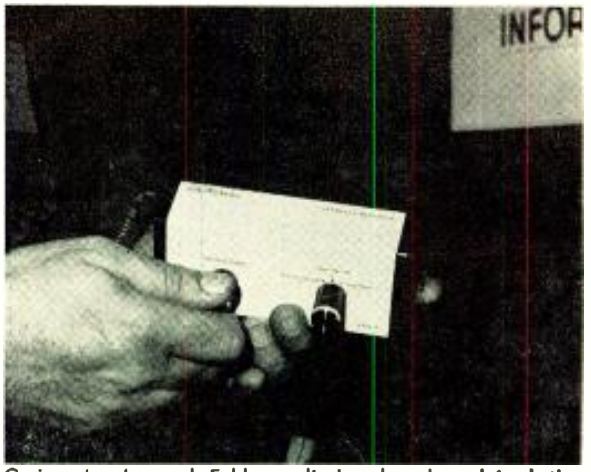
There has been some movement to get FCC approval for experimental quadcasts on a single FM station using the JVC disc. Experimental approval for 30 days has been granted San Francisco's K-101(FM) for after-hours quadcasts. If some other discrete quad broadcasting system is developed, then it might be up to the broadcaster to first decode the quad information from the records and transmit the four discrete channels. But this doesn't seem likely either, at least not within the next year.

Some interesting figures from the JVC spec sheet: Frequency range, 30—15,000 Hz each channel; separation, ch. 1 to ch. 2 and ch. 3 to ch. 4, more than 20 dB; separation, ch. 1 to ch. 3 and ch. 2 to ch. 4, more than 25 dB; S/NR, more than 50 dB. Pickup cartridge characteristics: frequency response, 20 Hz to 45 kHz; stylus radius, 0.5 × 0.2 mil; stylus pressure, 1.5 grams.

Matrix si, Mpx no

In a parallel development, Electro-Voice has demonstrated its own version of a compatible quad disc. Unlike the JVC system, the E-V disc does not use multiplexing and does not use frequency modulation. What it does do is largely guesswork now, because pre-patent jumpiness has made company spokesmen more tight-lipped than a four-year-old at castor-oil-taking time.

This much we do know about E-V's quad disc: It does its intended job at least as well as the JVC quad disc. It requires no more frequency bandwidth than does the usual, two-channel stereo disc. It can be recorded with any standard 45/45 cutting head and played back on any conventional stereo magnetic pickup. It is fully compatible—it can be played as stereo or quad and can be broadcast with no additional equipment or special FCC permission. Not next month but right now.



Co-inventor Leonard Feldman displayed and explained the Electro-Voice quad disc adaptor which enables FM stations to broadcast four-channel stereo using normal two-channel facilities, without having special FCC permission.

The secret is in that patent-applied-for decoder box, hardly a handful, which Electro-Voice plans to market for $49.95. It looks deceptively simple —this tiny black box (it's really white with black trim) with a couple of control knobs and five stereo pairs of input and output jacks in back. The box is installed between the preamp and amplifier or connects to the tape-output jacks at the rear of the conventional stereo amplifier. The little decoder box puts out four signals, left and right front and rear, which are to be jacked into two stereo power amplifiers. The gadget also can synthesize a kind of quasi-quad from two-channel program sources.

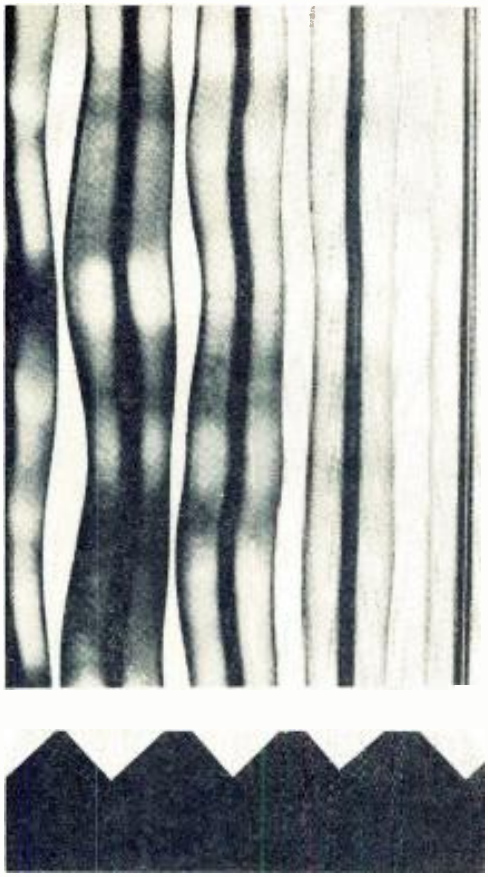
Inside the box are a couple of beefy electrolytic capacitors and a large (about an inch square) hybrid chip that contains four or five smaller IC chips wired into the larger substrate. The whole thing's covered with black epoxy to keep out would-be prying eyes.

The E-V system's co-developer, Len Feldman, stressed the matrix's complete compatibility for broadcast in a recent interview with *BM/E*: "The biggest asset to the broadcaster is that he doesn't have to buy one nickel's worth of additional equip-

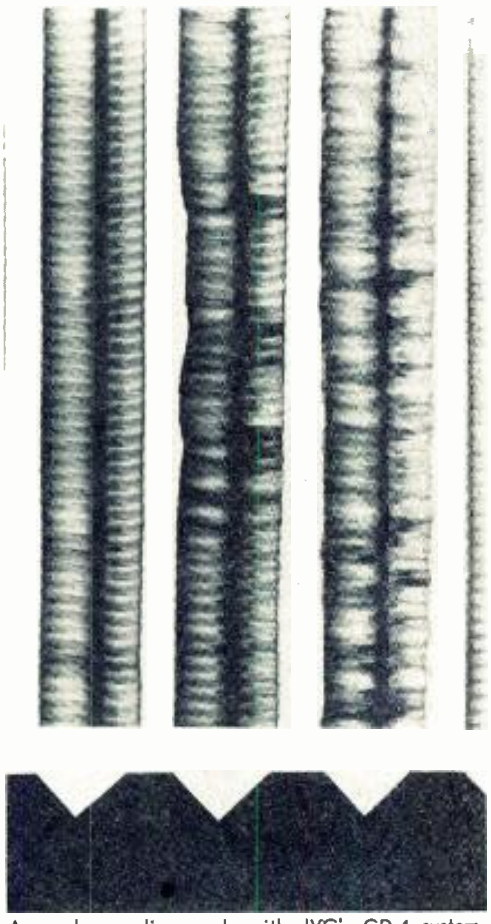
The K-101 Experimental Quadcasts

Working in the midnight—6 am experimental period, K-101(FM) San Francisco has been running tests on Lou Dorren's compatible four-channel system of FM broadcasting. (See BM/E May 1970, p. 38.) The system provides mixed-down mono and two-channel signals for mono and conventional stereo listeners. A 76-kHz subcarrier furnishes decoding info for four-channel listeners.

K-101's Jim Gabbert says results so far are promising. He's getting separation of 40 to 42 dB in the 50—15,000 Hz range, and S/N ratio of 60 to 62 dB per channel. While bandwidth (not deviation) is slightly more than FCC specs, Gabbert says spectrum analyzer checks of conventional two-channel FM stations show they are using slightly more bandwidth than what's kosher. He plans to submit a complete report to the FCC shortly. What the Commission will do then is anybody's guess.



Microphotograph of grooves and cross-section of conventional two-channel stereo disc show lateral and verfical 45/45 amplitude modulation. Note that groove at right is silent, or unmodulated.



A quad recording made with JVC's CD-4 system looks like this, a microphotograph similar to the previous one. In addition to lateral and vertical modulation of grooves, note frequency modulation (horizontal indentations) which account for the extra two channels.

ment. To quadcast, all he has to do is play the record—using the equipment he already has for ordinary, two-channel stereo broadcasting." According to Feldman, the matrix does not increase the frequency bandwidth of the stereo program material at all and therefore requires no special gear and no special FCC approval. It doesn't become quad again until it passes through the listener's decoder.

To prove this point, E-V demonstrated a short-distance broadcast in its display at the Boston Hi-Fi Show. A quad tape was encoded and "broadcast" through a flea-power stereo FM transmitter whose radiation was confined to the display area. This quadcast was suitably received on an ordinary FM receiver, passed through the decoder and then to the pair of stereo amplifiers for quad reproduction. Encoders are not needed for discs, only for tapes and live pickups. Yes Virginia, it worked.

At about the same time all that was going on, Sansui announced its own quad disc system. Information is very scarce on this one, but it sounds enough like the Electro-Voice matrix to be a twin brother. Company marketing philosophy has so far prevented anything more than a cursory announcement; Sansui likes to have a viable product ready to show before demonstrating anything—even something as important as compatible quad.

In the meantime, other companies are probably readying their own versions of quad discs for the marketplace. Nothing is certain right now, but the only one actually tooling up for production is Electro-Voice. This is one battle that may well be decided by the consumer. Meanwhile, tape advocates have been battling out the merits of various channel widths, interleaving and other aspects. RCA and Motorola started the ball rolling in the consumer-products area—RCA with two living-room quad eight-track cartridge-playback systems, and Motorola with an automotive unit. Quad-eight cartridges under the RCA label have already hit the record stores, although it's far too early to tell how well they're selling.

The open-reel format naturally gives the best and most believable reproduction, since there are four quarter-track channels on the oxide. Less clear is the future for the cassette as a quad medium. Philips and Astrocom/Marlux are slugging it out right now over format standardization. Astrocom/Marlux has demonstrated a quad cassette machine that uses four inline tracks much the same way that open reel machines do. Philips has shown specifications for a completely compatible quad cassette that it would like to see adopted as the worldwide standard. Trouble is, this compatible system has track widths so narrow that signal-to-noise ratio will probably be horrendous, to say nothing of fidelity. Besides, it's bound to be a couple of years yet before our technology is capable of making a head that can do the job. Track widths in the proposed Philips system are .011 inch wide, and four of them are stacked together in a space of .059 inch. Head manufacturers, take note! **BM/E**

FM Success:
Specialize; Stay Consistent

By Ray Nordstrand

THE STATION WITH A BROAD FORMAT (such as rock or "middle of the road") usually faces far more competition from other broadcasters, both AM and FM. The station with a narrow profile can become a big fish in a smaller pond, however, easily getting more numbers and more revenue. There are advantages to being on the "side of the road."

Advertisers in all media these days are less and less willing to buy amorphous numbers. They want prime prospects for what they're selling with minimum waste circulation. And they're willing to pay a premium to reach them. A specialized format is more efficient in delivering persons of similar occupation, income, education, and style of life, as well as appropriate age and sex.

The specialized radio station—be it underground or classical, black or country-and-western—reaches this better-defined target audience which is more meaningful to sponsors. Unfortunately radio is still underresearched in demographics, so that buyers often rely only on the age-sex breakouts in the rating books. But a sophisticated advertiser will also be interested in Pulse LQR data, Brand Rating Index Information, and individual station research.

One further advantage in specialization is the loyalty—indeed the love—such a medium generates from the audience it cultivates. The station that tries to have something for everyone (or something for a lot of people) can lose the special identity and credibility that so enhances advertising response.

Programming and selling a specialized concept successfully require consistency and conviction. You can't expect to sell the station to every account. In fact you shouldn't *want* to do so. You should be confident that there are enough prime prospects who will need and want your particular audience so that you don't have to "con" an inappropriate client into buying your medium.

WFMT in Chicago is a thoroughgoing fine arts station. We don't feel the need to lace Bach and Bartok with Mantovani and Liberace. But we do find that people who like serious classics also enjoy a bit of folk music, poetry, drama, and humor. They're also aware, concerned people, so good news coverage (our newscasts are "open-ended") and lively discussion (we have Studs Terkel each morning) are also helpful and appropriate.

According to the last Pulse LQR 53.7% of our men have family incomes of $15,000 or more; 55.8% are professional. These are both the highest percentages of any Chicago radio station—AM or FM. We also have more college-trained adults than any other FM. The ages are generally 25 to 49.

Continued on page 36

FM Success:
Make It Unique; Work It Out

By Don Kennedy and Gordon Swan

"Even in a highly competitive major market," says Kenko Productions, Inc.'s (Atlanta) Don Kennedy, "you can create a popular and valuable FM property."

Along with fellow consultant Gordon Swan, Kennedy entered the tough (16 AMs, seven FMs) Atlanta market in 1960 with a $25,000 investment to start up WKLS (FM) as an "easy listening" MOR—unique at the time in that market. WKLS built up a good audience and some imitators over the next ten years. Ads were limited to eight minutes an hour, about $6.00 a spot. In 1970 the station was sold for 30 times the original investment. The new owners were able to maintain the eight-minute-per-hour policy and raised rates to about $8.00 a spot.

How did Kennedy and Swan build such a profitable business? Partly, of course, by anticipating FM's tremendous growth in popularity during the '60s. But most of the credit goes simply to good decision-making on their part. Here's what they recommend:

1. Develop a unique approach

In our case the approach was to program all-instrumental music with limited commercials. While it certainly wasn't an original idea, it was being done by very few stations at the time—and by none in our market. So it filled a need. There are similar needs in most large markets today. The problem is just to find them.

FM operators have made huge successes by beaming foreign-language broadcasts to a particular group or groups. Others have featured an all-talk format, or concentrated on specific kinds of music such as Underground Rock, Heavy Classical, Country and Western or Gospel. Female announcers have rounded up good audiences.

2. Devise new operation methods

Automation was not generally accepted ten years ago and available systems tended to be expensive, so we built our own in order to keep our staff small. Program automation saved at least two people. Computer billing saved forty hours a month. A simplified traffic system saved another week per month. Omitting many office procedures and formalities made it possible to cut expenses while maintaining excellent sponsor service and good air sound. "Typical" station operation would have eaten up our money and driven us out of

Continued on page 38

Don Kennedy and Gordon Swan are management and engineering consultants in Atlanta.
Ray Nordstrand is president and general manager of WFMT (FM), Chicago.

FM Success?

Finances Gloomy

Although FM station revenue reached a high of $67.4 million in 1969, up 26.7% over 1968, losses were the highest in the last 10 years. An overall loss of $5.5 million was reported by independents and $3.9 million by FMs operated by AM licensees. Of the independents, 69% reported losses. This dismal overall performance and the details that follow were taken from the FCC's *AM, FM Financial Data Report—1969*, just released.

Major FM revenue gains were posted primarily by the AM licensees. The AM-owned FM stations took in $34 million, an increase of 36.5% over 1968. Independents collected $33.4 million, an increase of 18%. Historical income data and profit-and-loss figures are shown in the accompanying charts.

You can check your own station's performance (sales and expenses) by comparing it to the composite Revenue and Expense breakdown table.

It is interesting to compare FM expenses with AM expenses (see table comparing selected items on a percentage of income). Since the FM stations included in this breakdown operated at a loss of 16.2% on sales compared to profit of 11.7% for AM stations, you'd expect to see FM costs higher. As a matter of fact, technical costs and programming salaries do run about 4% higher for FMs than AMs. But selling expenses of FMs are 8% higher—indicating they just aren't getting the sales per man—and G and A items are way out of line. Under G&A, salaries appear excessively high as do "other G&A" which would include rent and the usual costs of being in business.

One word of caution in using these percentages, however. They do include the results of 179 stations owned by AM licensees. This group's expenses were not broken out separately, but as a group they reported losses of nearly 39%. It is likely this group proportioned excessive amounts to G&A and took the bigger loss with some equanimity knowing that it would be subtracted from AM profits on Uncle Sam's tax forms.

The FCC report shows that Chicago has the most FM stations with 30 reporting billings of $3.5 mil-

FM Revenue and Expense Items

(In thousands)

REVENUES FROM SALE OF TIME			
To major networks	$ 60		
Other networks	1		
To national and regional advertisers	9,604		
To local advertisers	34,449		
Total sale of time		$44,114	
OTHER REVENUES		$ 2,112	
TOTAL BROADCAST REVENUES		$46,226	
Less commissions	3,487		
NET BROADCAST REVENUES		$42,739	
TECHNICAL EXPENSES			
Technical payroll	3,177		
Other technical expenses	2,668		
Total technical		$ 5,845	13.7%
PROGRAM EXPENSES			
Payroll, talent and other program employees	9,504		
Rental and amortization—film and tape	128		
Records and transcriptions	413		
Cost outside news service	663		
Other payments to talent	200		
Music license fees	1,078		
Other performance and program rights	311		
All other programming expense	1,711		
Total program expense		$13,473	31.5%
SELLING EXPENSES			
Selling payroll	6,231		
All other selling	4,265		
Total selling expense		$10,496	24.6%
GENERAL AND ADMINISTRATIVE EXPENSES			
General and administrative payroll	5,586		
Depreciation and amortization	4,243		
All other G&A expenses	10,023		
Total general and administration		$19,852	46.4%
TOTAL BROADCAST EXPENSES		$49,666	116.2%
NET LOSS		$ 6,927	(16.2%)

Includes 422 independent FM stations and 179 that are associated with AM but which reported separately. Sales of approximately 125 station (with revenues totaling $2.74 million and expenses of $6.1 million) are not included in itemization since stations with less than $25,000 sales are not required to report details.

But Binaural's Back

While waiting for the four-channel question to get straightened out, FM operators have something new they can program right now: binaural sound. This fully compatible two-channel recording system requires absolutely no new equipment or techniques at the broadcasting end. The binaural recording is simply a two-channel recording made with a special microphone set up. Binaural programming can coexist with present stereo programming or with any future system used by stereo FM stations.

At the receiving end the only special requirement is that the listener use stereo headphones, fed by his receiver, rather than loudspeakers. The boom in phone ownership of the last few years has made binaural practical as a mass medium, in the opinion of a group at the National Center for Audio Experimentation. The NCAE, established at the University of Wisconsin by the Corporation for Public Broadcasting, has already started quietly developing programming using binaural techniques.

The method, familiar in the laboratory but not to the public, recreates around the two microphones at the recording end a close copy of the sound field the two ears would have experienced had they been there. The time, phase and frequency differences between the sounds at the two ears result from the spacing of the ears and the barrier (the head) between them. These differences are duplicated during recording by putting the microphones in a dummy head or by spacing them a few inches apart with a barrier between.

The listener's ears are extended back to the original scene, in effect, as each channel feeds directly to the corresponding ear. The result: an almost eerie reality; a sense of direction from each original sound, around nearly the full 360 degrees.

The group at NCAE is collaborating with BBC personnel to produce in binaural a series of plays originally written for BBC radio. The first two of these tapes, produced under the auspices of CPB, will be aired early in the spring over eight or ten public radio stations around the country. By fall NCAE hopes to have ten to a dozen binaural plays on tape which will be offered to public radio stations generally. Offering to commercial stations should come a few months later,

Year	Total FM Stations Reporting	Total FM Revenues (Millions)	Independent FM Stations			
			Number of Stations Reporting	Revenues (Millions)	Expenses (Millions)	Income (Millions)
1969	1961[1]	$67.4	442	$33.4	$38.9	$(5.5)
1968	1888	53.2	433	28.3	32.2	(3.9)
1967	1706	39.8	405	22.6	26.8	(4.2)
1966	1575	32.3	381	19.4	22.7	(3.3)
1965	1381	24.7	338	15.7	19.0	(3.3)
1964	1175	19.7	306	12.8	15.8	(3.0)
1963	1071	16.3	294	11.4	14.6	(3.2)
1962	993	13.9	279	9.3	12.5	(3.2)
1961	938	10.0	249	7.1	9.7	(2.6)
1960	789	9.4	218	5.8	8.2	(2.4)
1959	662	5.7	148	4.3	5.9	(1.6)

1. Includes FM stations operated by AM licensees but which price and offer time separately. The breakdown for 179 such stations (those who separated costs) reveals revenues of $12.1 million and expenses of $16.9 million for a net loss of $4.8 million

Operating Expenses—FM vs. AM

Selected Items—as percentage of revenue (422 indepenednts, 179 AM affiliates)

	FM%	AM%
Revenues	100	100
Technical payroll	7.4	5.9
Other technical	6.3	3.3
Program employees and talent	22.1	18.2
Records and transcriptions	1.0	1.8
Outside news service	1.5	1.7
Music license fee	2.5	2.7
Other programming expenses	4.4	4.8
Selling payroll	14.0	11.5
Other selling expenses	10.0	5.5
G&A payroll	13.4	11.2
Depreciation & amortization	10.0	4.9
Other G&A	23.0	17.9

All data from FCC reports.

Profit and Loss of Independent FM Stations[2]

Year	Total Number Reporting	Number Reporting Profit	Number Reporting Loss
1969	442[3]	136[4]	306[5]
1968	433	148	285
1967	405	115	290
1966	381	111	270
1965	338	102	236
1964	306	93	213
1963	294	86	208
1962	279	71	208

2. Includes 387 FM stations that are part of AM/FM combinations but for which no FM revenues were reported
3. In addition to the 442 independent stations are 179 FM stations associated with AM stations. Of these 45 reported an average profit of $18,923 while 134 reported an average loss of $42,114
4. Average profit: $16,674 5. Average loss: $25,541

lion. Highest billing area is New York City—$4.6 million for 17 stations.

The FCC reported financial data in 165 standard metropolitan statistical areas taking in 621 stations. Only six of these areas showed independent FM operations profitable as a whole (i.e., the FMs as a group were in the black). These areas were Atlanta, Champagne Urbana, Madison (Wis.), Newport News-Hampton, Terre Haute, and West Palm Beach. All were three-station markets, except for Terre Haute. The only market which produced a substantial profit was Newport News-Hampton, which delivered $140,727. Madison was next with $58,000.

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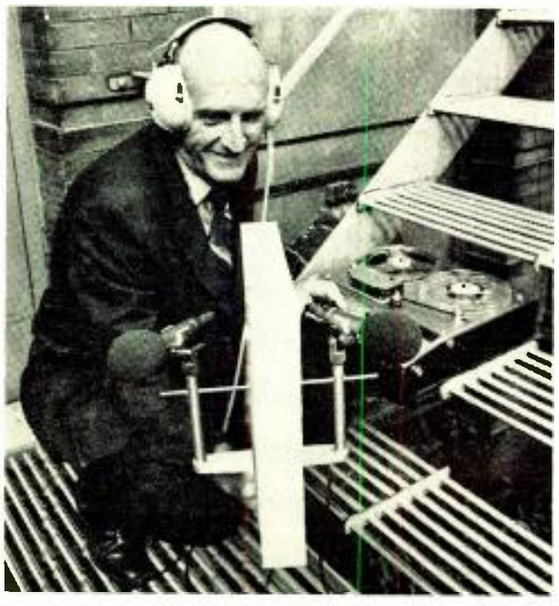
although plans on that are not yet final.

Initial distribution of the tapes will be by the NCAE, which should be addressed at Radio Hall, University of Wisconsin, Madison, Wisconsin 53706 (write there for their newsletter, also). Personnel most directly concerned with the project are Karl Schmidt, Director; E. G. Burrows, Associate Director; and D. J. Voegeli, Technical Director—all of NCAE.

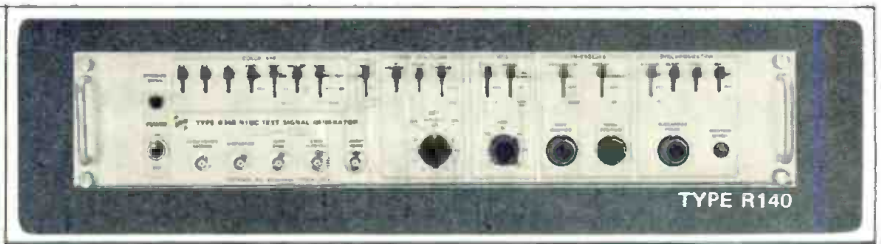
What is probably the first commercial binaural recording has been released by the Ziff-Davis Company, New York, and is being sold by mail through advertisements in that company's magazines, particularly Stereo Review, Electronics World and Popular Electronics. A 12-inch disc called "The Binaural Demonstration Record," it holds on one side six musical selections ranging through rock, jazz, and chamber music to Bach and Purcell on the organ. The other side is a demonstration of binaural effects (circling the listener, near and far, up and down), and a binaural tour of sound events—a basketball game, the subway, a steel plant, a parade, etc. The record can be bought directly from Ziff-Davis Company, One Park Avenue, New York, N.Y. 10016, at $5.98.



Binaural two-eared miking demonstrated by NCAE associate director E. G. Burrows.

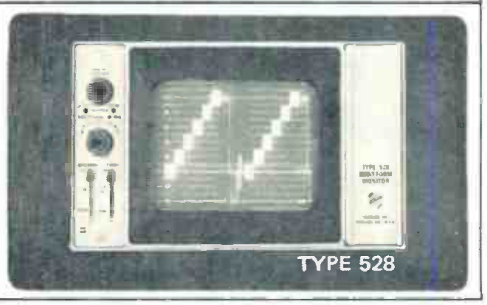
A COMPLETE FAMILY OF TELEVISION TEST INSTRUMENTS FROM TEKTRONIX

From signal source to waveform display Tektronix has an instrument designed to satisfy your video measurement requirement.


TYPE R140


TYPE R520


TYPE R529


TYPE 528

THE TYPE 140 NTSC TEST SIGNAL GENERATOR is a solid-state source of high-quality television test signals. Combined in one compact unit are: **NTSC Encoded Color Bars** with 75% and 100% amplitude, full-field or split-field bars at 10%, 7 1/2% or 0% setup level. **Modulated Staircase** providing variable APL, 10% to 90% and fixed APL, 50%. The test signal contains 5 steps plus blanking level with subcarrier phase locked to burst. **Convergence Crosshatch** provided for picture monitor linearity evaluation and convergence adjustment. **Vertical Interval Test Signals,** staircase or color bars, can be applied to lines 15 through 21 of either or both fields. **EIA Color Standard and Sync Generator** include a temperature controlled color standard with excellent frequency stability. Digital integrated circuits are extensively used to achieve stability, accuracy, and reliability. Outputs are provided of subcarrier frequency, composite sync and blanking, vertical and horizontal drive, burst, composite video and the convergence pattern signal. The Type 140 is the source of the waveforms displayed above.

140 NTSC Test Signal Generator $1800
R140 NTSC Test Signal Generator $1800

THE ALL SOLID-STATE TEKTRONIX TYPE 520 VECTORSCOPE is designed to measure luminance, hue and saturation of the NTSC composite color television signal. **Dual inputs** provide time-shared displays for comparison of input-output signal phase and gain distortion. **A chrominance channel** demodulates the chrominance signal for use in Vector Line Sweep, R, G, B, I, Q, Differential Gain (dA) Differential Phase (dϕ) displays. **A luminance channel** separates and displays the luminance (Y) component of the composite color signal. The Y component is combined with the output of the chrominance demodulators for R, G, and B displays at a line rate. **A digital line selector** permits positive selection of Vertical Interval Test Signals from lines 7 through 22 of either field.

Type 520 NTSC Vectorscope ... $2150
Rackmount Type R520 ..... $2175

THE TYPE 528 SOLID-STATE WAVEFORM MONITOR is ideally suited for monitoring waveforms from camera outputs, system output lines, transmitter input lines, closed-circuit and educational TV systems. Requires only 5 1/4 inches x 8 1/2 inches mounting space. **Flat, IRE, Chroma, and Diff Gain** vertical amplifier response positions. Sweep modes are: **2-V Sweep** (two field), **2-V Mag-Sweep** (expanded two field), **2-H Sweep** (two line), and **1-μs/div Sweep** (calibrated sweep with accuracy within 3%). Internal or external sync is selectable. Provision is made for **YRGB and RGB displays.** This **lightweight** waveform monitor converts to a **portable** unit for field service by adding an optional protective cabinet. An optional Rack Adapter permits side-by-side mounting of two Type 528's.

Type 528 Waveform Monitor $890

THE TYPE 529 WAVEFORM MONITOR is a general-purpose video monitor with VITS measurement capability. Vertical response characteristics are **High-Pass, Low-Pass, IEEE** and **Flat** (8 MHz). **A video-output amplifier** supplies video and a brightening pulse to a picture monitor, intensifying the same line(s) displayed on the instrument when using the **Line Selector.** Horizontal selection provides **2-field** or **2-line** displays, plus calibrated sweep rates of **0.125 H/cm** or **0.25 H/cm. Sweep magnification** extends the sweep rate by X5 or X25. **Positive field selection** in the **Line Selector** mode permits detailed study of any desired line(s), and a front-panel switch selects line 16 through 21 for viewing VIT signals.

Type 529 Waveform Monitor $1200
Rackmount Type RM529 ..... $1250

For a demonstration call your local Tektronix field engineer or write: Tektronix, Inc., P. O. Box 500, Beaverton, Oregon 97005.

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Circle 127 on Reader Service Card

An Automatic Color Camera

Another significant development in TV camera technology has appeared, with the introduction of a color camera which includes automatic registration and color balance and a rapid trouble-indicating facility. It should make truer color easier to attain and keep.

ONE OF THE MOST TEDIOUS OPERATIONAL procedures which must be periodically performed on color cameras is the lengthy manual alignment and color balancing routine at the beginning of each broadcast day. These, and subsequent adjustments during program time, have been replaced with fully automatic corrections performed by simply pushing a button on the new Marconi Mark VIII camera. An inbuilt computer makes the adjustments on command. Routine setup is reduced to less than three minutes.

Automatic registration and lineup

To begin setup, the camera-control operator presses the automatic lineup button. A diascope test slide in the camera optical system comes into operation as a motor-driven shutter caps the input from the lens. The test slide image (fig. 1) is reflected into the light-splitting system and thus into the three pickup tubes. The complete operation is then carried out automatically, by a miniature computer in the control unit. No external test charts are needed, and there's no need for a cameraman.

First the computer adjusts the diascope lamp brightness, bringing the green channel output to a preset level. Next the red and blue channel gains are adjusted to match them to the green level.

At this point, automatic beam alignment of the three pickup tubes takes place, using the top left-hand corner of the central white area in the slide. The focus voltage of each tube is varied, and center-point displacement is measured. Vertical measurement is done by counting lines, while horizontal measurement is done by counting cycles of a 5.5 MHz oscillation. In both cases, the appropriate alignments are corrected to bring the difference in count at the two extremes of the focus variation to zero.

As the next step, the computer performs automatic registration of the red and blue images with the green. The eight diagonal edges of the four triangles on the chart are used to examine the relative timings in the three channels. Both horizontal and vertical errors are thus detected from horizontal information only. Corrections are applied to horizontal and vertical centering, width, height, twist, skew and horizontal linearity in the two slave channels (red and blue). The system is arranged to minimize the errors detected at all eight inspection points.

Each step in the automatic process is indicated by a monitor lamp on the camera control unit. Thus an operator can initiate and monitor several camera setups simultaneously. When the operation—which takes from two to three minutes—is finished, the diascope is switched off and the capping shutter withdrawn.

Overall length of the Mark VIII camera, including a studio zoom lens and a tiltable viewfinder, is 22¾ in.

Color balance

To match the three channels for a particular scene illumination, the camera is uncapped and aimed at a white object occupying at least 10% of the picture area in roughly the picture center. The operator presses the color-balance pushbutton, and the iris is automatically adjusted to bring green signal to a peak level of 0.6 volt. The red and blue gains are then automatically adjusted to match this level.

The complete balancing level operation takes about 10 seconds. Thus it may be quickly readjusted during programming while the camera isn't on the air, as for instance if the scene illuminant should change its color temperature.

An important feature of the automatic lineup circuits is the use of motor-driven potentiometers for the various adjustments involved. Each pot has a thumbwheel so manual adjustments can be made for emergency or test purposes. But note that motor-driven controls consist of mechanical information stores which cannot drift, be affected by

powerline variations, or be changed accidentally during operation.

The automatic lineup system not only saves time, but standardizes a procedure which usually varies slightly between individuals when performed manually. It's also possible to easily interchange camera tubes and set up the camera quickly.

Dynamic centering

Initial setup is made using the diascope test chart, which is not available during camera on-air operation. To insure further against the possibility of registration errors, the horizontal and vertical centering circuits are also arranged to operate from normal picture information. The dynamic centering system is intended to eliminate the effect of small mechanical movements in the optical system under extreme environmental conditions, either of temperature or shock. A relative movement of only 10 μm at the image plane represents a registration error of 1 part in 1000. Fortunately such errors are usually simple and can be corrected by centering adjustments only.

Picture information is sampled along horizontal and vertical lines which cross in the picture center and which are about 20% of width and height. Edges appearing in a narrow window centered about mid gray are used to detect errors between red and green or between blue and green. To avoid misinterpretation due to unrelated transition in proximity, any error signals which exceed $\pm$360 ns horizontally or four lines vertically are ignored. In addition, action is taken only when an apparent error in a positive or negative transition is confirmed in an associated negative- or positive-going transition on the same field and at a distance equivalent to at least 1.8 μs horizontally or 20 lines vertically.

There remains the possibility of misoperation with certain types of picture detail. This is minimized by applying correction slowly; the overall effect is thereby beneficial provided correction is applied in the correct direction most of the time. The risk of misoperation is thus reduced to the unlikely case that the particular pattern in question remains the center of interest in the picture for a prolonged time.

Auto test facility

The camera channel is provided with an automatic testing feature which allows an immediate visual check of the operational state. A series of pulses is injected at suitable points along each video path, the output being viewed on the CCU picture monitor. The pulses are so gated and timed that each occupies a small rectangular patch on the screen, as indicated in fig. 2. If all pulses are present, all rectangular patches are white, indicating that all sections of the video path are functioning correctly. Apart from the video channels, other squares are allocated to monitoring power supplies and scanning generators. Any defect is immediately indicated by a black square, the position of which

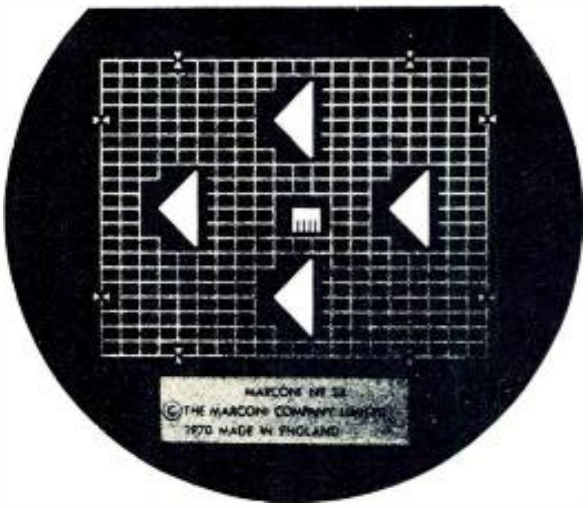

Fig. 1. Inside the camera, a diascope contains this pattern which is used for the automatic setup procedure.

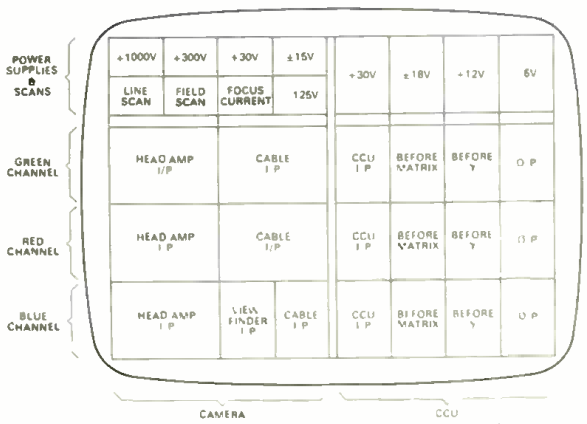

Fig. 2. The automatic test display is shown on the CCU. Each area is normally white, going black when a fault occurs.

indicates the area of the fault and the unit which should be changed.

Signal processing

An automatic black level control circuit is built into the camera to stabilize output to an optical black signal. Each camera tube is fitted with an optical mask which excludes light from the photocathode region outside the normal image format. The tube is overscanned by 10% at the beginning of each field, providing reference black to control the subsequent clamps in the amplifier chain.

A choice of four gamma laws is provided: 0.40, 0.45, 0.50, and 0.55. The function generator is maintained at constant temperature in an oven, tracking between channels being accurate to within 0.25% with respect to peak white signal.

Elimination of differential lag

A major problem of many three-tube cameras has been the greater degree of lag in the red and blue tubes, which has tended to produce color distortion in the smear behind a moving object. A white object tends to produce a multi-colored

Continued on page 39

Ask these people how to process 16mm and 8mm Ektachrome film fast.

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ABS-CBN
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WISH
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WTVM
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WTTV
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WRBL
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KCST
San Diego, California

KXTV
Sacramento, California

WKY
Oklahoma City, Oklahoma

KTVT
Fort Worth, Texas

KRGV
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WDAM
Hattiesburg, Mississippi

WDHN
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WTVY
Dothan, Alabama

WINK
Ft. Meyers, Florida

KLFY
Lafayette, Louisiana

WAPT
Jackson, Mississippi

WJTV
Jackson, Mississippi

WSWO
Springfield, Ohio

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Chattanooga, Tennessee

KJAC
Port Arthur, Texas

WCTV
Tallahassee, Florida

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WUSN
Charleston, South Carolina

WLUC
Marquette, Michigan

KFYR
Bismarck, North Dakota

WTOK
Meridian, Mississippi

KOSA
Odessa, Texas

WJAR
Providence, Rhode Island

WHTN
Huntington, West Virginia

WRDW
Augusta, Georgia

WNCT
Greenville, North Carolina

WDAY
Fargo, North Dakota

KARD
Wichita, Kansas

WANE
Fort Wayne, Indiana

WBRZ
Baton Rouge, Louisiana

KHAS
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Abilene, Texas

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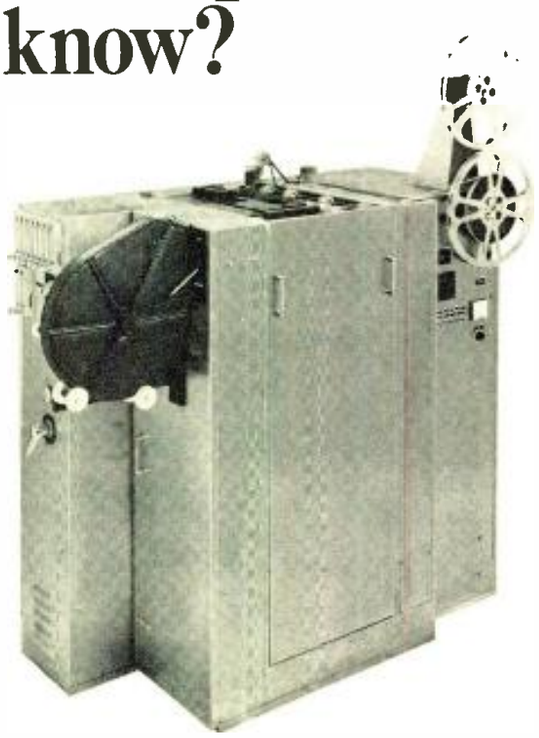
Do they know something about Jamieson's Mark IVA color processor you should know?

Jamieson's re-engineered low-cost Mark IVA 30 FPM color processor is the easiest of all machines to operate. It is fully instrumented. Automatically controlled. It has a warm-up time of just 10 minutes. A put-through time of just 23 minutes. And the Jamieson Mark IVA delivers processed film at a rate twice that of other machines of similar size.
Write us for complete information on the Mark IVA and our other processors.



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It replaces all lost video information—in color or monochrome—with signals exactly matched for luminance and chrominance while maintaining video stability and full color interlace even through multi-generation dubs.

There are no white or color flashes, no color mismatches, no grayed-out values. The only way the home viewer can detect its operation is that he gets the best picture he's ever had, which ought to make both you and him happy.

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BROADCAST EQUIPMENT

Test gear

Plug-in sweep oscillator, Model 3304B, covers VHF, UHF and military telemetry bands 1 MHz-1 GHz, and commonly used IF frequencies. Linearity 5% 50 kHz-1GHz. RF output 0.35 V rms. For use with Model 2003 Sweep System. $1095. TELONIC. **279**

Cable test set checks continuity with pulse. Range 2-10,000 yards with accuracy of ±5% on CRT, ±2% using X-shift vernier. Checks cables from 10-1000 ohms. Power supply: rechargeable battery, 117 or 235 Vac, 45-550 Hz. JAMES G. BIDDLE. **280**

Signal generator/frequency marker covers 300 kHz-300 MHz in six bands, with 1 V output ±0.25 dB. Has 54, 10, 1 MHz, 200 kHz crystal (harmonic) combs, and crystal sideband marker 4.5 MHz from the variable marker. Output is ALC'd. KAY ELEMETRICS. **281**

Gain/delay test set, Type SPAF, allows direct reading of envelope delay and amplitude response distortions between luminance and chrominance in TV system. Measures amplitude −6.6 to +6.6 dB with 0.1 dB accuracy; delay −112 to +112 ns with ±2 ns accuracy. Usable on both NTSC and PAL systems. $1500. ROHDE & SCHWARZ. **282**

TV test modules: pulse bar and ramp signal generator; linearity/variable APL generator; multihurst generator; combination sync/blanking adder and black/white generator; bar/dot generator. Each self-powered, independent, may be driven internally or by external sync. Each provides three composite outputs plus VIT output, all usable simultaneously. WARD. **283**

VSWR/wattmeter Model 3122 simultaneously displays forward and reflected power with VSWR during normal operation or maintenance. Plug-ins permit selection of ranges: 10 W-10 kW, 0.45-2300 MHz. $200. BIRD. **284**

Multi-purpose generator produces sine, square, triangular waveforms, plus/minus sine, plus/minus square, plus/minus pulse, haversine, and others. Has dual output amplifiers. Frequency range 0.1 Hz-5 MHz (primary generator), 1 Hz-1 MHz (secondary generator), 1000:1 voltage-controlled frequency. Modes include run, gate, trigger, pulse, hurst, sweep. $595. EXACT ELECTRONICS. **285**

For more information, circle boldfaced numbers on Reader Service Card.

New and significant

Dropout analyzer discriminates, counts, displays, and provides per-

manent dropout profile chart of videotape under test. Operates automatically with any VTR, quad or helical, and frees personnel for other duties. Provides instant visual display for on-the-spot troubleshooting, and provides performance history of tapes. Also certifies and grades new or old tapes for use as high-band color, low-band color, monochrome, master or dub tapes. Four models available; VTA-103 capable of additionally monitoring audio and control tracks. KATTRONICS. **275**

Safety matrix provides fail-safe system of paralleling two audio power amplifiers to common load. Model JBL 7125 allows parallel connection of amplifiers up to 150 W rms each, so that if one amplifier fails it is automatically switched out of circuit and power output is 3 dB down. Panel lights show normal operation and failures. Relay contacts allow remote external indicators such as bells, buzzers, lamps. Front-panel meter shows balance between amplifiers. JAMES B. LANSING SOUND. **276**

Video effects amplifier produces synthetic colors, enhances images. Video Quantizer Model 606 may be used to select from one to 16 slices of data at pre-selected amplitudes which are then mixed to achieve complex patterns. Applications include image tone reduction, PCM simulator, equal brightness contour generator, video keying source, image enhancement, electronic art, color synthesis. Will drive RGB color monitor direct, or may be fed to NTSC encoder for use in broadcast system. $3500. COLORADO VIDEO. **278**

Slow-scan TV system consists of camera and monitor which operate over 2-kHz channel and furnish 128-line picture in eight seconds. System can use voice-quality telco line or pictures may be stored on

audiotape recorder. Camera operates with normal room lighting. $1391. ROBOT RESEARCH. **277**

Television equipment

Studio system packages are intended for CATV local origination, educational TV, similar uses. Colorcaster I includes camera, color VTR, color monitor, audio system and cabling; $12,400. Colorcaster II includes film and slide projectors, multiplexer, color monitor, audio system, cabling, color film chain and color VTR; $20,700. Colorcaster III includes color studio camera, VTR with assemble and insert editing, video switcher and special effects unit, monitors, audio console cartridge and recorder, film-chain island including color camera, plus lighting. IVC. **295**

TV demodulator Model DEM911 covers both UHF and VHF bands, has defeatable automatic fine tuning, four IF stages, RF sensitivity better than 15 μV, video output 1.5 V pk-pk in 75 ohms. $279. SC ELECTRONICS. **296**

Monochrome camera has 7-in. viewfinder, both video and RF output, is available with or without zoom lens. Has AGC, uses ⅔-in. separate mesh vidicon. Model AVC-4000A without lens, $1100; Model AVC-4000A/V-5, with 5:1 zoom lens, $1550; Model AVC-4000A/V-10, with 10:1 zoom lens, $2200. SONY. **297**

Continued next page

Video monitors: Monochrome units available with 5, 9, 15, 18, and 22-in. CRTs. Color monitor has 23-in. pix tube. All have front controls, modular construction, audio systems, AUDIOTRONICS. **298**

Film processors available in Super-8 or 16-mm versions. FILMOpetite may be daylight-loaded with camera magazines: operate quietly and are compact (48 × 54 × 24 in.). Color and black-and-white $6000-$18,000. BELL & HOWELL. **299**

Broadband down-converter for ITFS 2500-MHz band uses low-noise transistors. Schottky-barrier mixer diode, has noise figure of 7-8.5 dB. Model MC-2500 has 18-20 dB gain, frequency stability of ±50 kHz. Operates –40° to +140°F. EMCEE. **300**

Zoom lens is 6 × 9.5 with aperture of *f*/1.6, angle of 68° and may be focused at full aperture as close as 24 in. ANGENIEUX. **301**

Audio gear

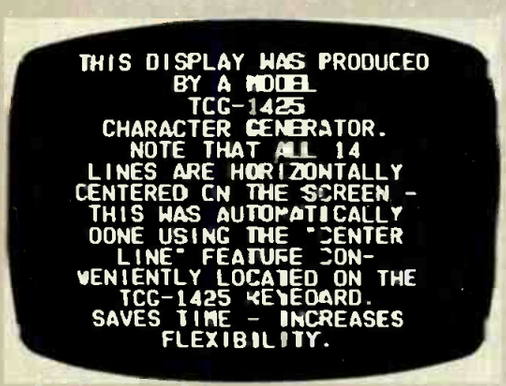
Equalizer-amplifier module accepts mike or line level input, consists of preamp, straight-line attenuator, equalization and program amplifiers. Has 12 dB boost and attenuation and reciprocal equalization curves for each of eight frequencies. Phase reversal switch allows 180° shift of incoming signal. Echo send before or after attenuator or equalization. ELECTRODYNE. **309**

Automatic rewind-cue unit operates with any Ampex or Scully tape transport. Works with automation system, causing any single-direction tape to rewind at end and automatically recue at start, without using tape machine brakes. $495. RON CRIDER INC. **310**

Recording studio console provides up to 28 inputs and 16 outputs, is only 4 ft. wide. Model 9300A has plug-in modules and Modulite volume level meters, which use sequential colored lights to indicate audio level. Console has channel-check facility which tests all input lines without disturbing program output. Internal or external echo. ALTEC LANSING. **311**

Low-cost noise-reduction unit is B-Type Dolby system designed for semi-professional tape machines. High-frequency noise reduced by approximately 10 dB when tape is processed by unit, which can match nearly any tape deck. Advocate Model 101; $125. ADVENT CORP. **312**

Continued next page



Put more character in your productions

TeleMation can give you all the Character Generator options for a lot less than you may think!

The TCG-1425 Broadcast Character Generator produces 14 lines of 25 characters each—full-page displays formed by line not dot matrix methods, so characters are all uniformly bright, easy to read. The TCG-1425 offers more editing functions than any other character generator and provides such flexible operating features as:

- **Automatic Synchronization** to either of two keyboard-selectable sources—super over network without genlock.
- **Eight Special Editing Functions** for fast, first-time composition and editing, including **Hop Left/Hop Right, Snake Up/Snake Down, Copy Up/Copy Down, Open Line/Close Line.**
- **Automatic Line/Page Centering** — Automatically centers any line in the display, or the entire page. Information may be centered after entry.
- **15th Preview Line** — Allows composition preview. This line may be inserted into on-air displays with the "Copy-Up" feature.
- **Random Access Disc Memory Accessories** — Available for storage and retrieval of up to 1,000 lines of character generator information.

The TCG-1425 has a few other convenient control features, such as one-line 560-character horizontal crawl from internal memory, vertical wipe (window shade effect), vertical roll, and flash. But the most convenient feature of all is the price:

TCG-1425 Electronics Unit	$7,200.00
Keyboard Control Unit	995.00
Matting/Shadowing/Edging Option	1,595.00
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Monitor speaker system includes solid-state amplifier protected against transients and overloads. Model MS-7000-02 uses silicon transisters, acoustically baffled speaker and all welded steel construction. KELMAR SYSTEMS. **313**

Reverberation unit uses multiple springs and floating threshold peak limiter which reduces peak noises and overloads. Orban/Parasound unit is available in console or rack mount, with or without power supply. PARASOUND. **314**

CATV equipment

Tractor has five hydraulically operated attachments for trenching, cable laying, backfilling, grading, dozing, digging, and boring underground. M450 Ditchmaster digs 14 in. wide down to 48 in. deep, buries cable or flexible tubing 24 in. deep. Has center articulation, power steering, four-wheel drive, four-speed transmission. VERMEER. **320**

Shield-bonding kit makes bonding and grounding connections in splice closures and pedestal terminals. Shield connectors may be used on any plastic or lead sheathed cable. Formed lip fits over aero-seal clamp, and staked attachment bolt is fastened through hole in pedestal bracket so cable is securely anchored with conductivity no less than of No. 10 copper conductor. PREFORMED LINE PRODUCTS. **321**

Two-way filter separates or combines VHF (50-252 MHz) and sub-VHF (5-30 MHz) signals, allowing addition of sub-VHF services to existing systems with minimum equipment change. CASCADE. **322**

Broadband VHF/UHF antennas have moderate average gain, sharp horizontal pattern, high front/back ratio, low noise level, broad bandpass. Para-Periodic line includes VHF low band and FM, VHF high band, FM only; UHF translator (70-83) model, and all-band UHF. Elements made of solid aluminum rod alloy with diagonal bracing to withstand icing. SITCO. **323**

Bidirectional amplifiers include trunk, trunk bridger, distribution, and multi-set models. Reverse capability is 10-30 MHz. All models built in heavy-duty RFI-shielded housing, hermetically sealed, with surge and lightning protection, inbuilt taps, sealed entry connectors, and tilt-compensated gain. ELECTRONIC INDUSTRIAL ENGINEERING. **324**

Circle 110 on Reader Service Card →

Damaged reels mean trouble for you! That's why Comm/Scope spends extra money for reels made of two plies of sturdy white pine bolted together. Fork lifts won't hurt them and they won't split on tne job.

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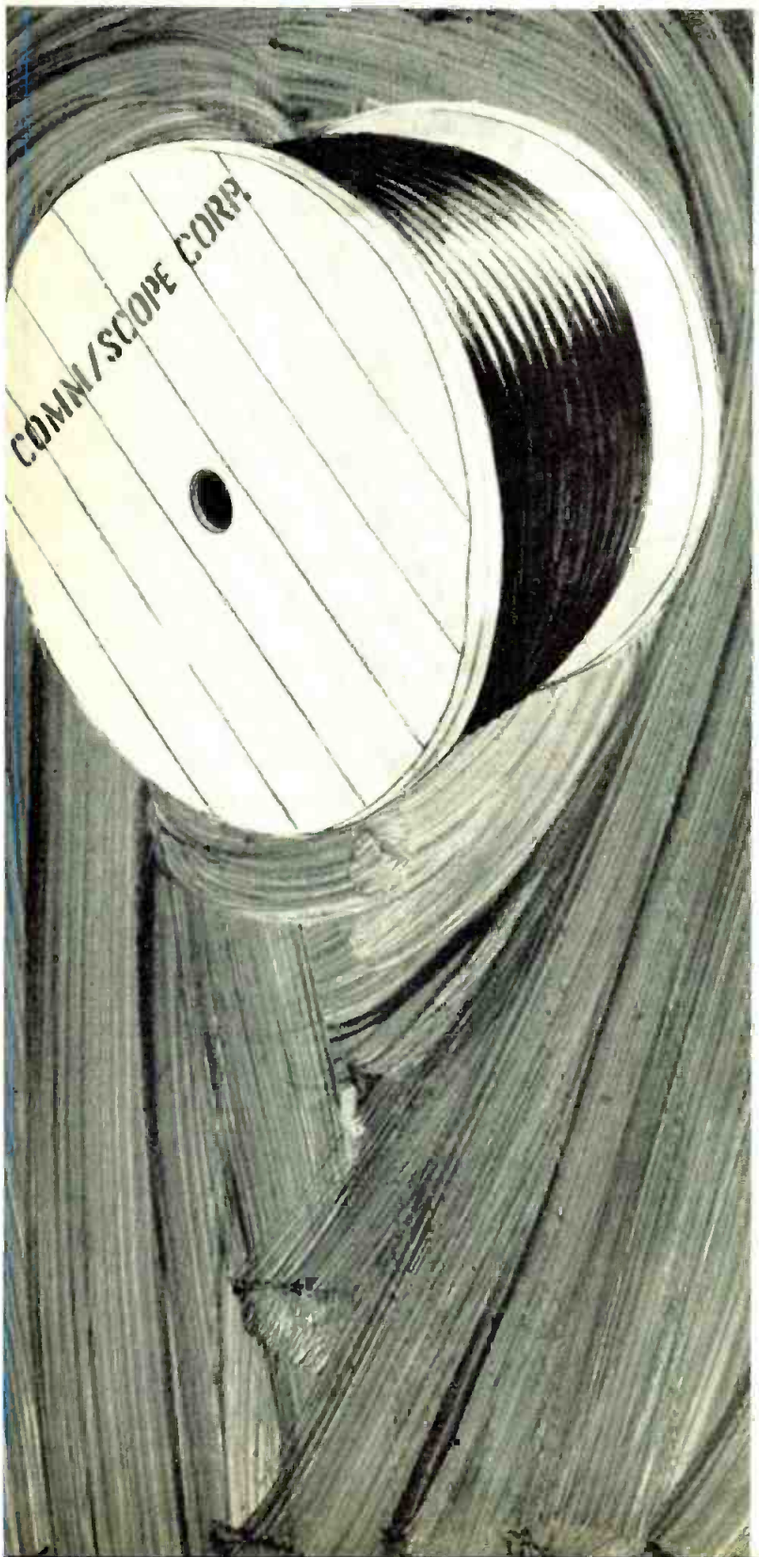


CROSS-TALK

Drugs programming

Dear BM/E:

Congratulations on your highly relevant, rational article on "Broadcasters and Drugs" in your November issue. It is more than time to look at the drug problem realistically. I only hope that this article is read throughout the industry.

Jon Busch
Station Manager
KSPN (FM)
Aspen, Colorado

Ed. note: We have been pleased with the amount of interest generated by our feature, "Broadcasters and Drugs," November, *BM/E*, page 18. While two readers commented that our magazine was not the appropriate place for this kind of article, more than fifty responses have come in praising the coverage for its informational and rational approach. Two radio stations reported they were just starting a series on drugs and appreciated the additional material provided. One reader, however, took exception to most of the points made. His letter follows.

Dear BM/E:

In the November issue of your magazine, there was an editorial opinion concerning drugs. It must have used the same panel of "experts" that prepared the President's report on pornography. I have read most everything that has come my way on the subject of drugs, and I must say that this was the most ridiculous approach I have seen yet. It compares with the chemical testing of body fluids and glandular activity to see what effect pornography has on a person.

Anyone who would equate marijuana with coffee is the last person who should be turned loose before our young people. As for lsd (not capitalized), may I suggest you contact Art Linkletter. Better yet, why don't you talk to about a dozen drug addicts, if you can get them to talk, and speak the truth.

Concerning "scare tactics," there are some things that any intelligent person is afraid of. Lack of fear is in some cases an indication of lack of knowledge, or stupidity. I doubt that you can show me one drug addict who started out to become an addict. I doubt that you can show me one alcoholic who set out to become an alcoholic. They simply weren't afraid of the stuff. It just wasn't that dangerous. Many of them are dead.

As for medical doctors, they are probably the last people who should be taken as absolute authorities on what drugs do to others. I never met one yet who could handle a drug addict, or an alcoholic. I have had some experience with both, and I found the medical profession helped neither.

The use of drugs (not medicine) is immoral. There is no other classification needed to make it undesirable. It will also kill you. None of them are harmless. Ask any drug addict, or alcoholic.

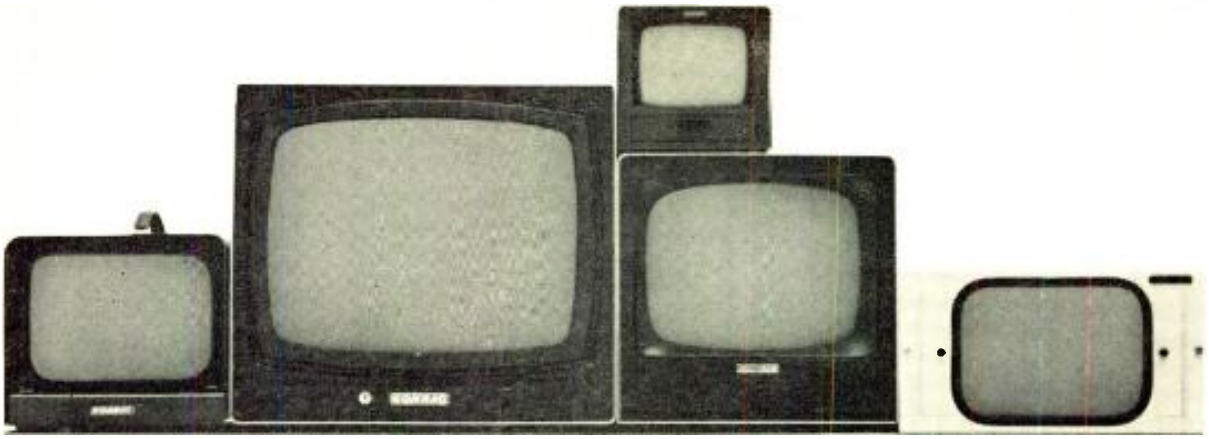
Ken Vassy
Operations Manager
WADA (AM)
Shelby, N.C.

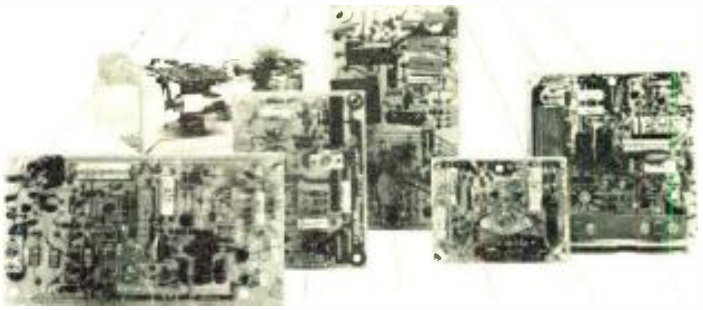
Audio comments

Dear BM/E:

My congratulations on your magazine's excellent article on audio limiting/compression/enhancing (October, 1970). In scanning the broadcasting industry's technical publications over the past few years, I have not seen such a comprehensive, cogent, and informative essay on the subject before. I feel that if more station chief engineers and "expert" station owners were to acquain themselves with the concepts covered in the article—the differences between hard limiting and clipping and expanding-compressing, and so forth—the audio quality of many radio stations would be improved. I have, over my years as a radio announcer and "golden-eared" audiophile and experimenter, seen many stations simply crank up a peak clipper or overload limiter and try to control program dynamics, with dreadful results. It seems that many station managers/owners have a curious kind of "modulation mania" that requires the mod meter needle to hover just at, or possibly above, 100%. More sophisticiated and subtle, if less extreme, program control by limiter/expander/compressors would be desirable, but of the seven FM stations I have worked for, only two have had the proper equipment for this purpose.

Nevertheless, I must say it seems to me that years ago, before such complex devices as the Audimax/Volumax or EMT 156 were even thought of, FM radio sounded better. The kind of thinking that prompted the CBS Labs' ads proclaiming "higher program power" on FM had not swept the medium up in a loudness race. And early mid-fifties recordings by Mercury, boasting on the jacket that "no compression of any kind has been employed" still sound more natural than many of the souped-up releases of today with their special audio processing (such as Dynagroove). As any musician with an ear for reproduced sound will tell you, recording/broadcasting engineers simply don't seem willing to reproduce the dynamics in their natural state. Will future electronic-steeped generations lose sight of the





Which model do the boards go in?

Any one of them. Conrac is introducing a new generation of monochrome broadcast-quality monitors. The same high voltage module and five quick-disconnect boards work in every model of the new series. They're interchangeable, and that's a big feature. You get the operational flexibility of being able to "board snatch" when needed. Reduced requirement for component stocking. Ease of maintainability.

You also get the next generation of Conrac monitors designed to meet the stringent requirements of broadcasting. Conrac's new series "S." A complete selection of black and white monitors. All solid state. Designed for UL approval. Your choice of 9-, 12-, 14-, 17- or 23-inch kinescopes. Available as cabinet, chassis, or rack-mount models with several important broadcast options. Write for details.

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Circle 112 on Reader Service Card

concept of loudness/softness, which was one of the great advances in music in the baroque and rococo eras? At the present time, every radio program and many records just seem to blast forth at the same droning level.

Stephen R. Waldee
Los Gatos, California

Dear BM/E:

I'm writing to say that I especially enjoyed reading your October issue of *BM/E*. Audio processing is a matter which we at WMAJ are well aware of (Audimax/CBS Dynamic Presence Equalizer/Volumax in the audio chain to the transmitter, as well as extensive equalization of our NBC line, and careful treatment of all recorded commercial material).

In spite of our careful attention to this matter, a problem has arisen: We refuse to overmodulate at this station, but some of the competing stations in our market area do. Their overmodulation is obviously present to the practiced ear. They drive their transmitters to clipping levels. We, personally, would rather have the clear, clean, legal signal that we now have. But there seems to be little justice in the fact that they *do* sound noticably louder than we do, which gives them some advantage from a sales standpoint (few of the sponsors, it would appear, are audiophiles, or they could have brought considerable weight to bear in the direction of *lowered* modulation).

I know this problem is not one peculiar to this market: Past employers have never said, "How's the distortion level?" or "There's not enough presence in the network line!" but I have been told, literally, to "keep the peaks in the red." This is a problem that has bothered me for some time, and after reading your October issue, I've finally decided to speak up about it. After all, *we* are doing the *right* thing, and all we (the engineers) get for it is static: "Are you sure our signal is as loud as it could be?"

Fortunately, the management here at WMAJ has placed its faith in our hands: We say that we are as loud as we can legally be, and they believe us. But I've known a lot of good engineers who got ulcers because of this. Do you have any suggestions, or should we just resign ourselves to living with overmodulation from the competition?

Gregory E. Miller
Carl Volz, Jr. CE
WMAJ-AM-FM
State College, Pa.

Ed. note: If your competition is overmodulating AM on negative peaks, that's illegal and the Radio Inspector should hear about it. If he's overmodulating on positive peaks, which is currently legal, we suggest you write the FCC in support of its expected proposal to remove the loophole and limit all modulation to 100%.

Correction

Dear BM/E:

We were surprised to note in the July, 1970, issue of *BM/E* (page 30 thereof) that there appeared the statement "WMZK (MuZaK). . . " . . .

WMZK does not have any authority to utilize the trademark "MUZAK."

Will you please make appropriate notation in your records concerning the foregoing—with an appropriate retraction of the error appearing in your publication.

Your cooperation would be appreciated.

Michael M. Goldberg
MUZAK, Division of
Wrather Corp.

FCC Rules

Continued from page 12

to a local or national advertiser which shows broadcast of commercial announcements one minute in length, whereas in fact some of the announcements were only 30 seconds in length.

Interpretation: This is fraudulent billing. The invoice misrepresents the length of some commercials, a highly important element of the price charged for them.

10. A licensee knowingly issues a bill or invoice to a local or national advertiser which sets forth the time of day or the date on which commercial announcements were broadcast. But in fact they were presented at a different time or on a different day, or were not broadcast at all.

Interpretation: This is fraudulent billing. Time of broadcast is often highly important in its value and the price charged for it. Charging for advertising not broadcast is clearly fraudulent.

Conclusion

All broadcast licensees are urged to review their billing practices carefully. If you are in doubt about a particular situation, consult your legal counsel. **BM/E**

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

SALE
OF THE MONTH

Make It Personal

Ken Brooks
Sales Manager KUJ Radio
Walla Walla, Washington

The Challenge: Landing new accounts is only part of the story in small-market advertising sales. Keeping them happy and helping them make the most out of their expenses is just as important. We had a chance to do this for one of our good customers—a Mayflower Mover—and ended up with an interesting promotional idea and a satisfied client. What he needed was a way to counteract a house-to-house campaign by his competitors, who were implying that "they" were Mayflower Movers. He was about ready to start on a huge ad schedule he couldn't afford.

The Solution: I convinced him we should do a simple campaign building his firm's connection with Mayflower through a personal approach. We built an image around himself and his wife—coupling radio spots with small newspaper ads using pictures of our client and his wife. Since he was starting to operate in a city nearby, this campaign could serve as a springboard and image builder for his expansion. We broadcast "The Adventures of Cliff and Tiny," weaving the commercial message through spots that were humorous, punchy, and that have so far proven very effective image builders. Our client has overcome the confusion caused by his competition, he's done it inexpensively—and he's built up a working image to carry with his operation as it grows.

FM: Specialize

Continued from page 19

From the subscription list of WFMT's monthly magazine, *The Chicago Guide* (paid circulation: 51,000), we know where our listeners live—largely in the higher-income lakefront and north suburban communities, the eastern strip of the city.

A perusal of Brand Rating Index gives some clues as to buying habits of listeners to classical music radio in contrast to nine other formats. It shows, for instance, that the classical devotee is far more likely than other radio listeners to purchase airline tickets, wine and liquor, recording tape, car rental services, securities, pipes, cat food and Volkswagens. They are also the highest TV viewers.

Armed with this precise kind of knowledge about the listener, we seek those sponsors for whom we feel we can do a job. We don't spend much time on the west side of town. We don't solicit used car dealers, finance companies or wig boutiques. Not that we couldn't do these advertisers *some* good; we're simply not the best way for them to spend their money.

But the selling doesn't stop with selecting the right client. We help him plan a strategy and produce commercial copy that is most relevant to our audience. Just as you don't talk English to a Spanish language market, you don't use a jingle to sell a sophisticated, educated audience which has just enjoyed an opera or oratorio. For our format a straight-forward, live commercial has proven to be the most effective way to please and persuade the listener.

A further selling point WFMT offers is a limit on commercial time. We'd rather charge a bit more than clutter the air with strings of confusing messages. We average just four minutes per hour, give one hour protection and avoid double spotting. These policies, combined with an especially attentive audience (not passive background listeners), give the commercials impact and exclusivity. They are heard, remembered and believed.

The result is that WFMT has the biggest revenue in Chicago FM and a renewal rate well in excess of 90%. Moreover, Pulse ratings typically show WFMT to have the largest "cume" audience in Chicago FM, even though its admittedly a "minority" audience.

These same principles apply to any other format. Every station has its strengths—unique attributes of its listeners and their buying patterns. The first job is to believe in the format and fully understand the audience. Then "lead from strength" and sell the station as a unique product, not just a set of rating points.

While the growth of FM as a whole depends on diversity and quality—the medium's ability to appeal to more and more different audiences—this doesn't mean that an individual station should not seek out a specific segment of this larger market and "do its own thing" as best it can. Through such diversification and specialization FM can prosper as a mass medium. **BM/E**

Continued from page 8

newspaper-CATV cross-ownership proceeding (Docket 18891), except that the NAB and ANPA (American Newspaper Publishers Association) must have comments in by April 16. Reply comments in both dockets are due to June 18, 1971.

- It is up to individual broadcasters to decide whether fairness considerations require carrying "the other side" of the question when running anti-smoking spots—according to the FCC's answer to the Tobacco Institute's argument that stations carrying anti-smoking spots must carry answering views that smoking may not be hazardous to health.

IN BRIEF . . .

NAB has begun preparations for May, 1971, which has been designated National Radio Month. The theme: "Radio . . . The Greatest Sound On Earth." Jingles and other promotional materials are being prepared to help acquaint the public at local stations with the scope of radio services available.

Other recent NAB activities include support from President Vincent T. Wasilewski for "comprehensive campaign expenditure reform" instead of the "piecemeal approach" which had been demonstrated by the bill vetoed by President Nixon limiting only radio and TV campaign expenses . . . . . Three executive vice presidents have been named by Wasilewski: **Grover C. Cobb** (vice president, broadcasting, of Gannett Co., Rochester, N.Y.) will take over station relations; **Paul B. Comstock** (currently NAB vice president and general counsel) will handle government relations; public relations will be the responsibility of **Paul Haney** (now vice president for public affairs with Houston Astros and Astrodomain) . . . . . Requests made to the FCC by NAB include:

- Eliminate the requirement for resistors on transmitters of non-directional stations where the radiated signal must be limited. This would bring the requirements in line with those for directional stations which are allowed to reduce transmitter power by means other than use of resistors.
- Abandon the 1966 proposal to reallocate land mobile radio services, since recent FCC rulings already "resolve the frequency congestion problems at issue."

FM: Make It Unique

Continued from page 19

business in a few weeks. Innovations saw us through.

New logging ideas, some simpler methods of automation requiring less expensive initial outlay, better music library selection, combination announcer-salesmen . . . all these can lead to greater success and more profit in today's FM station.

3. Plan toward a goal

Put your plan on paper. Be specific.

For example: Make a careful study of your top expenses, then figure how to make an income giving an excellent profit over the maximum expense figure. Write down the sponsors you'd like to have on the station and about how much you could expect to receive from each one each month; take into account each customer's seasonal or other trends. Include twice as many sponsors as you expect to get (or more) and then go after each one with specific ideas to show him how your station can increase his business.

On programming: Get a definite idea in your mind of how you want your station to sound—what "image" you want to convey and which group of listeners you wish to reach most effectively. Then list the ingredients of the approach that will create that sound. On your list might be the kind of announcers you'll use, the type of copy you'll accept, the policy you'll choose for handling the music.

Many a bright operation has been squelched by an operator who panicked at a low rating or (listening to a well meaning traditionalist or legal adviser) changed either format or operation methods. You can't be reckless, of course, but if you know you're right and are serving a real need, stick with it. Guard against letting others dampen your enthusiasm.

When you get to a low point, a good idea is to bring an objective man in from another city to listen to your station. Pick a radio owner or operator who doesn't have an axe to grind and who doesn't know you well. You may discover that your ideas and programming are really very good.

4. Get expert information

Find out everything everyone else has done by visiting other operations or getting information from someone who already has a success story.

When we began, we visited every station we could that programmed the way we intended. We stole ideas from four or five FM operations, combining them and using the ones that fit our needs.

A good number of undeveloped FM stations are still out there in medium and large markets. Bold new programming ideas or services may open exciting possibilities for profit at stations begging for profitable program ideas. **BM/E**

Automatic Color Camera

Continued from page 24

smear as it moves rapidly across the screen. In the Mark VIII camera, this defect has been overcome by using differential image sizes on the three tubes to increase the relative brightness of the red and blue images. Lag is inversely proportional to image brightness, and thus it has been possible to balance the lag in all three tubes. Smearing from fast-moving objects is therefore the same color as the object itself, which is far less noticeable.

Pickup tubes

Although the Mark VIII can use any standard 30-mm lead-oxide vidicon, it was designed to use the latest type of Leddicon tube developed by English Electric Valve Company. This tube incorporates a highlight overload protection (HOP) gun which discharges scene highlight overloads, and eliminates burned-out "puddles" caused by specular reflections from glass and other bright objects.

The Leddicon also incorporates a light bias feature, which reduces lag usually associated with most lead-oxide tubes at low-light levels. And an optically coated faceplate is used to reduce light loss due to reflection at the front surface. The coating gives an increase of some 3% in light input to the tube.

The camera will produce just acceptable pictures with the iris at *f*/2.2 down to five foot-candles. A quality picture is obtained with the iris at *f*/4 and incident lighting at 75 foot-candles.

Camera cable

A 34-conductor cable is used, including three coaxial conductors which carry the three video signals from the camera to the CCU. The cable carrying the blue signal is used also to transmit the viewfinder signal from the CCU to the camera by heterodyning video up to a band in the range 10—20 MHz. Frequency modulation is used to avoid the necessity of cable equalization.

Time-division multiplexing is employed to transmit line and field timing information for deflection circuits in the camera head, together with 17 on/off control signals from the CCU to the camera, and three from the camera to the CCU. The control inputs are sampled every field, one input being sampled per line. The first 24 lines of each field are used for this purpose.

Where to see it

It's expected that Ampex—which will market the camera in the U.S.—will show the Mark VIII at the upcoming NAB Convention in Chicago this March. Marconi unveiled the camera at the London International Broadcasting Convention in London last September. Units are currently in production by the company for the BBC and for London Weekend Television. **BM/E**

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

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1 Ampex 3200 Slave . . . $1500.00, 1 Ampex 300 Half or Full Track . . . $900.00. 2 Ampex 350 Record Reproducer Amplifiers without power supplies . . . $200.00 ea. 2 Ampex 351 Record Reproducer Amplifiers . . . $250.00 ea. All equipment in excellent condition. Best offer. Box 271-1, BM/E, Blue Ridge Summit, Pa.

EQUIPMENT FOR SALE (cont'd)

Used Equipment: McMartin—Ampex—Magnecorder—CBS—other misc. Let us know your needs. New equipment available: Ampex—CBS—Belar—Tapex cartridges. Write for new and used equipment list. Mastertone Company, 8101 University Blvd., Des Moines, Iowa 50311.

Jack Panels and patch cords, Audio and Video, new and used. Precision video coax cable and connectors (Belden 8281). Write for catalog. Gulf Electro-Sales, Inc., 6325 Beverly Hill, Houston, Texas 77027. Phone 713-781-3066.

AMERICA'S LARGEST STOCK AND CONSIGNMENT LISTING of new and used broadcast and recording equipment. We trade-sell and buy. THE MAZE CORPORATION, P.O. Box 6636, Birmingham, Ala. 35210.

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Transmitter: Gates model BC5-A 5kw/1kw. Available around December 15. In use at present time, $2750.00. Mastertone Company, 8101 University Blvd., Des Moines, Iowa 50311

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First phone through tape recorded lessons at home plus one week personal instruction in Washington, D.C., Atlanta, Boston, Detroit, New Orleans, Minneapolis, Seattle, Denver, Portland, Los Angeles. Proven results. Our 17th year teaching FCC license courses. Bob Johnson Broadcast License Training, 1060D Duncan, Manhattan Beach, Calif. 90266. Phone 213-379-4461.

American Institute of Radio, by encouraging students to attend both day & night classes can guarantee you a First Class License in 2½ to 3½ weeks. New classes start every Monday. Housing can be arranged for $12-15 per week. Total tuition $330. 2622 Old Lebanon Rd., Nashville, Tenn. 37214. 615-889-0469 or 889-2480.

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FROM THE EDITOR

Revelations of Docket 18894

Our editorial in the December issue was a plea to broadcasters to clean up their signals and make a commitment to quality. A respected veteran broadcaster picked up the phone and said he didn't want to argue with some of the charges leveled against broadcasters, but suggested that CATV operators who degrade off-air signals ought to have been singled out for comment.

At the time, we were in the thick of reading some of the replies to the FCC's proposed technical standards for CATV systems, and could agree with our caller. The CATV industry itself embraces the need for some technical system standards. Broadcasters who filed comments wanted the standards to go further to prevent CATV operators from introducing ghosts in the transmission of local signals, and to prevent them from carrying an off-air signal at all if they could not get a reasonably clean signal at their receiving antenna.

Moreover CATV group operators evaluating systems for possible purchase have been shocked at the poor signal quality they found in many instances. Some of these systems never got out of the 1950s: vacuum-tube gear, jury-rigged cables, and the philosophy that any picture is better than no picture.

We think all that has to stop. If CATV is to grow up, it must accept its responsibilities along with its privileges. If a cable operator wishes to stake out an area and try his hand at making a profit, the signals he furnishes to subscribers should meet minimum technical standards. Broadcasters have been required to do so for years. The relevant phrase in the Communications Act is "the public convenience, interest, or necessity."

While we're suggesting minimum technical standards for CATV, let's agree with Archer Taylor that the entire television system should be closely examined by a blue-ribbon industry technical committee. The broadcast system—particularly color—could use some improvement. Receivers should be redesigned to accommodate both CATV and off-air reception, and eliminate such annoyances as direct pickup and ghosting when getting a cable feed.

We think the goal should be better TV for everyone.

The Editors

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

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TRANSMITTER EQUIPMENT

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CATV (See also: Components, Wire & Cable)

*Appears in CM/E (CATV supplement) only

30/324 Bidirectional amplifiers/EIE
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COMPONENTS, WIRE & CABLE

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ANTENNAS, TOWERS & TRANSMISSION LINES

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MISCELLANEOUS

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35/115 Log system, automated/Cybrix

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Up Down. Up Down . . . despite all the advances in color receivers and broadcasting techniques, the only way the viewer can cope with color variations from one program segment to the next is to keep adjusting the hue control on his set. Even an athlete can't keep up with it! Now, the CBS Laboratories' Color Corrector changes all that. For the first time the broadcaster can correct encoded signals at a single viewing point to achieve consistent color values from a variety of signal sources. Program material from cameras, tapes and film with wide ranging color values can be matched to each other to reduce the viewer's subjective shock from one program segment to the next. The Color Corrector can be installed with cameras or VTR's or film chains or in the program line.
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A Division of Columbia Broadcasting System, Inc., 227 High Ridge Road, Stamford, Connecticut 06905

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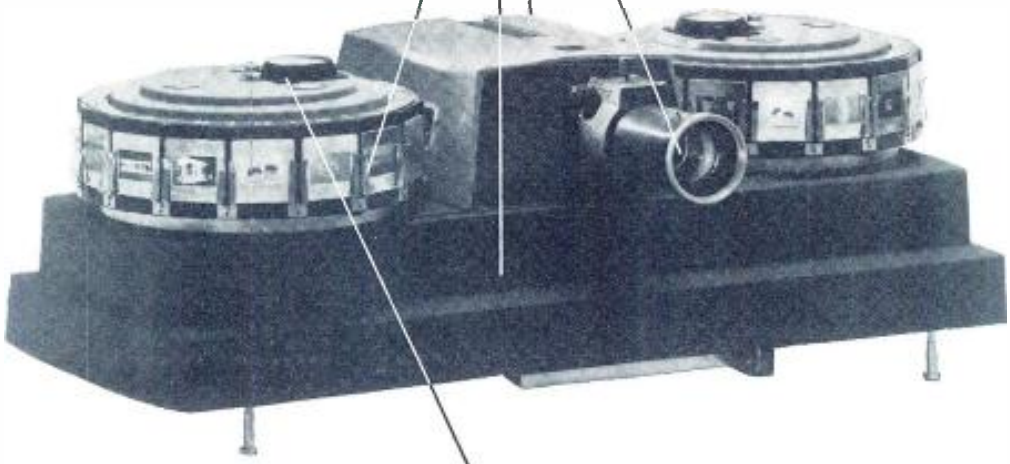
2 These things make it better. You have two channels. 16 slides each. The color, intensity and polarization of each is balanced perfectly. Automatically. There are soft preview lights so you can check all slides without spinning the magazine.

3 Each channel has only one mirror surface and it's set so it never needs adjustment. The magazines are so finely tuned there's no change in sharpness as you go from one slide to another. And if you need speed, they'll flip one to another in a second.

4 The lenses are all color corrected, coated and have a diaphragm and holder for neutral density or color correcting filters. You've got a choice of lenses including 7½" and 9" for multiplexing. Plus inverted 3" and 5" for direct projection onto a camera tube face.



5 Lamps have a low-glow Standby Mode. There's never a big surge current. You get longer lamp life. There's also a turbine blower for each lamp. And a blower system that cools every slide. And an air filter that keeps dust out of the works, slides and optics.

6 Warning: you have to pay a little bit less than you'd expect. You can't buy better. For all the specs ask your supplier, or contact Spindler & Sauppe, Inc., 1329 Grand Central Avenue, Glendale, California 91201. (213) 247-1610.

SPECTRUM 32 PROJECTOR Spindler & Sauppe

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