A MACTIER PUBLICATION / DECEMBER 1968

BM/E

BROADCAST MANAGEMENT/ENGINEERING

REAL OR SYNTHETIC?

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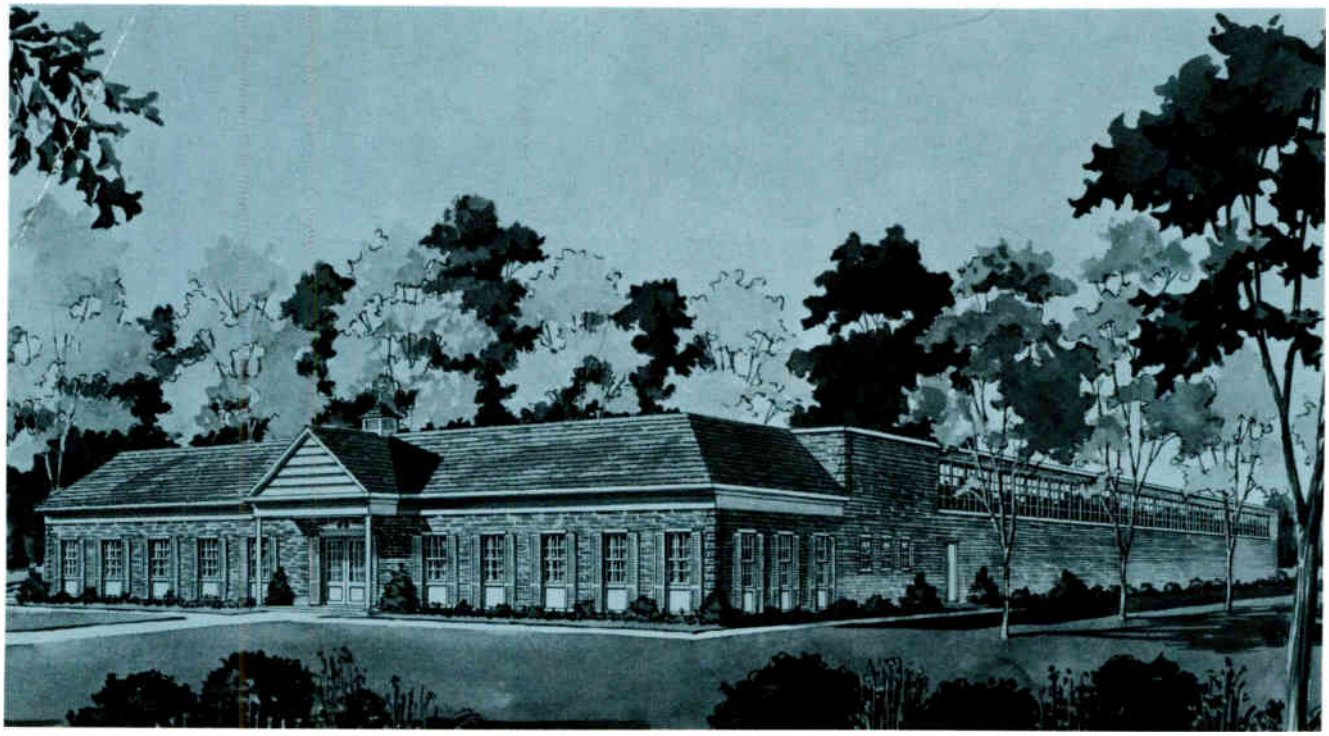

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National Sales Manager

T. K. Chapman
Manager of Marketing Admin.

Charles Green
Manager of Quality Assurance

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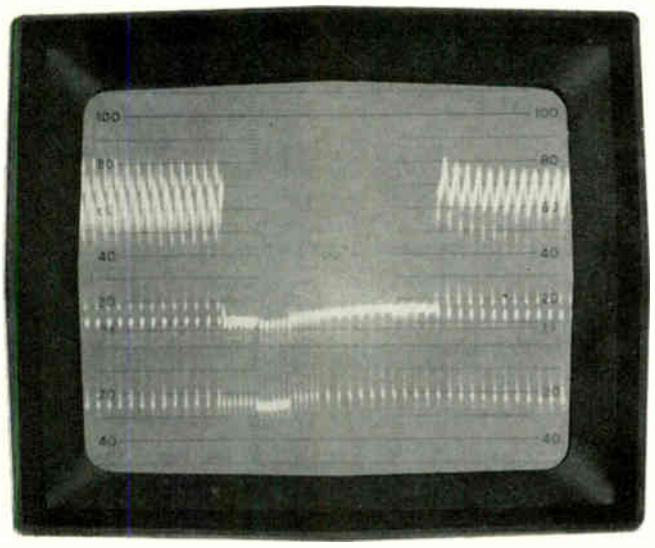
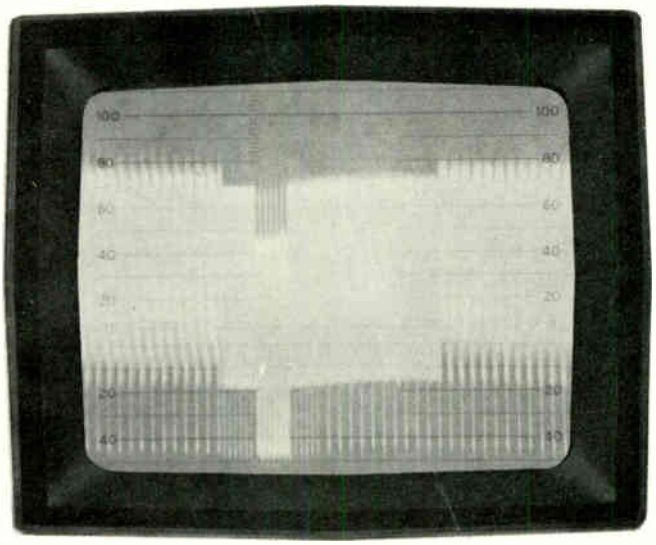


Triggers on clean signals.



Triggers on noisy signals, too!

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

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

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

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087/21

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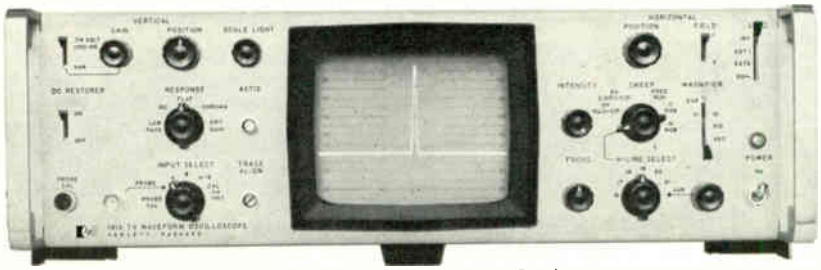

Circle 2 on Reader Service Card

DECEMBER 1968/VOLUME 4/NUMBER 12

BM/E

BROADCAST MANAGEMENT/ ENGINEERING

This month's cover: The "new" sound, the "acid" rock—they're both aspects of today's ultrasophisticated recording techniques that prompted RCA Victor's J.M. Eargle to say, "Today's recorded sounds have their first life as they're played back from the tape master." In Art Sudduth's cover concept, the solo singer, via multichannel, becomes a psychedelic phantasmagoria. And this is pretty much the case with the new sound. For highlights on the latest acid-producing audio equipment and techniques, see pages 23 through 37.

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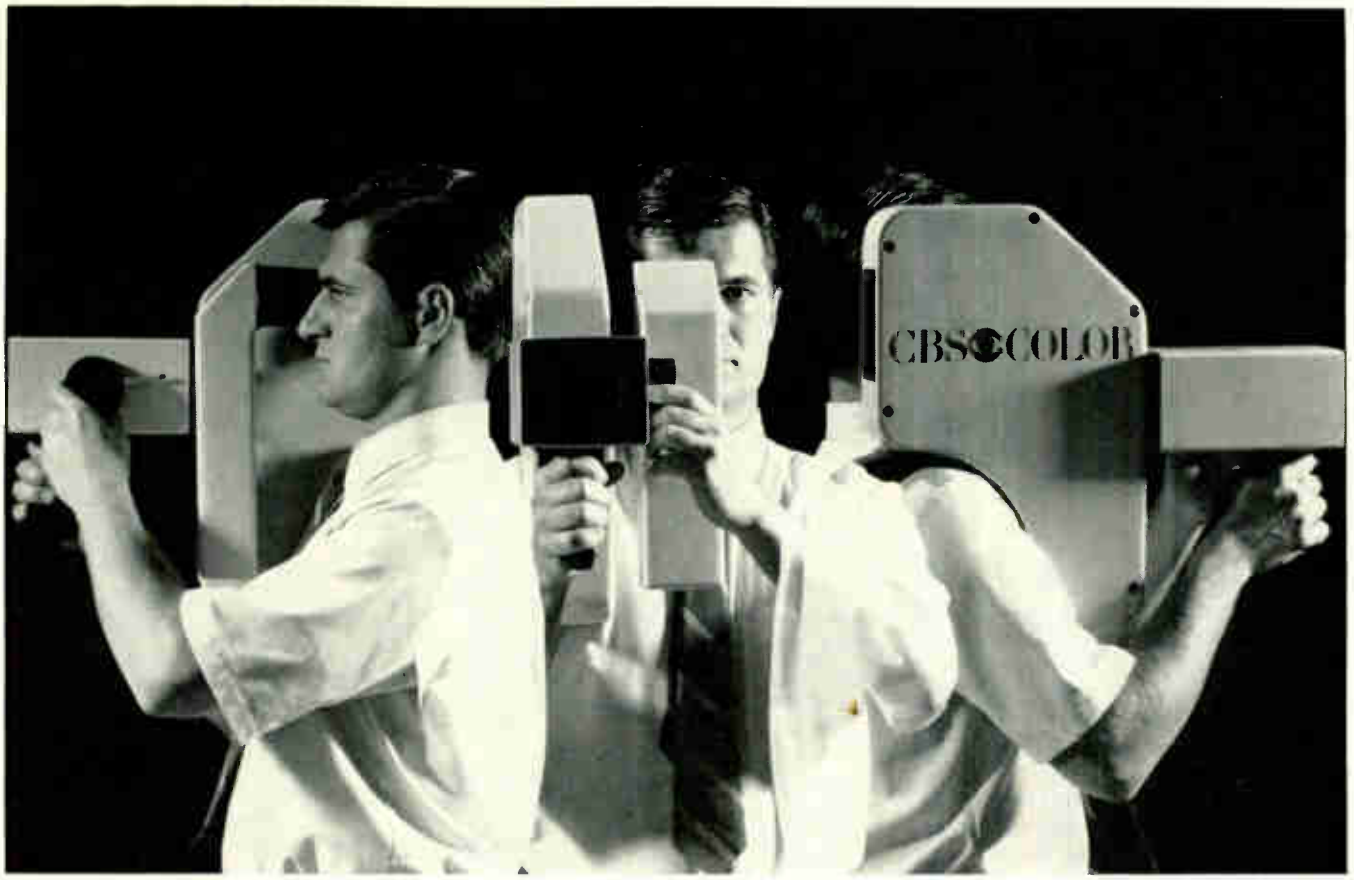

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Our Professional Products give you a better look at the world.

Proud new achievement in Professional Products from CBS Laboratories is the Minicam VI, a remarkable, portable television camera that gives you a closer look at the world. Minicam VI is a camera that can go anywhere: land, sea or air and bring you studio-quality color pictures live right from the scene of action. Captures fast-action sports events and fast-breaking news stories—when they happen. Minicam VI is just one more significant innovation from CBS Laboratories ...the organization which has researched, developed, produced and marketed such advances as the Masking Processor, the Image Enhancer and Mobile Television Vans. Look to CBS Laboratories for tomorrow's electronics today.

Masking Processor electronically corrects color distortion. Gives true color fidelity—automatically—without adding noise to the picture.

Image Enhancer "rides through" weaknesses and defects in home television receivers. Delivers amazing picture clarity...both in color and black-and-white.

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BROADCAST INDUSTRY NEWS

CPB gets ⅓ of authorized funds

Educational broadcasting will receive $9-million in fiscal year 1968-69 to the Public Broadcasting Act which President Johnson signed in early October. This figure represents one-third of the $32-million originally authorized by the Public Broadcasting Act through the current fiscal year.

"We are pleased that funding is finally available to launch the Corporation for Public Broadcasting ($5-million) and assist the states in improving educational radio and television facilities ($4.-375 million). However, we are disappointed that the funding is so far below the authorized amounts," says William G. Harley, president of the National Association of Educational Broadcasters.

Harley says that the NAEB will urge reinstatement of the facilities' funds cut from the 1968-69 budget when supplementary appropriations are considered early next year.

H. Rex Lee takes oath for 7-year term at FCC

H. Rex Lee was sworn in for a seven-year term as a member of the Federal Communications Commission on October 28 by James D. Cunningham, the FCC's chief hearing examiner.

Commissioner Lee, 58, succeeds former Commissioner Lee Loevinger, who retired from the Commission late June. Lee's nomination was announced on September 11 and confirmed by the Senate on September 16.

Before coming to the Commission, Lee was assistant administrator of the Agency for International Development of the Department of State. From 1961-67, he served as governor of Samoa, where he was responsible for developing a television oriented system of education.

A native of Rigby, Idaho, and a graduate of the University of Idaho, Lee is a career officer of the Federal Government and has held positions with the Department of Interior and the Department of Agriculture.

Visual introduces low-light camera tubes

The P880 and P884 isocon camera tubes for low-light conditions recently were introduced by Visual Electronics Corporation of New York. According to Leo Darrigo, product manager at Visual, the new tubes were developed by English Electric Valve Company, Chelmsford, England.

The P880 (3-in.) and the P884 (4½-in.) camera tubes use the principle of isocon scan. The tubes' inherent advantages are based on the elimination of one of two beams that occur in the orithicon tube, thereby obtaining a noise-free beam in the black areas. This permits reproduction of scenes with good tonal quality at light levels of 10^{-6} ft candles. The isocon tubes also have a dynamic range ten times greater than that of the image orithicon.

Apollo 7 radio and TV pickup pool

Aboard the U.S.S. Essex, Mutual Broadcasting System reported the splashdown of the 10.8-day mission of Apollo 7 via this equipment-packed van. Transmission was handled by a Gates 1-kW ST-1A, consisting of an SG 70 sideband generator and an HFL 1000 linear amplifier. The van was outfitted at Manhasset, N.Y., and hoisted aboard the WW II carrier just before it sailed from Quonset Point, R.I., on October 8.

Ask Si Your Questions

Starting in our January issue, broadcast station management expert Si Willing will answer questions from our readers dealing mainly with the many problems of selling air time. Some typical questions: "How can I sell hearing aids if the potential customers are too deaf to hear the spot announcement? How do I increase sales in a market that's reached advertising saturation? How do I sell in a print-oriented agricultural community?" Ticklish questions? Sure they are, but Si has the answers, drawing as he does on his many years of running successful radio stations.

Si is president of KMAR Broadcasting Corp. (Winnsboro, La.), and of KNNN Broadcasting Corp. (Friona, Texas). He's also chief exec of brand-new KCRF-FM (Winnsboro, La.), which should be on the air in May, 1969.

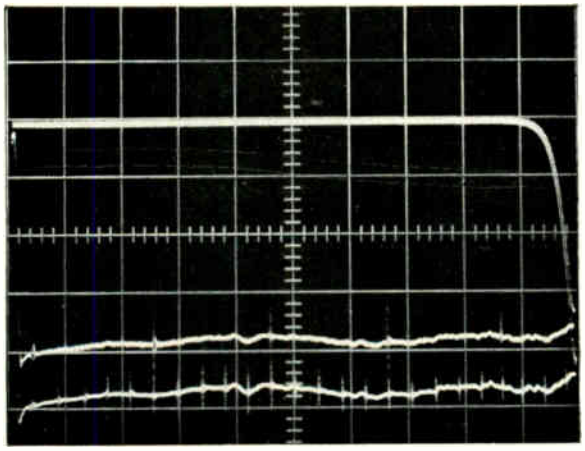
Watch for this new column, "Management Q & A," and send Si Willing your question, c/o BM/E, 820 Second Ave., New York, N. Y. 10017.

FCC seeks modulation monitor amplifier data

It has come to the attention of the FCC that many stations using remote control facilities are using rf nonstandardized amplifiers between transmitters and remote locations to boost off-air signals to a level sufficient to drive required modulation meters. Since the

24-HOUR DELIVERY.

The C701 Line Extender Amplifier . . .



50MHz **270MHz**

Unretouched photo of oscilloscope trace showing signal bandwidth of C701 amplifier. Upper trace markers are 50 MHz apart. Lower trace markers, 10 MHz apart.

- **50 MHz to 270 MHz**
- **linear within ± ¼ db**
- **minimum full gain of 25 db**

Off-the-shelf delivery of the 20-channel C701 Line Extender Amplifier, right now! Unexcelled reliability of the improved C701 is assured by Conductron's long experience in space electronics R&D and manufacturing. And the mechanical design provides ease of installation and servicing that meets or exceeds any other amplifier on the market.

Minimum Full Gain—25 db
Return Loss Rel to 75 ohms in—17db Min.
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Maximum Noise Fig. CH 2—14 db
(12 db equalization)
CH 13 Output Capability—44 dbmv
(12 channels—57 db Cross Mod)

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specifications and characteristics of these amplifiers materially affect readings on the monitors, the Commission is attempting to set "minimum specifications for a-m and fm amplifiers of practical design, which can be used with any type-approved monitor."

The Commission is seeking comments on these seven areas of amplifier performance: sensitivity (the minimum signal necessary to produce the output required to drive the least sensitive, type-approved modulation monitor), width and flatness of pass band (rolloff characteristics, if desirable), selectivity and susceptibility to cross-modulation, power output capability-permissible nonlinear distortion, suppression or radiation an isolation of input/output, controls and metering and signal pickup facilities. The Commission also asked whether additional or alternative characteristics should be specified.

Comments are invited by January 17, 1969, and reply comments by February 17.

ACTS requests review of independent TV carriage

The All Channel Television Society (ACTS) filed with the FCC late in October for an inquiry into the affect of CATV carriage of major market independent television stations on the Commission's Multiple Ownership rules. ACTS further requested a "freeze" on further CATV carriage of such stations beyond the predicted Grade B contours, pending completion of the requested inquiry.

The request addressed itself specifically to the carriage of New York City stations, WNEW-TV, WOR-TV and WPIX-TV by Xenia Cable TV, Inc., of Xenia, Ohio. The brief, addressed directly to Chairman Hyde, alleged that signals were being imported within the Grade A contour of WKEF-TV and three other stations operating in the Dayton television market—WLWD, WHIO-TV and WKTR-TV.

Regular and political ad policies must agree

A licensee may maintain a policy under which agency commissions are not paid for political advertising placed by an advertising agency if it applies the same policy to local commercial advertising. That is the ruling of the FCC's staff expressed in a letter to the law firm representing KSEE, Santa Maria, Calif.

KSEE had inquired whether "a licensee broadcast station may consistent with the requirements of Section 315 of the Communications Act and Section 73.120 of the Commission's Rules and Regulations, adopt and enforce a policy under which agency commissions will not be paid in connection with political advertising placed by a recognized advertising agency on behalf of a candidate for local office, where the licensee adopts and enforces a similar policy with respect to agency commission in connection with local commercial advertising."

The FCC's reply, signed by William B. Ray, chief Complaints and Compliance Division, Broadcast Bureau, stated "that inasmuch as the station's rate policy is applicable to both commercial and political advertisers, such a policy would not violate the provisions of Section 315 of the Act or Section 73.120 of the Commission's Rules." The reply further stated that the "ruling is limited solely to the facts in this case."

Task force chief urges Broadcast-cable union

"Tomorrow is coming, ready or not. Cable and broadcast television are one big business. We have to figure out how to balance it out and make it work together," said Sol Schildhause, chief of the FCC CATV Task Force, at the National Association of Broadcasters fall conference in New York's Hilton Hotel.

Schildhause reviewed the broadcast-CATV dilemma which results from trying to maximize the benefits of cable television without endangering the structure of basic, over-the-air television. He confirmed that the Commission was reexamining its Second Report and Order with a view to getting into the next phase of regulation.

Despite all the talk about the "explosiveness" of the CATV industry, Schildhause told his audience that CATV is still a small industry and a small-town industry, only "perched as of now on the threshold of bigness and of the big cities."

TvB foresees retailers doing own commercials

Retailers will handle their own television advertising, store window displays will be replaced by giant television monitors and customers will make purchases electronically from their homes, according to Howard P. Abrahams, vice president, local sales, the Television Bureau of Advertising.

Abrahams attributes his predictions to retailers' "feeling that agencies have missed the boat in not taking over the television side of their local advertising" and retailers' desire "for greater flexibility in their television commercials."

"Fifty percent of major department store advertising budgets will go into television in the next five years," Abrahams says. "Big retailers maintain advertising departments of up to 150 people, many of whom have expanded their television co-ordinator to include a television copywriter, graphics designer and producer. Others have created house agencies which handle television advertising."

As to electronic shopping, Abrahams predicts that in the coming future professional display people will be replaced by window TV monitors connected to the store's central studio. Purchasing directly from homes will affect retail credit systems, according to Abrahams. "Banks will make customers' payments to the store, later billing customers for one overall account, on electronic instructions from the customers through computerized television sets."

Commissioners speak on complaints issue

The public's complaints to the FCC, totaling 3042 for September (an increase of 1829 over August), are predicted to rise even higher by FCC Commissioner James J. Wadsworth. Commissioner Robert E. Lee stresses program responsibility in reducing the number of complaints from the public.

Coverage by the major networks of events in Chicago during the Democratic National Convention account for the majority of September complaints. Others allege bias in presentation of news concerning political candidates, tasteless or indecent material on certain network comedy programs, and distasteful manners and opinions of moderators and participants in open mike and discussion programs.

In answer to public criticism of the commission and broadcasting, Wadsworth says that "considering all budgetary, legal, political and other restraints, the FCC is doing pretty well . . . While I am

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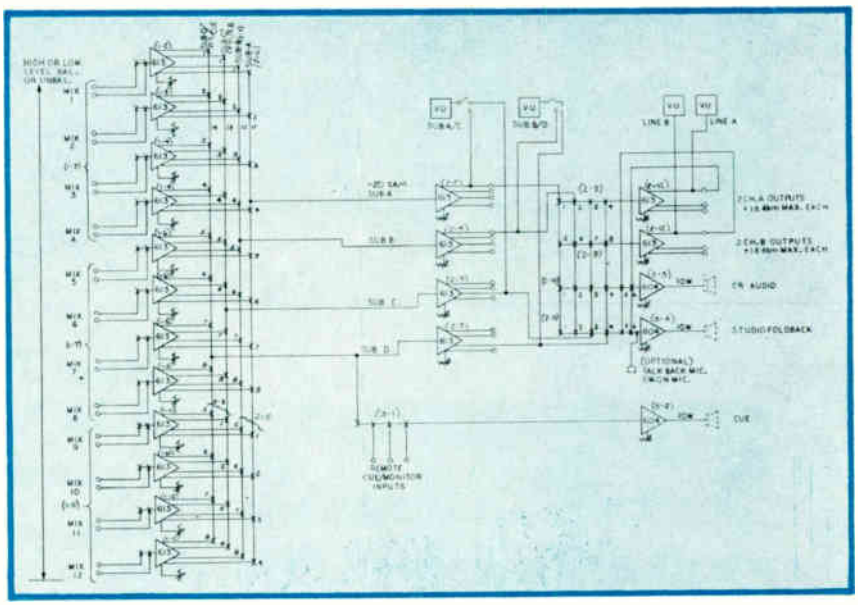
objective . . . to develop a high quality Audio Console with extraordinary operational flexibility and versatility, required to accommodate a wide variety of studio and mobile programming needs. All signal switching and level changes to be accomplished by means of DC remote control.

achievement

. . . the Ward AC-650, a compact Dual Channel Audio Console. The original objectives were realized by employing advanced engineering concepts and the utilization of the highest quality components and controls. Here are a few of the features that have made the Ward AC-650 so popular with station engineers and studio personnel . . . • Provides 24 inputs selectable to 12 mixing channels • Any mixer may be fed to any one, or all, mixing busses simultaneously, retaining high cross talk isolation between busses • Output obtained from sub-masters at line level, thereby providing 4 channel output if required • Ideal for AM-FM-Video • Momentary contact illuminated push-buttons engraved to customer preference • Employs silicon transistors throughout • All inputs High or Low level • Plug-in audio amplifiers have individual power supplies operated from low voltage . . . • Slider type level controls • Three 10 watt monitoring amplifiers supplied.

Write or call for full details of this remarkable Audio Console system.



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unable to share the pessimism of our critics concerning our past and current performance, I have grave questions about our future abilities to keep up with even our present level of performance . . . Government resources devoted to communications have been disproportionately or perhaps even scandalously small."

Lee says that the "licensee cannot blame the network when he receives complaints about 'excessive sex, crime and violence' or 'questionable' movies, over-commercialization or loud commercials. The licensee alone is responsible for everything broadcast over his station." Lee adds that the job of the station is to censor and if it is doing its job, it censors every day.

Common carrier chief cites land mobile needs

Frequency scarcity in mobile radio communication and some of the concrete steps being taken by the Commission to offset it were outlined in mid-October by Bernard Strassburg, chief of the FCC Common Carrier Bureau, in a speech to the 20th Annual Convention of the National Association of Radiotelephone Systems.

The Bureau Chief admitted, "There is no dispute that in a number of areas the radio common carriers are encountering frequency saturation accompanied by long waiting lists for both two-way radiotelephone service and one-way paging services. It is obvious that additional frequencies must be made available . . ."

Strassburg called attention to the fact that "there is an outstanding Notice of Inquiry and Notice of Proposed Rulemaking relative to the future use of the frequency band 806-960 MHz in which the Commission proposes, among other things, the allocation of 75 MHz of frequency space for common carriers." This space now encompasses uhf channels 70-83 and 19 a-m and fm STL channels.

Strassburg went on to say that Commission wants comments and advice on: "whether the 75 MHz allocation for common carriers should accommodate aircraft and maritime as well as land mobile units; whether base stations should be multiplexed, perhaps using single sideband techniques; whether the spectrum space should be divided between radio carriers and landline carriers; whether unused common carrier space should be put to other uses, at least temporarily; and how soon a system or systems reflecting the current state of technology can be developed?"

Lee cites problems for uhf licensees

Difficulties for the prospective uhf-TV station owner include proposed allocation of channels for other services, CATV and direct satellite broadcasting, according to an address presented by FCC Commissioner Robert E. Lee before the New Jersey Broadcasters Association at Atlantic City on October 7.

Lee also raised questions concerning station ownership and network program origination. The Commissioner noted that most members of the Association are radio broadcasters, but he said that the "wired city" and satellite broadcasting are dangers to radio as well as TV.

"New Jersey has no commercial vhf channels," said Lee. "Accordingly, the future of television in this state is uhf . . . It now appears that the squeeze is on. First,

the FCC proposed to lop off the top end of the uhf band for community type stations and translators. In a later action it proposed to donate the lower seven channels to the land mobile radio services and the upper 14 to both private and common carrier land mobile use."

Lee said that if CATV hits "your town before you hit the air, the viability of your uhf station can be lessened, if not lost, and your chances of a network affiliation can be diminished."

Commissioner Lee informed his audience that the FCC authorized the formation of an industry advisory group, the Committee for the Full Development of All-Channel Broadcasting. Commissioners Cox and Lee have indicated their support for the Group's recommendation that no station be permitted to have a primary network affiliation with more than one network, if another station in the market did not have an affiliation with any network."

"I am advised," said Lee, "that we have authority to prescribe regulations which would restrict favored stations from skimming off all the desirable network programs, even taping some for delayed broadcast outside prime time all the while other stations in the same market take the leavings. I think it is in the public interest that we exercise this authority to require that each television station compete for a network affiliation and obtain one, and only one affiliation in a three-station market."

Lee concluded by saying that the Commission's obligation is to foster free competition at all levels whereby sponsors, program producers, networks and stations confront their peers. "The problem is to allow the creators of programs, shaped by economic and creative enterprise, an access to marketplace."

WJJY to put 1½-MW signal on uhf

WJJY, a new television station in central Illinois scheduled to broadcast next February, has ordered a $1,150,000 RCA color broadcast system that will make it one of the nation's most powerful uhf's.

The channel-14 station will be capable of radiating 4.3 megawatts of effective power, according to Keith Moyer, president of Look Television Corp., WJJY's owner. Under FCC rules, 5 megawatts is the maximum effective radiated power permitted uhf stations.

WJJY will have color studios in Jacksonville, Illinois, where a 8400-square-foot building is being completed, but has authority to carry a three-city identification of Springfield, Quincy and Jacksonville.

The station's high power results from the combination of a 60-kilowatt transmitter and an RCA panel antenna, custom-designed for directional service. The system will radiate signals from a 1610-foot tower to a potential audience of 800,000 viewers.

Bell pole pact to permit originations

Approximately 1200 leaseback tariffs and pole attachment agreements now in force with Bell Telephone and all future agreements no longer will require CATVers to refrain from full program originations. Most Bell pole agreements and channel service tariffs to date have permitted only time-and-weather service or public service programming.

Disclosure of Bell's new policy

Continued on page 68

FOCUS ON
CATV

FCC gives indications that CATV ad ruling is due soon

Amid rulings that appear alternately to favor broadcasters, CATVers, and others that merely fight a holding action, the FCC is giving verbal and action clues that indicate a ruling on CATV origination and advertising is due soon. Signs are that the Commission intends to make the ruling with a maximum of information and a minimum of interference from other government bureaus or from business interests.

The freeze on CATV advertising in the San Diego area, which allows unrestricted program origination but no advertising, set the stage for the Commission's cards-close-to-the-chest tactics. Since the San Diego ruling, the FCC ruled in favor of Jefferson-Carolina's Greensboro cable system in an action brought by three area TV broadcasters. The broadcasters' petition contended that they would suffer economic injury if the City Council's recent franchise revision is allowed to stand. The franchise now permits program originations and the sale of advertising.

Commission pronouncements at the mid-September CATV legal seminar in Washington and elsewhere indicate industrywide rulemaking on originations and advertising sales will be handed down as soon as the Commission is satisfied with the quality and quantity of collected data. The Commission is reported to be considering the prohibition of all commercial originations by any cable system not originating all of its own programming despite a published recommendation by the President's Task Force on Telecommunications that all cable systems in markets served by four or more TV stations be allowed to accept commercials.

NCTA committee grappling with advertising standards

A committee headed by Marcus Bartlett, vice president of Cox Broadcasting, has until the first of the year to get final approval of a suggested set of cable TV advertising standards. Directors of the National Association of Cable Television Association have approved a resolution supporting the principle of advertising by cable systems. Approval was coupled with recognition of the San Diego and Greensboro decisions, the Commission's expressed intention to proceed with rulemaking and Telecommunication Task Force recommendations.

NCTA President Frederick W. Ford's recognition of the Board's action included the comments that NCTA was "particularly concerned about the lack of access by small businessmen to the audio-video medium as a means of advertising their products and services in the limited areas from which they draw their customers . . .

"There is no justification for the argument that cable television systems should be prohibited from carrying advertising on the grounds that such a ban is necessary to protect the revenues of TV stations. Advertising on cable systems —because of its economy and high efficiency—may create a whole new advertising medium—one which regular TV stations, because of their much higher rates and inability to pinpoint markets with the same precision as cable systems, can never hope to offer . . ."

N.Y.C. listens to pros and cons of CATV originations

Notwithstanding letters to New York's mayor from NAB and FCC whose import was that New York should be wary of decisions concerning CATV originations, the Board of Estimate heard late in October what three CATV companies operating in the City and opposing theater owners, assemblymen and senators had to say on the matter. The hearing drew an estimated 300 to 500 protesters.

The letters to Mayor Lindsay from Commissioner Wadsworth and NAB Counsel Douglas A. Anello indicated that the mayor would be apprised of federal activities bearing on the subject and warned that any decision arrived at by the Board of Estimate would necessarily be subject to rulemaking by the FCC due very soon.

Kernel of the opposition's argument was articulated principally by Assemblyman Stavisky.

"Millions of families will compelled to pay for programs now available free of charge, including motion pictures, the World Series, pro football, dramatic shows and special events," he said.

"Free TV will be left with little more than fourth-rate films, travelogues, TV reruns and other dregs."

Assemblyman Stavisky's view was seconded by several movie theater groups who have been displaying "Stop Pay TV" and "Save Free TV" signs on the marquees around town. Anti-CATV forces also have been circulating leaflets encouraging active opposition to CATV originations in New York.

Proponents included Marty Glickman, the sportscaster, and Edward Cleary, executive secretary of IBEW. Their arguments were that local college sporting events would be better covered by CATV and also that the advent of CATV in New York has brought 1100 new jobs and has the potential of providing 10,000 more if the franchise is expanded.

Manhattan Cable Television, Teleptompter Corp. and Sterling Information, Ltd, are seeking Board of Estimate permission to originate programs experimentally until Dec. 31, 1969.

FCC isn't saying where uhf ends and importation begins

Despite the fact that the FCC has not committed itself to any published standard for delineating that portion of uhf-TV coverage area which should exclude CATV importation of distant signals, a decision is now pending which involves importation of signals into the Birmingham, Ala., market.

The case and the Commission's reticence to set forth a standard have spurred several proposals, one with an area larger than the next:

- Clear Vision, whose case is now pending, is adamant about the position that U's in top-100 markets should have an area limited to the composite Grade A contours.
- The Commission's Broadcast Bureau thinks the area should be larger. The Bureau thinks the area should have the same definition as the American Research Bureau's "Area of dominant influence," which encompasses the geographic area within which a broadcaster has the most viewers.
- Largest area of exclusion of imported signals is advanced by Taft Broadcasting, licensee of the station opposing Clear Vision. Taft says the area should be defined as the total geographic region within which a broadcaster can be expected to attract viewers.

After a hearing examiner and the FCC Review Board declined to make a decision on the matter, it was sent to the full Commission for a ruling.

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INTERPRETING THE FCC RULES & REGULATIONS

The licensee's programming responsibility and conflict of interest

THE FIRST AMENDMENT OF THE CONSTITUTION provides all licensees with the basic right to communicate ideas without abridgement. Section 326 of the Communications Act of 1934 specifically prohibits censorship. The fact that one may not engage in broadcasting without first obtaining a license does not mean that the terms for holding that license may unreasonably restrict or abridge the free speech protection of the First Amendment and the Act. While the Commission must determine if program service is reasonably responsive to the needs and interests of the public, it may not condition the grant, denial or revocation of a broadcast license upon its own subjective determination of what is or is not a good program. Therefore, the responsibility for the selection and presentation of broadcast material ultimately falls upon the individual station licensee.

However, since broadcasters are required to program their stations in the public interest, convenience and necessity, the broadcaster's freedom is far from absolute. The Commission may not grant, modify, or renew a broadcast license without finding that the operation of the station is in the public interest. Thus, the licensee must make a diligent, positive, and continuing effort to discover and fulfill the tastes, needs, and desires of the public it serves.

The anomaly. On the one hand, the Commission is prohibited from dictating programming to licensees; on the other, it is compelled to make certain the public interest is being served. This dichotomy has resulted in a gray area that has been the source of great confusion and concern to many licensees. Of course, the Commission has a natural proclivity to expand its indirect control of programming.

Many of the questions which cause broadcast licensees the greatest concern relate to programming. What precisely is the licensee's program control responsibility? Exactly, what is the extent of the Commission's control over programming?

Superficial and casual attention by licensees to these questions may well lead to a deferred renewal, hearing, severe fine, or something worse. To compound the problem, as is customarily the case with regulatory agencies, there are no easy answers to the questions. The licensee can keep out of trouble by understanding the development of the Commission's position, the current trends, and by endeavoring to offer somewhat more than is required.

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.

Licensee and/or employee conflict of interest

All broadcasters realize that the Commission holds them strictly accountable for the content of their programming. However, what sanctions will the Commission apply? If the licensee's employee is at fault, to what degree will the licensee be held responsible? As stated previously, there is no written rule; the broadcaster must look to all the circumstances and employ its good faith judgement; and the Commission will employ the identical criteria. For example, if the violation concerns serious violations of the Communications Act and/or the Criminal Code (as exemplified by the "payola" and "plugola" scandals of the late 50's), the Commission will assess a very large fine and/or order a hearing looking towards revocation of the broadcaster's license. (See letters to WMEX, WILD and WORL, Boston, and WHIL, Medford, all in Massachusetts, March 1, 1960, Report No. 3498, 85075.); Alternatively, if the facts indicate that the licensee was (1) acting in good faith, (2) the violation is minor and the first mistake, the Commission will most likely ask only for a letter of explanation from the licensee. (See letter to KGFJ, Los Angeles, California, February 1, 1968, Report No. 7000, 12027.) Both of the preceding Commission investigations concerned record selection procedures by disc jockeys; however, the Massachusetts station's procedures reflected gross derogation of their responsibility to supervise their employees, and the KGFJ letter merely reflected concern that the licensee might not be exercising proper supervision of its disc jockeys. What does the Commission consider to be "adequate" supervision by a broadcaster of its employees engaged in programming decisions? At what time is the licensee required to inform its listeners that it has an economic or other interest in the subject matter of a program—such as a newscast or a station editorial? Review of several relevant cases and policy decisions should aid the broadcaster to make such a determination.

Conflict of interest precedents

In a case investigating possible payola violations (where a nonpublic hearing was held), testimony indicated that (1) the licensee was not aware of any violations until informed thereof by the Commission, and (2) the recurrence from time to time of some violations raised a question as to the licensee's diligence in implimenting the station's procedures regarding acceptance by

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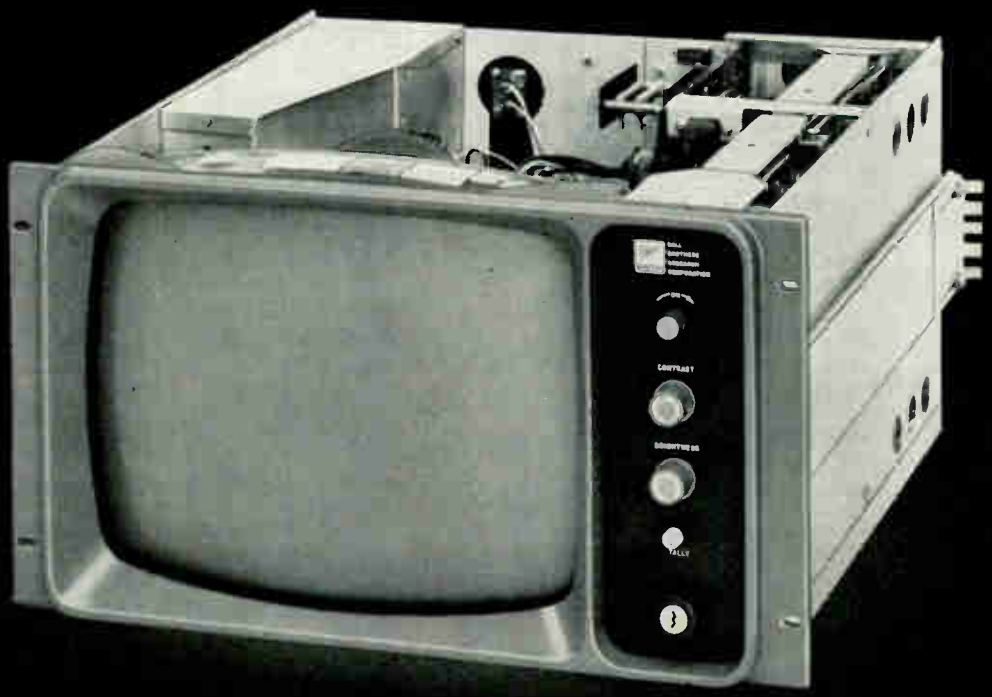

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certain employees of favors, loans, extraordinary forms of entertainment, and information regarding "outside" business ventures which might create a conflict of interest with their roles as employees of the station.

For example, a careful reading of the no-payola statements the broadcaster required of employees and outside record promoters to sign would have revealed ambiguities in some of the statements which should have been resolved at the time. This would have demonstrated greater desire on the station's part to make these measures really effective; also, it would have enabled the station to make its policies clear where misunderstanding may have existed. Furthermore, although it appears that the station investigated a number of payola complaints against employees, by memorandum, the President suggested that such complaints not be accepted thereafter over the telephone. Allegations involving such serious violations should have been accepted and investigated. Additionally, such investigations—especially when reports of payola continued to be received—should have been conducted with great thoroughness. In some instances the station resorted to independent sources to dispose of reports of improper practices, in others, the station seemed to have accepted the self-serving statements of the individuals involved without further confirmation. The only way a licensee can avoid imputation of knowledge of improper conduct on the part of its employees is to investigate fully all reports or other indications of misconduct.

A licensee has an obligation to exercise special diligence to prevent improper use of its radio facilities when it has employees in a position to influence program content who are also engaged in outside activities which may create a conflict between their private interests and their roles as employees of the station.

Receipt of unusual favors or gifts of more than nominal value should obviously be prohibited. Further, if conflicts of interest in the form of outside economic interests of station personnel are not prohibited, then the personnel involved should be insulated from the process of program selection. When complete insulation cannot be effected, a licensee should take extraordinary measures to insure that no program matter is presented as a result of such practice. In this case, the Commission decided that the derogation of responsibility by the licensee was not so serious as to foreclose the proposed assignment of license of the station to a new owner. See *Crowell-Collier Broadcasting Corp.*, 8 RR 2d 1080 (1966).

In an inquiry concerning conflict of interest by the broadcaster, a station owned an airport restaurant which was involved in a controversy with the airport authorities. The station broadcast several editorials advancing the arguments of the restaurant; the broadcaster stated that it emphasized the restaurant's arguments because the local newspaper had presented "the other side of the story"; however, the station had not revealed its ownership of the restaurant to its listeners. The Commission found that a licensee's obligation to serve the public interest does not preclude it from editorializing on matters in which it has a significant personal interest; however, its decision to do

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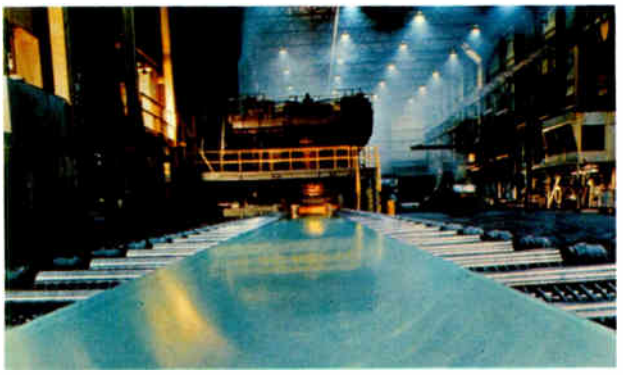

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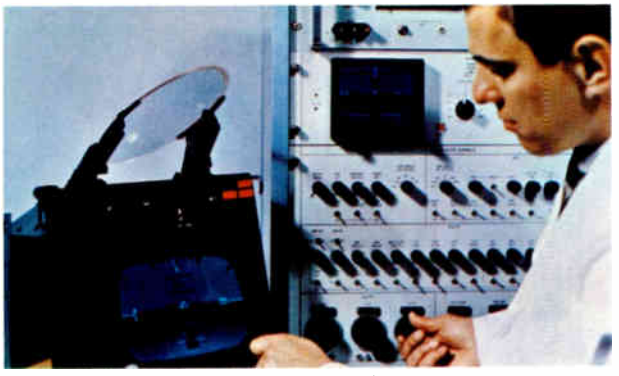

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so imposes a responsibility to reveal to the broadcast audience the extent and nature of its private interest. See *Gross Telecasting Inc.*, 13 RR 2d 1067; 14 FCC 2d 239 (1968). The Commission decided that the circumstances of the case did not warrant assessment of a fine or forfeiture; however, the questions raised as to the licensee's qualifications would be considered with the next application for renewal of license of the station.

Current policies espoused in NBC-Huntley case

In another case, where an NBC news commentator (Chet Huntley) attacked a federal meat inspection law, and the commentator had investments in cattle business, the network failed in its responsibility to take the appropriate action to reveal the facts to its listeners. Additionally, since the matter discussed was "a controversial issue of public importance," the network was responsible under the Fairness Doctrine to afford a reasonable opportunity for the presentation of conflicting viewpoints. See *National Broadcasting Company*, 14 RR 2d 113 (1968). After taking all the circumstances of NBC's and Huntley's virtually unblemished records of good broadcasting into consideration, the Commission decided that it would only require NBC to submit a statement concerning revision of its procedures to guard against any further conflicts of interest. However, the Commission considered the matter of such importance, it issued a statement discussing the licensee's responsibilities in its new operations and any other potential conflicts of interest situations:

> The licensee is responsible for the integrity of its news operations. To insure that integrity, the licensee must exercise reasonable diligence to determine whether or when one of its news employees is properly discharging his news functions in connection with a matter as to which he has a significant private interest which might reasonably be thought to have an effect on the discharge of that function. There are, of course, a variety of factual situations which might confront the licensee and a corresponding variety of actions which it might take. It might determine that the conflict is of a minimal or insignificant nature, or that it is so great as to call for the substitution of another, disinterested news employee to deal with this particular matter, or that while there could be said to be a significant conflict, broadcast journalism would be best served by permitting the employee to continue his duties while divulging the nature of the conflict to the audience, so that they are made aware of the fact that in this instance the commentator does have a significant private interest in the matter he is discussing. In short, here as in so many areas, the licensee is called upon to make reasonable good faith judgements as to the nature of any conflicts and the remedial action, if any, called for.
>
> Similarly, we do not believe it appropriate for this agency to specify the particular route to be taken by a licensee in order to exercise reasonable diligence in this area. One method which might be used would be to require periodic statements of the interests of the employees, with the obligation to keep them current. The licensee, particularly in small broadcast operations, might pursue other methods (e.g., making clear the principle against undisclosed conflicts of interest and requiring disclosure in any doubtful situation). Here again, the choice is one for reasonable, good faith judgement of the licensee. However, where a conflict matter is or clearly should be known to the licensee, it has a special duty to take appropriate steps to ascertain the full facts and to take whatever remedial action is called for. **BM/E**

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5
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Our 8-channel MM-1000 Master Recorder costs from 2 to 4 thousand dollars more than other 8-channel recorders. But with the MM-1000 you can readily expand to 16 or 24 channels. Add-on "kits" enable you to add channels as you need them. Or you can buy the MM-1000-16 or -24 completely checked out and ready-to-go.

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The MM-1000 tape transport is designed to handle 1" and 2" tape. It's the same transport that's now in use on over 3000 Ampex video tape recorders. When you go from 1" to 2" tape, you just change the tape guides and the plug-in head assembly. Lets you quickly change from 1" for 8 channels to 2" for 16 or 24 channels.

3. It's versatile

The MM-1000 offers more standard and optional features than any other master recorder. Tape Motion Sensing for instance. Allows you to change modes without going into stop or without stretching or breaking tape. Automatic Tape Lifters? Yes, and with manual override. Ping Ponging? Sure. Sel-Sync® ? Naturally, also remote Sel-Sync. How about Variable Speed Motor Drive Amplifier? Yes again, plus an Electronic Timer with up to 4 remote read-outs for pinpoint accuracy. Versatile? You bet!

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"New generation" recording capability is built into the MM-1000. The new groups demand this capability and record at the studios that offer it. The MM-1000 is capturing the imagination of these groups, and challenging their creativity. With the MM-1000 you'll have a promotable edge over studios with past generation equipment.

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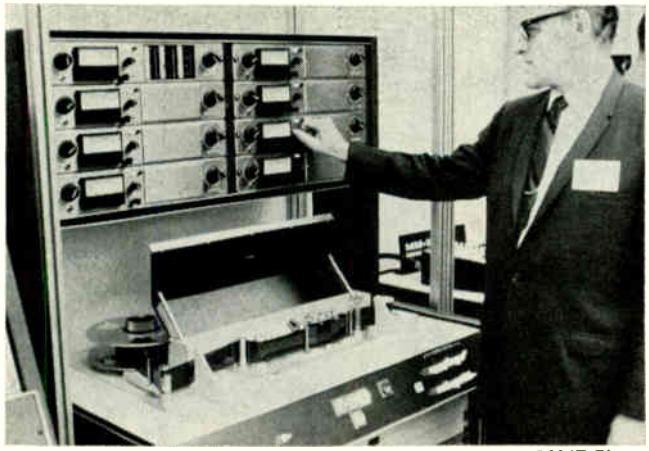


BM/E Photo
Two-inch wide tape on Ampex MM-1000 will accommodate up to 24 channels. Unit is shown here with preamps for 8 channels.

New Sophistication For Broadcasters

This year's Audio Engineering Society Convention emphasized technological areas that are brand-new for some broadcasters and are just in the exploratory stages for others. The very idea of a broadcaster going in for 16-channel consoles and recording equipment seems a bit radical, until you hear the kind of spot commercials this gear can produce.

THIS YEAR'S AES CONVENTION was a record-breaker from all standpoints. The number of exhibitors and the sophistication of their wares was up sharply over anything that the Society has done previously. Inventiveness and fresh ideas abounded both in the displays and in the technical papers.

Noteworthy on the convention floor was the renewed emphasis on multichannel recording. This technique is nothing new to the recording industry, where 8-channel masters have been made for several years as a matter of course. But this format has now been expanded to 16 channels, and manufacturers are pushing hard for multichannel facilities in the broadcast station. The ultimate goal is to get both radio and TV stations to use multichannel for mastering spot commercials and other relatively complex audio takes. The results can be slicker and much more polished than are possible with present-day two-channel stereo equipment.

New Tape Portable

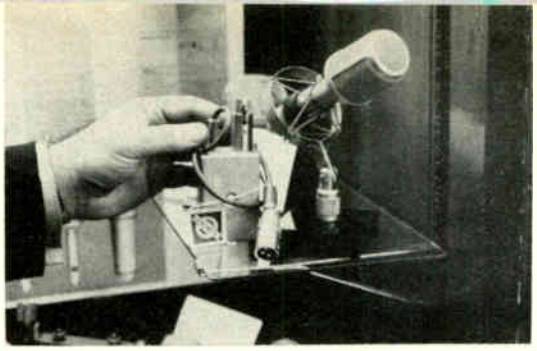
A new Nagra—the Nagra IV—at 12.5 x 8.7 x 4.3 in., is slightly smaller than the Model III, which the new machine replaces. The Model IVD replaces the Nagra III BHO nonsysnc recorder, and the Nagra IVL replaces the Nagra III PHO synchronous model. The IV's 18 new features include two mike inputs, low-frequency dialogue equalization and modular construction. Speed regulation is specified at 0.05 percent or better. Frequency response at 15 in./s is 30 to 18,000 Hz± 14 dB; to 15,000 ± 1 dB at 7.5 in./s.

New from AKG Division of North American Philips is an interesting mike concept with across-the-board applications. It's called CMS, or condenser microphone modular system. Modules are the AKG C-451E condenser mike and five screw-on capsules, offering long-reach shotgun, omnidirectional, cardioid and figure-8 pickup patterns with built-in FET preamp and flexible shaft or extension tubing where needed. All mike capsules operate from the same battery- or ac-powered amplifier.

Tandberg is now offering 3 versions of its Model 11 portable monaural tape recorder. Difference between their models 11-1 11-2 is that the former is a full-track recorder; the latter, a half-track machine. The 11-1-P Pilotone recorder connects via cable to a camera for sound/film synchronization. It has 5 heads, 3-speed operation, automatic volume limiting and separate controls for mixing mike and line inputs.

Attache-Case Mixer

A company making recording equipment for other companies for the past three years—Gately Electronics—late last year put its own label on its gear. Using new and improved circuits, Gately



Budget-priced mixer and control line by Gately (left) provides flexible console designs. Neumann condenser mike (above) and cigarette-pack-size preamp/power supply were part of star performer line showed by Gotham Audio. One of line of Vega wireless microphones (right), transmitter pack is built into extension of Shure microphone case, and trails wire antenna. Line offers mike flexibility.

BM/E Photos

finds broadcasters very interested in its products. Current price list shows about a dozen pieces of broadcast and studio equipment at budget prices. An eye-catcher is Gately's mixer (p. 54, June/68 *BM/E*), available in an attache case or wood cabinet. It offers six-channel stereo mixing, and input may be switched to either output channel. Five preamp plug-ins are available, including 40- or 60-dB mike preamps and an NAB tape head preamp.

Model 1731 audio operational amplifier is the key active component in Melcor Electronics Corporation's amplifier and preamplifier line. The operational amplifier can yield dramatic reductions in size, weight and power consumption. Wide bandwidth, high gain and low noise are cited as making it suitable for wide application possibilities. Melcor's products for broadcasters and recording systems include: phono preamp, graphic equalizer, program equalizer, compressor, three monitor amplifiers and power amplifier.

Another company doing interesting things with operational amplifiers for studio/broadcast applications is Quad-Eight. On the scene since 1962, Quad-Eight recently developed a modular mixer with four operational amplifiers that includes boost or attenuation at six frequencies, remotely controlled equalization in or out, and input attenuation. Quad-Eight's product emphasis is on audio consoles for theater and motion picture use. But many of the company's concepts and components have broadcast applications.

Langevin, a company working in close cooperation with Quad-Eight, also builds consoles around the modular concept. Langevin makes two sizes of its AM4A console housings, which accept up to 13 or 19 AM401 input channel mixer modules. The input modules feed a program module (AM407), which provides reverberation capability. The AM407 program modules feed a master gain control (MG61), which sets output level of the board. All circuitry is prewired, and a solid-state power supply is built into each module, making interconnection, rearrangement, increasing or decreasing number of mixer modules simply a matter of bolting or unbolting. Two- three- and four-output channel mixers are also available.

New State of the Art

The many technical sessions during the Convention exemplified the emerging new state of the audio art. Concepts and techniques are becoming more refined, while entirely new directions of audio design were strongly indicated. Even more important, measurements and instrumentation specifically oriented toward audio are reaching new levels of sophistication. As measurement technology improves, so must the basic recording equipment, certainly borne out on the exhibit floor.

Recording studio audio control. Described is a system with both visual and acoustical audio control facilities for checking multichannel information, the derived 2-channel stereophonic signal and monophonic compatibility. In this paper, Alex Balster of Philips' Phonographic Industries (Baarn, the Netherlands), recommends for best studio use, the system semiautomatic control facilities for rebalancing multichannel outputs from either a mixing console or a multitrack recorder. Labor costs are reduced by the system—a recording engineer can assess the quality and potential if a multitrack "take" during recording without rewinding and replaying.

Major amplifying and recording components of the system are:

- Reduction units, to convert multichannel information into stereo Left and Right signals.
- Submixers, for rebalancing recorded multitrack material for monitoring purposes (including frequency correction and reverberation).
- Program units, with sources fed to switch positions via a built-in patch board for maximum flexibility.
- Preselectors (three rotary switches), enabling the recording engineer to preselect sources to be monitored, and forming a second differentiation for signals to be sent to a post-prepost switch.
- Post-prepost switch, simiplifies signal handling, resulting in stereophonic signals with correct correlation of all channel information and correct level relationship.

Besides linking the stereo signals from the reduction amplifier via additional circuits to the monitor loudspeaker, the signals are also fed

Chromium Dioxide Tape—Just Over the Horizon

What ever happened to Crolyn tape? Fact of the matter is, DuPont hasn't yet released any Crolyn (chromium dioxide) tape in an audio version. The formulation is still being tested and evaluated.

But the tape is around. Crown International has been testing and demonstrating sample reels on its equipment, with show-stopping results. The tape is currently being marketed in computer grade and instrumentation grade. It's this instrumentation-grade tape that's available in ¼-inch width and is eminently suitable for audio recording. There aren't any audio specs or lab test results available, though.

What Crolyn does, according to Crown's Clyde Moore, is to double the effective frequency bandwidth for a given tape speed. Given a set of frequency specs for a tape recorder at 7½ ips using conventional oxide tape—these specs will be exactly the same at 3-¾ ips with Crolyn. It's even possible to get full audio spectrum response within a couple of dB at 1-⅞ ips, and this is where Crolyn's real audio future will probably be.

Moore indicates that the noise level is good, that Crolyn has much lower print-through than conventional tapes, and less wipeoff of high frequencies in general use than is normally the case.

There are problems. For one thing, Crolyn needs different recording bias than oxide and it demands high-quality erase heads. Machines with good quality erase heads and adjustable bias can accept the Crolyn with no modifications. The Crown 800 series for example, has front-panel bias adjustments that can be read out on the vu meters. The whole adjustment procedure takes a few seconds.

Using this new tape can give the broadcaster and recordist an immediate improvement in dynamic range and S/N ratio at minimal cost. For information and spec sheets on the instrumentation-grade tape, write on your letterhead to: Lewis Bancroft, Photo Products Dept., Centre Rd. Bldg., E.I. duPont de Nemours, Inc., Wilmington, Delaware 19898.

to a level indicator, which consists of meters indicating vu and peak levels and a phase relationship indicator. The phase relationship indicator overcomes the disadvantages of not being able to measure the average relationship between sum and difference signals due to the rapidly changing image and amplitude-dependent indications typical of phasescopes.

Audio Systems' Dynamic Range Compression. A system that minimizes the subjective sensation of audio distortion is described by Barry Blesser and Karlo Baeder (Elecktromesstechnik Wilhelm Franz KG Lahr/Schwarzwald, West Germany). The system permits a sound engineer to vary any of six psychoacoustical parameters that affect static characteristics. Adjustments vary for different types of channels and programs; the system automatically modifies its own dynamic characteristics as the program signal changes.

The program input signal passes through the preamplifier buffer, the variable-gain section (multiplier), and finally through the output power amplifier. The gain computer, which is divided into the compresser, limiter, and expander sections, examines the past and present values of the input and output program signals to determine the proper gain for the multiplier section. With a fixed gain for the amplifier, main program channel functions as an ordinary program amplifier. Characteristics of the gain-computer section determine the nature and quality of the compression.

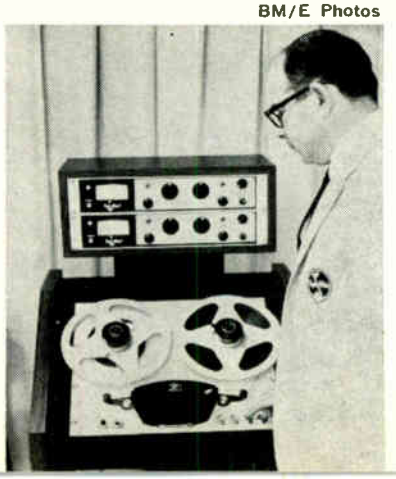
The approach used in designing the gain-computer section involves separating the relevant psychoacoustical parameters. Some of the distinguishing parameters are incorporated into the circuit and are therefore fixed; others are adjusted by the user for his particular application. The more important dynamic properties are adjusted by the system as a function of the program.

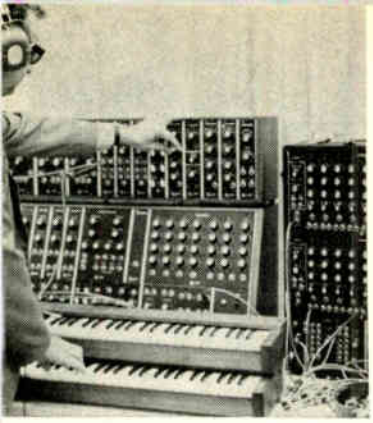
Blesser and Baeder made their decisions from the results of trial-and-error experiments. Trained observers were asked to describe the performance of the system with different types of programs. Using this approach, the designers were able to create a system whose output does not sound "muddy," "flat," "distorted," "dense," or dull"; rather, it sounds "natural."

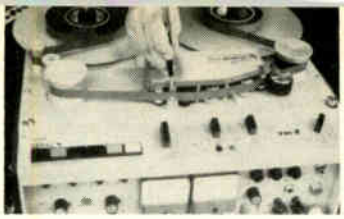
Tape Recorder Capstan Drive. Arturo E. Stosberg's paper (Willi Studer, Regensdorf, Switzerland) deals with a new drive system for tape recorders. Heart of the system is an electronically controlled asynchronous high slip eddy current motor. The completely homogenous rotor delivers a highly uniform torque. The capstan shaft

BM/E Photos

New Nagra IV (left) portable recorder meets broadcast and recording specs, has many options. (Below) Scully 16-channel system uses 2-inch wide tape for pro recording studio use. TapeAthon 900 (right) has dual capstans, features instant stop/start, has many options for broadcast flexibility.







Electronic music is produced by versatile R.A. Moog "organ" (left) with variable harmonic content to imitate variety of instruments. Sprocketless tape drive by Schlumberger (left, above) uses perforated tape. Photocell reads sprocket holes and adjusts machine's servo drive for constant speed. New portable recorder from Tandberg (right, above) is battery operated and accommodates 7-inch reels. Console (right) by Fairchild is made up of integrated control modules. Modules have integral slider pots, selectors, preamps, faders, echo controls, compressors and equalizers.

BM/E Photos

can be coupled to the rotor directly without mechanical damping by a flexible coupling with flywheel. Speed ratios of 1:16 are possible.

Disadvantages of the hysteresis synchronous motor which are overcome by the asynchronous eddy current motor include:

- Motor speed directly proportional to power line frequency.
- At synchronous speed, generated torque depends on a phase angle difference.
- Periodic flutter caused by the poles of the motor.
- Low efficiency (below 10 percent) and heavy weight with reference to mechanical power delivered.

Advantages of the hysteresis synchronous motor not incorporated in the asynchronous eddy current motor are:

- No parts exposed to wear.
- No radiation of rf into frequencies.

Synchronous Television Sound Recording. An appropriate counting device can synchronize sound recorders. VTRs telecines and other equipment used in motion picture and television film production. The present system makes use of electromechanical systems with perforated tapes, sprocket wheels, synchronous motors and so on. Widespread use by film and TV of a counter system discussed here by M. Calmet (Design Engineer, O.R.T.F. industries), would simplify rerecording, dissolving, and provide several high quality sound tracks.

The system makes use of two machines for transporting recordings on tape or film in any combination. Cueing marks inserted on the tape or film on the pilot machine are transmitted to a differential electronic counter (2 inputs). One input is used for direct counting from the pilot machine; the other for reverse counting. The reverse counter is connected to the slave machine. The slave machine's progress is tied to the pilot machine by speed differentials sensed in the counter. Error voltages are transmitted to the motor of the slave machine to increase or decrease the speed of the machine's motor.

The system is more than sufficient for applications of sound-picture synchronization, but is insufficient to record the two channels of a stereophonic program on two separate tapes. Precision could be improved by increasing the frequency of the cue marks.

Magnetic Tape Testing and Interpretation. A tape specification should tell whether various tapes are interchangeable, which tapes are capable of the best performance and how to adjust the recorder for optimum performance. Klaus E. Nauman BASF Computron Inc., Bedford, Mass.) discusses measurement and usefulness of the following recording-performance parameters: flux vs bias current for constant signal current; third-order distortion vs bias current for medium and short wavelengths; dc-noise vs bias current; and distortion vs recorded flux.

Nauman concludes that tape interchangeability would be facilitated if tape manufacturers provided users with complete performance curves, and if specifications referred to a commonly available reference medium. This information would also indicate which tapes are capable of better performance and help users to adjust equipment for optimum performance. The required curves are:

- Tape flux vs bias current for constant signal at 1, 10 and 14 kHz.
- Third harmonic distortion of a 1-kHz signal at a constant flux of 320 pWb/mm vs bias current.
- Magnetization vs recording field strength, with no bias, normal bias and over bias.
- Third order CCIF intermodulation distortion

Continued on page 38

BM/E Photos

Compact, 16-track 2-inch tape recorder by 3M (left) has meters on top, electronics down below. Budget-priced pro-quality recorder by Norelco (below) is ideal for field use. Swedish-built studio console (right) imported by Gotham Audio, has built-in flexibility.

How Ray Dolby Pushes Back the Sound Barrier

It's been making the scene in England and on the Continent for the last couple of years. Now at last, Dolby noise reduction has come to America. Add "Dolbyize" to your technical vocabulary; this system's here to stay, and you may be using it before the next year is out.

SHHHHH! IT'S SO QUIET, so incredibly quiet, that just-mastered tape. There's virtually no hiss, scrape, rumble or print-through that you can hear, and your ear's trained to pick up just these defects. No, there's a scrape—a cellist's bow buzzes across the sounding board for an instant. But there's nothing, absolutely nothing added by the tape equipment or by the oxide as the red ribbon wends it way past the heads and onto the takeup reel.

What happened to the noise? You can't just stamp out tape hiss and all those other annoyances just like that, you say. That's right, you can't—unless you're the proud owner of a Dolby A301 noise reduction system. And it takes more than mere money to buy this system—you really have to know somebody or get on a waiting list —it's no off-the-shelf item, that's for sure.

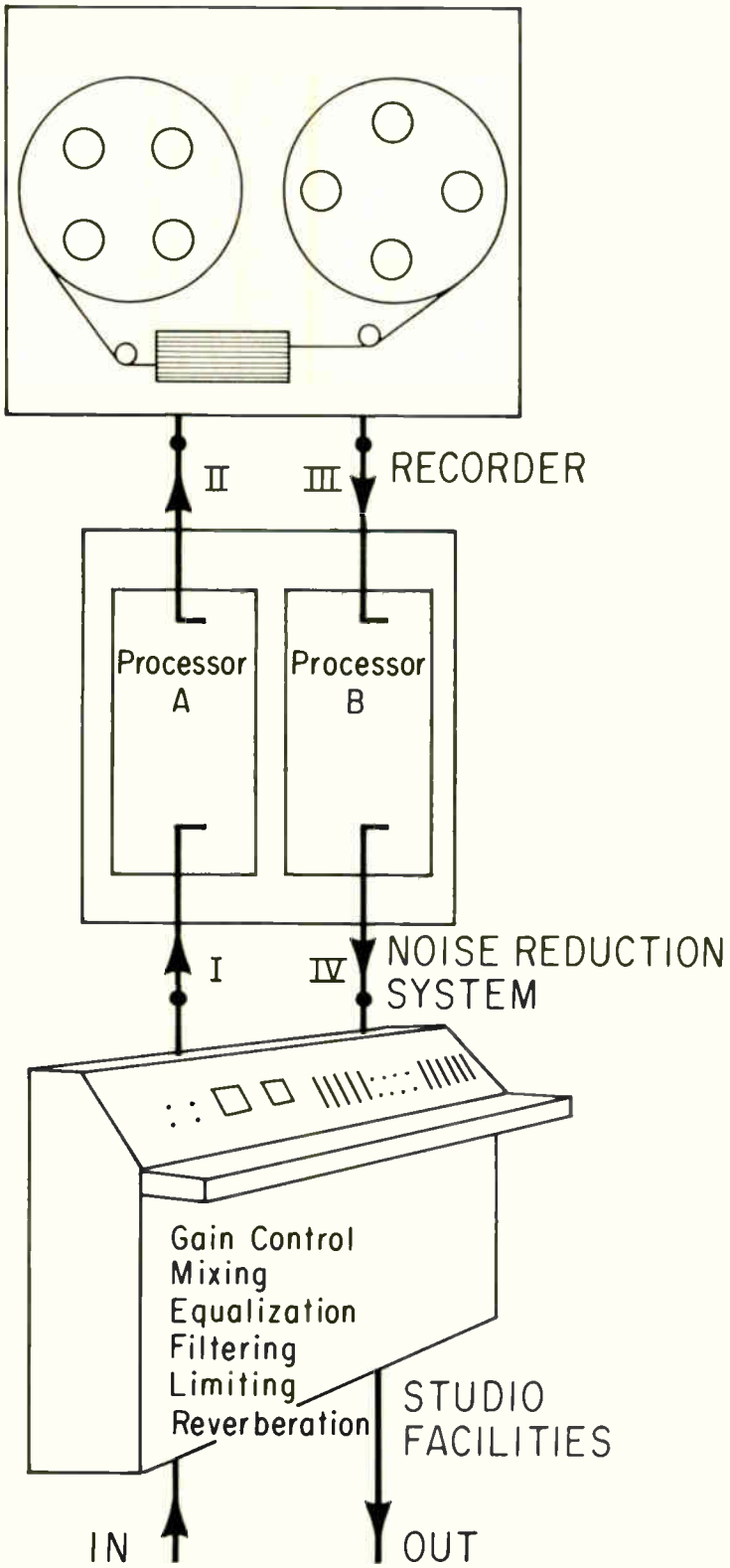
In his small shop in Southwest London, Ray Dolby's craftsmen—a baker's dozen or so—lovingly nurture and create each A301 by hand—lavishing on each plug-in board the kind of care and devotion usually reserved for the Rolls Royce paint shop. They won't be hurried, these craftsmen, for Dolby believes in those extra ounces of care and perfection that are the core of his own brand of zero-defects program. Total production right now is 20 units per month, and everybody wants them, even at $2000 apiece.

Dr. Ray Dolby is an American who's set up shop in England. His noise reduction system is the latest in a string of major achievements. Back in the early 1950's, while still a teenage undergraduate, Dolby designed most of the circuitry for the Ampex videotape recorders.

Pushing Back the Noise

Basic operating principles underlying the Dolby system are relatively simple. Low-level signals tend to get lost in unwanted noise, and it's this signal that gets an expansion-type boost before it goes to the tape heads. The recorder then dutifully puts the signal on the oxide—along with its usual share of hiss, scrape, print-through and rumble.

The black box and its inventor, Dr. Ray Dolby. Unit is responsible for an entirely new generation of recordings.
BM/E Photo



Dolby processor must be used for input and output from recorder. Same unit can be used both ways.

With the Dolby noise-reduction system, the signal goes through the A301 on its way to the tape heads. The Dolby greatly expands (or "stretches") low-level signals so they're way above this extraneous noise. When the tape is played back, the signal path goes through the A301 once again, which compresses or pushes down the whole package—wanted signal as well as noise. But the original signal had been boosted so high that when it's returned to a usable level, the noise is pushed way back—virtually out of the picture.

Comparison listening tests demonstrate the effect graphically. Most evident of the immediate benefits is the total absence of tape hiss. Conventionally made recordings always have hiss; Dolbyized tapes have none at all. Oh sure, you could probably measure some hiss and other noises if you wanted to put some sophisticated instrumentation in the line, but it's the hearing test that's important here, and the results are much more than merely impressive.

Unlike other expansion/compression systems, there's none of the characteristic swishing and other associated circuit-introduced noises. Just the signal comes through with the Dolby.

Overall noise reduction is 10 dB minimum—that's right—10 dB! Some noise elements such as hiss can be reduced as much as 13 or 14 dB in practice. This pushes this noise right out of the audible range.

And what about that bugaboo of tape storage called print-through? The magic Dolby black box does away with this problem too, once and for all. The tape must be recorded through a Dolby A301 to be print-through-free. Print is a gremlin that can strike at any time and any place. It can happen on the first master, or a week later or a year later to all but Dolbyized tapes. No more B-winds needed—ever. And even the B-wind wasn't all that safe from print.

Down with Crosstalk

Channel separation is another beneficiary. Cross-talk on Dolbyized tapes is down to the vanishing point. Remember, cross-talk is added at the recorder, not in the console or mixing circuits. Again, there's a 10-dB-plus reduction. Dolby feels that this is the same as increasing the effective tape width 5 to 10 times. Is this at last goodbye to the 35mm tape master? Could be.

The basic A301 breaks the audio spectrum into four frequency bands and acts on each band separately. There's a gradually sloping overlap on both sides of the crossover frequencies, but the total signal-processing action is ruler-flat across the spectrum. The same A301 that's used for making a two-channel stereo recording can be used for the playback by reversing the connectors. It's strictly a black box with no controls and can work both in the recording and the playback modes. Or it can be split and used simultaneously for mono recording and playback.

Dr. Dolby says that he uses four bands because "This is the minimum number of bands for un-

qualified zero-defects noise reduction. When you're making master tapes," says Dolby, "you're concerned with print-through at least as much as with hiss. From a long-term point of view, I'd say that print-through is very largely the determining factor in tape quality—especially after a decade of storage. Because of the print-through problem, the BBC for example, transfers all of its priceless material to disc as soon as possible; it then stores it in both tape and disc form."

Early Success

The first A301's came off the production line in April, 1966, when Dolby Labs made its first delivery of five units to Decca Record Co. in England—known under the London label in the U.S. About 250 units have been sold to date—to some-70 record companies and studios all over the world.

Broadcasters are increasingly interested in using the Dolby for network use in many parts of the world. One of the first radio nets to recognize the system's value for broadcasting has been the V.N.I.R.T.—the Soviet Union's state radio. The Russians have one Dolby which they use in mastering tapes to be sent out to network affiliates. Five more A301's are on order by Meloydia Records, the Soviet record company.

There is some resistance to the system. "There are engineers," says Dolby, "who believe that it's wrong to introduce any further complexity or more electronics in the recording chain. They want to get their recording machine as close to the microphone as possible. This is a defensible point of view; recording is very subjective."

Regarding ultimate cost reduction, Dolby feels that "Until there's widespread understanding and acceptance, we must make the noise-reduction system as nearly flawless as possible so the concept isn't sullied prematurely. Ten years from now, we may be able to make a cheap and dirty noise-reduction system with very little inspection and quality control. But it takes time for the correct use and maintenance of the system to filter through to all levels of the industry. Maintenance people as well as recording engineers must learn how the system works. Once they understand, then accepting the possibility of defects is possible.

"With the noise-reduction system, the black box effect is just a mystery to some people. If anything goes wrong during the recording session, they say it must be the noise-reduction system. This is why we must spend so much time on quality control, checkout and inspection. The A301 is really built in a Rolls-Royce way, and I'd like to see us continue with these standards as long as possible."

Ideal for small-budget stations, KLH recorder uses one band of Dolby system, kills hiss, and retails for $600.

Broadcasters to Dolbyize

Many large broadcasting organizations outside the U.S. are seriously considering adopting the Dolby system. The South African Broadcasting Corporation has ordered 12 units for use in their land-line links and is considering the system for use in the entire network. Other users include Swedish Radio, BBC and EBU. Other broadcasting combines thinking about Dolbyizing are the German, Dutch, Swiss, Danish and Australian systems.

But it's in tape mastering that the Dolby really comes into its own. Tape and disc manufacturers have made varying degrees of hay in their advertising, some of them implying that the vastly improved noise characteristics in their records and tapes have been due to some proprietary inventions of their own. Tain't so; it's all done with Dolby black boxes.

In the meantime, the small broadcaster who can only dream of owning a couple of A301's has some possible salvation. It's called the KLH tape recorder. KLH, a consumer-oriented firm, has landed exclusive U.S. rights for using the Dolby system in its own tape equipment. The KLH just uses one of the A301's four frequency bands—the highest one. This provides an immediate elimination of tape hiss—the chief offender. Naturally any Dolbyized tapes made on the KLH recorder must be played back on a similar instrument. But here's the best part—this professional quality recorder with Dolby circuits sells for $600. The small broadcaster can afford to have a picnic with two or three of these machines for less than the price of a single Dolby.

In the meantime, the recording industry is Dolbyizing on a worldwide scale, and the time may come soon when all new releases will benefit from this technique. It won't work, alas, with old recordings. It's not a panacea for cleaning up sound that's already dirty and noisy, but that new sound—wow! **BM/E**

Want Specs?

Specifications and delivery information are available on the Dolby A301 and on the KLH recorder. Write on your letterhead to: Dolby Laboratories, Inc., 333 Sixth Ave., New York, N.Y. 10014; John Milder, KLH Research and Development Corp., 30 Cross St., Cambridge, Mass. 02139.

BM/E Photo

Peter Bartok has devoted his life to making quality recordings, both of his father's music and such groups as the New Lost City Ramblers. An innovator and perfectionist, Bartok prefers to rebuild commercial gear to his own specs, including tape equipment, microphones, disc cutting heads, and tape speed controls. The editing machine shown here is built into a wooden office desk, with the drawers replaced by amplifiers and speed controls. Since he works independently, Bartok would rather rent a hall for a recording session than maintain permanent, high-priced quarters for only an occassional take. His is the art of the meticulous craftsman, concentrating on painstaking detail, with all system components honed to a keen edge.

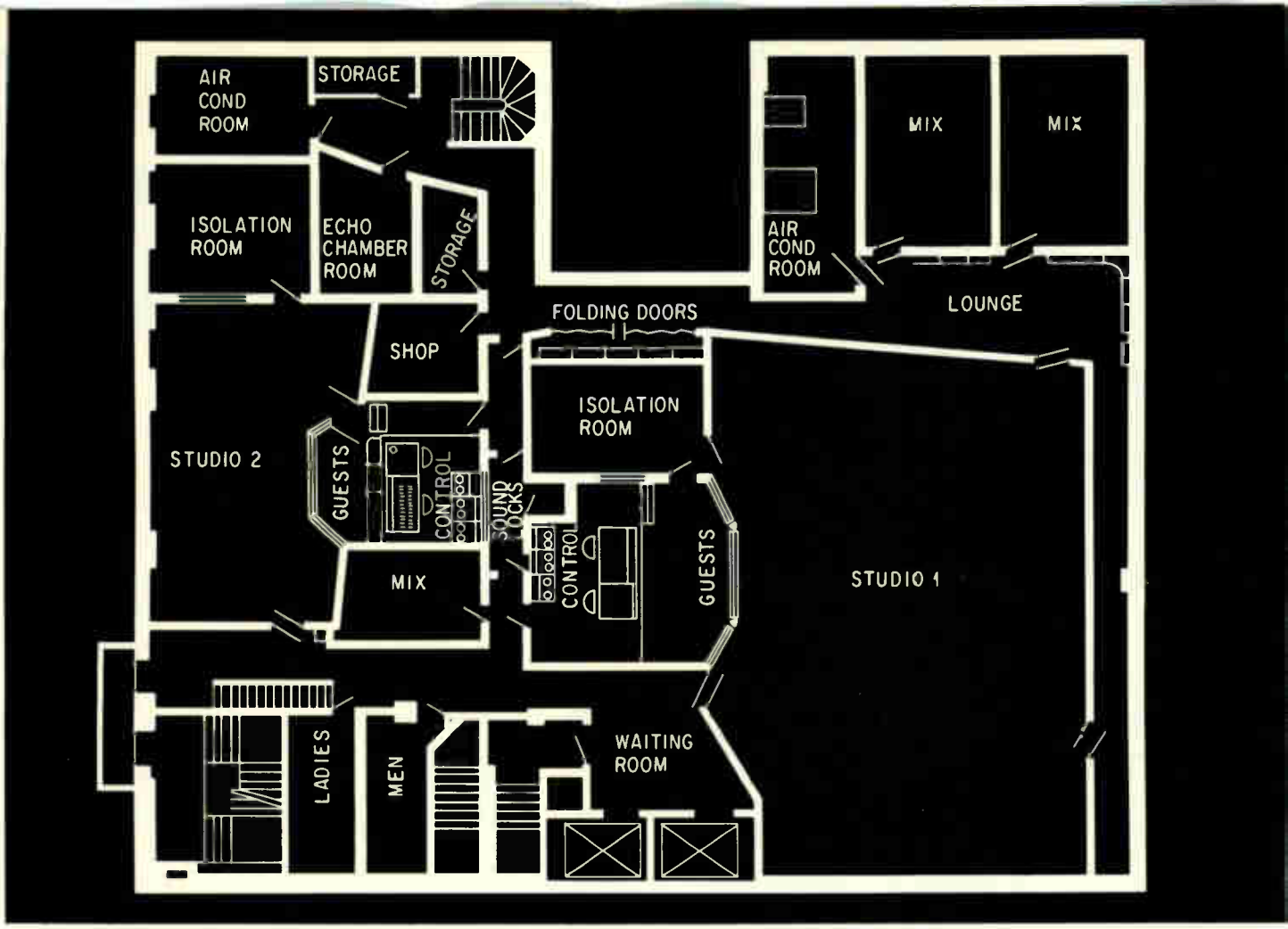
How to have

Too often, a broadcast station recording is simply the result of any available tape recorder's being patched into the main console. Doing a thoroughly professional job doesn't have to involve very much extra expense, and can result in some very welcome added revenue.

A RECORDING STUDIO can be many things to many people. To the small broadcaster, it may be that big, seldom-used Studio B that sees service taping the local high school glee club or a teenage rock group that wants a sample take for personal use. Used this way, and with very little additional cost, an infrequently populated station studio (the one with a piano sitting in the corner) can become the focal point of a lucrative extra-income operation.

What's Needed

First important element is a certain amount of sound-deadening. Since this is a broadcast studio, the acoustics will probably already have been



One floor of Mercury Records' new studio in New York.

the 'ideal' recording studio

taken care of. If you're setting up entirely new quarters, plan the acoustics carefully (see *BM/E*, August 1968, pages 30-33) and get equipment that's flexible enough for both recording and broadcasting. Remember, there'll be people appearing on various broadcasts who will be willing to pay for a tape of their program. Tape dupes and possibly some dubs or mixes may also be salable. Some people won't have tape equipment at home and will want discs; that's some more revenue. So dust off that cutting lathe you haven't used in a few years; it's worth money!

The professional recording engineer often works with no studio at all. It's certainly the contention of such eminent audio men as David Hancock and Peter Bartok (the composer's son) that a captive full-time studio is too costly and wasteful. "It's far better and cheaper to rent Town Hall for a morning recording session than to try to maintain facilities on a full-time basis," says Bartok.

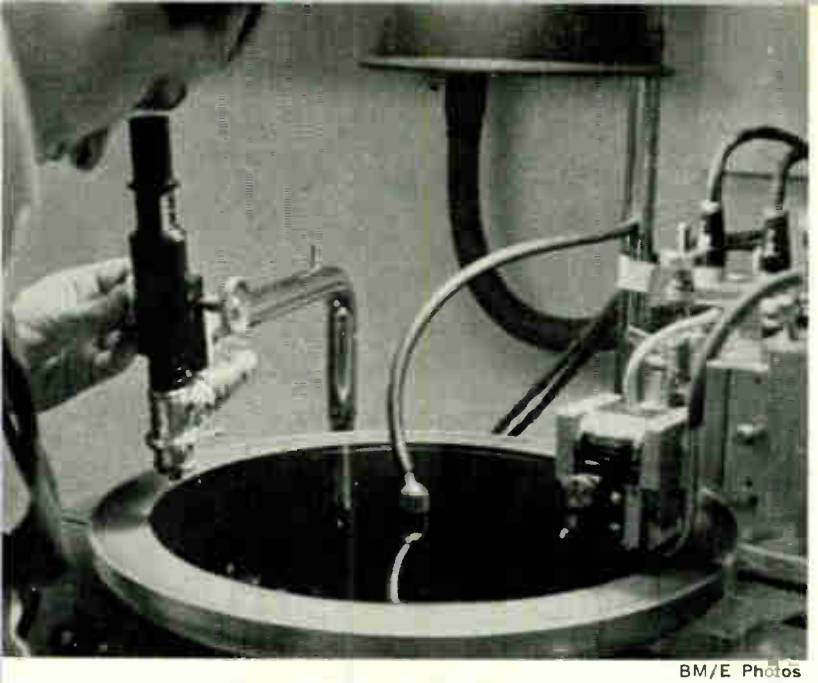
The basic microphone complement for a recording session may make no special demands on the broadcaster—you may already have an appropriate selection of mikes on hand. But your microphone supply may be antiquated or inadequate in numbers for the recording sideline. Remember, this recording business mustn't interfere with your normal production and broadcasting schedule.

Picking the right microphone for recording is largely a subjective decision. It's got to be a mike that pleases both your audio engineers and the ultimate listener. Characteristics such as frequency response, polar pickup patterns, presence and warmth—all are important in selecting the right mike for your recording studio. For more on mikes, see pages 34-37 in this issue.

One Channel or 16?

Some engineers—especially Bartok—like a simplified mike setup with as few channels as possible. Others, such as Mercury Records' Chief Engineer Doug Hawkins, prefer multichannel takes. Using up to 16 channels in the current setup, Hawkins describes the company's method of recording rock groups:

"These groups come in here with no score and no specific music in mind. They use the studio the way they'd use a rehearsal hall, fooling around and improvising together until they've got something. Then we'll tape maybe two minutes of their ideas on two or three channels and play it back for them. They get some more ideas



BM/E Photos
The moment of truth—the stereo cut made on the master disc from a Mercury master tape.

BM/E Photo
Typifying the fine equipment available, a single Neumann condenser mike is poised for a session (above). Smaller studio (below)) and isolation room are used for small groups.

BM/E Photo
Eight-channel console in Studio 2's control room is largely custom-built by Mercury engineers.

and add a couple of more channels as a kind of counterpoint or added-on sound, synchronized with the original take. We can go on this way, adding on until we've got 16 channels filled up. This is the way today's sound gets on tape."

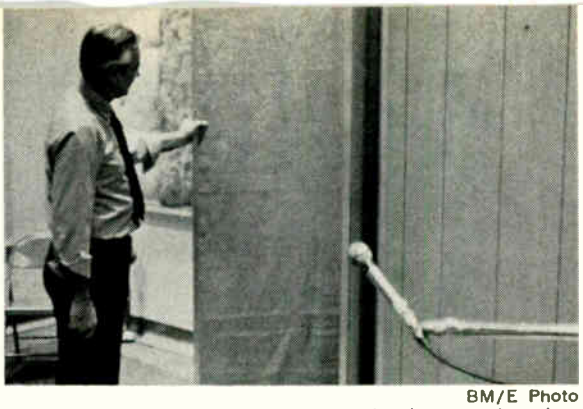
Much of the equipment and many of the recording techniques are relatively standard and well understood in the industry. It's the advent of 16-channel mastering that's really the big swing in audio recording, and this capability has given rise to an entirely new approach to recording. The so-called "workshop sound" is actually a grouping of spontaneous compositions, and these "think takes" can be recorded on the spot to form the nucleus of a dubbed and added-on multichannel recording.

Then the fun begins with mixdown—boiling down and condensing 16 channels into two for stereo albums and ultimately into one for mono pop singles. This new era of recording has made the traditional rented hall impossible to use. Recording equipment has become too complex and the need for many studio/rehearsal halls with sophisticated equipment has made the new studio a must for the major record companies. "We've just finished moving in here," says Hawkins describing the New York studios, "and we're building an identical facility in San Francisco."

The Mercury studio is impressive by any standards and contains lots of ideas that can be used in any size broadcast station. For starters, each studio has a second, much smaller studio adjoining it. This small room—the isolation room—is used for soloists who must be kept acoustically separated from the main recording group and for various special effects. The isolation room's mikes terminate in a Cannon plug panel on the main studio's wall where they can be patched into the mike inputs going to the control room. Mike receptacles are standardized throughout the building for easy interchangeability.

Each control room has that huge 16-channel console with all sorts of gadgets—adjustable reverb on each channel, cross-mix and special switching. The feed is to a 16-channel Ampex for mastering. Directly in front of the console, and below it (out of the engineer's line of sight) is an area designated for "guests." This would be roughly analagous to the sponsor's room in TV stations, and has a row of theaterlike seats for nonperforming members of the recording group, managers, friends and so on. It just keeps all these extra people out of the engineer's hair dur-

BM/E Photo
Fiberglass blankets cover portions of studio wall. Facilities are so new, blankets haven't been covered yet.



BM/E Photo
Folding screens are hard on one side, absorbant on the other, and can be arranged for best acoustical "tuning."

ing a take; they've got a place to sit, so they have no excuse to hang over the poor guy's shoulder while he's manning the controls.

Double Walls

Every studio is a room-within-a-room to get the best feasible sound insulation. Even the door frames are separated by vibration-absorbing neoprene strips. No solid, one-piece, sound-transmitting door jambs here! Glass is double, with several inches of air space between panes. The glass on the studio side is titled with the top into the studio to cut down on high-frequency reflections. The walls are angled and irregularly shaped to break up any standing waves.

Every couple of feet or so, the studio walls are covered with large vertical frames filled with fiberglass sound-absorbing blankets. These were open to view during a recent studio tour. They'll be covered over soon with esthetically pleasing material and done up in psychedelic colors—supposedly to stimulate the rock singer's imagination, or something. These fiberglass blankets help "tune" the room for proper reverberation time. A large studio at Mercury is somewhat bright, while smaller studios have purposely been made acousically dead. Each studio has its own purpose in life and the scheme of the recording business.

Another feature of the studio setup: large folding screens with one surface highly reflecting, the other highly absorbant. A couple of these screens can be set up to surround a soloist completely if need be, with either bright or dead surfaces. These screens add lots of extra flexibility at a minimal cost and could probably be an immediate help in many a radio station.

Mix-Down

Once the 16-channel sound is on oxide, the fun really begins. A recording engineer must mix-down, using one of the several mixing rooms on the floor. Those 16 channels must ultimately become two, and this is where the recording engineer's art really comes into its own. Fortunately, it's possible to make many mixes and remixes, and this is often done and repeated until several engineers and officials agree on the final product. Each number that a group records may require a different mix, and this can get especially hairy when a long-playing album is involved. Even further mixes are needed for pop singles which are still released in mono only.

Presented with a good mix, the next stop is the cutting room, where another audio specialist makes the tape-to-disc transfer. The stereo disc room uses Ampex tape playback for transfer and has built-in monitoring right on the Westrex cutting head. This feature is important—it lets the recording engineer monitor precisely whatever signal is at the cutter and is going onto the disc.

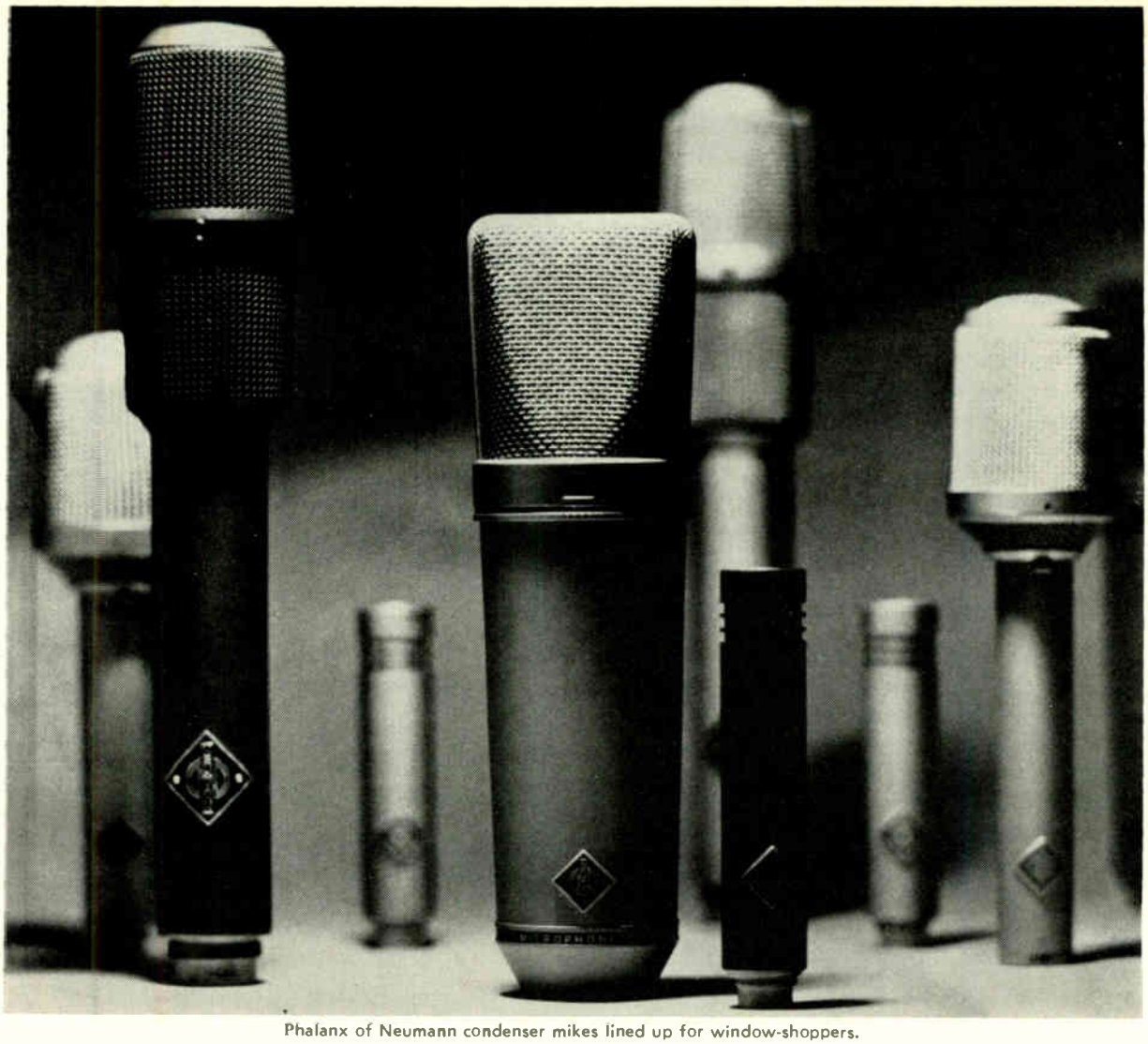
In another cutting room, mono singles are still made. Here, Neumann cutters are used, and are helium-cooled. "The reason for this," explains Hawkins, "is so we can really pour on the level." These high-amplitude cuts provide plenty of signal output for those cheap portable phonographs that the pop singles will ultimately be played on. Since the cutter has to swing so widely, it heats up more than usual, hence the helium.

Versatile Tape Machine

A home-brew addition to a standard multitrack one-inch Ampex audio recorder lets the machine accommodate ¼-inch, ½-inch and 1-inch tape. The modification consists of an ingenious rotating tape guidepost that can be turned and locked into the appropriate position for the right tape width. This is like having three different tape recorders in the mix-down room.

Much of the electronics and special circuitry at the Mercury studios is home-brew because of the company's highly specialized needs. This gives rise to the contention that no facility for broadcast or recording can be put together entirely from off-the-shelf production equipment. Some of those accessories will almost always have to come from your own workshop. After all, everyone has different requirements, and no single piece of gear is going to be used in precisely the same way by any two organizations.

The main thing to strive for is versatility. The same studio can be used for broadcasting as well as multitrack recording. If you have such a dual purpose in mind and want to have both the 16-channel console and a standard broadcast console, put in a wide window, park the consoles side by side, and connect them to the studio mike receptacles via a patch panel common to both units. You'll end up with one of the most versatile studios in town—especially if you add mix-down and a disc-cutting lathe. **BM/E**



Phalanx of Neumann condenser mikes lined up for window-shoppers.

Picking a Microphone— A Feast of Plenty

New technology, plus the inexorable workings of gradual refinement and perfection of older designs, face the audio engineer with an almost insoluble dilemma of choice—there are just too many top-quality, economically priced microphones on the market! A feast of such proportion creates problems; who makes the ultimate choice and how?

THE MICROPHONE IS THE FIRST LINK between your station and your audience. Most station engineers have a fair understanding of the microphone's basic properties, and get a fair amount of mileage and versatility out of the station's equipment. Too often, microphones in use are ancient or are pitifully inadequate for today's demands. The warm, round sound of that favorite antique velocity mike may be fine, but how long has it been between factory overhauls? And what about that old favorite's ponderous size? It just plain gets in the way, and your announcers and performers have trouble seeing around its bulk into the control room for cues and vice versa.

The Young Generation

Today's mikes come in a wide variety of shapes, sizes, functions and specifications. There's one for every purpose and for every station budget. The really amazing fact is that so much capability

can be purchased for so little money. The Electro-Voice 635A is an excellent example of this. An omnidirectional dynamic, this type has such wide frequency response that early users were incredulous because of its low price tag ($50). Because of its small size and handy "handle," it's become a favorite for hand-held use on TV rock and other popular music programs. Performers like the mike because it's so handy, light and durable; it'll take quite a beating. And all these features are true of most of today's dynamics, with variations depending on the price and manufacturer.

But it's possible to become spoiled by the cornucopia that's brimming over with top-quality mikes at bargain-basement prices. Naturally no microphone is all-encompassing or completely perfect. Commenting on the 635A, ABC Radio's engineering director Sammie Aed says, "This was a good mike at the time for the price. If we were to re-mike the studio, we'd still go for a bunch of 635A's, but we'd also add some velocities for newscasts and packaging commercials. We'd probably also go to some AKG and Neumann condenser types for our fm network and special-purpose production." But Aed is eminently satisfied with the 635A—having equipped virtually all of ABC radio's new flagship studios with it.

The problem is, that no matter how new the facilities are, tomorrow a new microphone will be introduced that has a little edge on all its predecessors, and the trade-up process begins again.

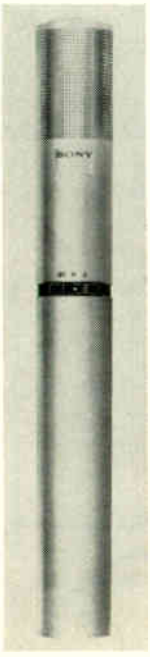
The Generation Gap

An entirely new generation of microphones has appeared in the Electro-Voice catalog. These include dynamic types RE10, RE11, RE15 and RE16. These mikes have significantly flatter on-axis response than previous models and uniform polar characteristics. Some of the new family's benefits: reduced room reverberation and background noise; higher gain before feedback; reduced coloration of off-axis pickup.

These characteristics will be a big help in many recording applications. But there are lots of times when you *want* room reverb—especially in recording the solo piano. Here, you'll most likely revert to a figure-eight velocity type or a condenser mike with adjustable pickup patterns. The rear pickup of the figure-eight ribbon is just the ticket for the large concert hall where room reverb is so all-important. An extra plus: the out-of-phase effect from the rear of the mike actually enhances the recorded sound.

Diehard adherents of the velocity mike cite its warm, round tonal quality as one of its especially important features. But the velocity has the built-in problem of fragility. Newer designs have resulted in ruggedized versions that will withstand mechanical shock fairly well, but that ever-so-delicate ribbon is still susceptible to wind damage (so you still can't use this type outdoors) and can even be damaged by air rushing through it when swung around on an overhead TV boom.

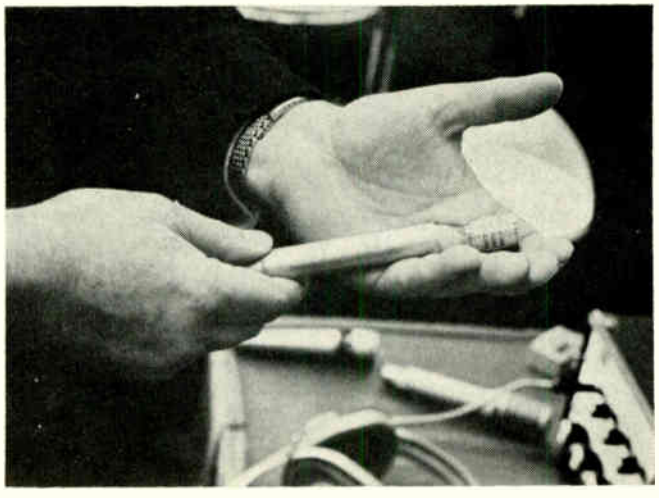
If you're willing to work within these mechanical limitations, then by all means set up velocities. There are plenty of pros—such as David Hancock and Peter Bartok—who use the velocity in preference to most other types. Bartok, who's not as much concerned with fragility as he is with total dynamic range, even modifies brand-new velocity mikes. He feels that the ruggedization process has raised the ribbon's low-frequency resonance too high—placing it at about 50 Hertz. He lowers this resonance to about 30 Hz by loosening up the ribbon element. "In this state, the ribbon can touch the magnets if you're not careful," Bartok explains, "but it's worth the trouble for the improved frequency response." He also files down the pole pieces a little to extend the upper frequency range.



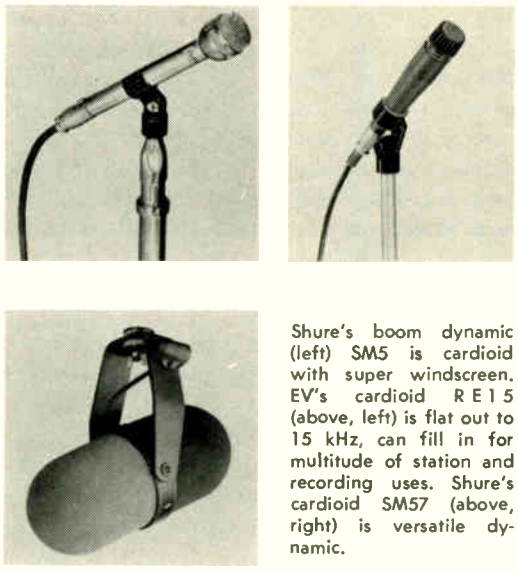
Economy condenser microphone from Sony (far left), the model C-22 is tagged at $99.50. It has usable response to 20 kHz and cardioid pickup pattern. FET preamp is self-contained, as is battery supply. (Below, left) Guts of updated old-standby Neumann condenser U87i, show compact FET transistor preamp. Self-contained battery supply is on reverse side. Mike has selectable polar patterns and almost ruler-flat response (see curve on p. 37). AKG's modular mike (below, right) has screw-on condenser head, modular preamp in the tube, and add-on accessories for extra versatility such as shotgun mike applications.

BM/E Photo

BM/E Photo



Newest of the velocities is RCA's bidirectional SK-46 (left). Shure's cardioid SM-33 ribbon mike (second left) is ruggedized. Old warhorse (above) is RCA 77-DX velocity with adjustable shutters to vary polar pattern. Familiar shape of RCA's BK-11A (right) ribbon still graces many studios.



Shure's boom dynamic (left) SM5 is cardioid with super windscreen. EV's cardioid RE15 (above, left) is flat out to 15 kHz, can fill in for multitude of station and recording uses. Shure's cardioid SM57 (above, right) is versatile dynamic.

For overhead TV boom work, the highly directional dynamic is still the best choice. These mikes have to work over long distances, so the elongated pickup pattern is important. Especially good for these overhead TV pickups are E-V types 442, 667A and 668. For really long-distance pickups—parades, football fields, etc.—the E-V 643 "shotgun" mike is the most suitable.

Straddling the Fence

Equally committed to both dynamic and velocity types, Shure Brothers believes in optimizing various models to meet specific user needs. Says professional products manager R. W. Carr, "Microphone selection is largely subjective. There are many factors which affect the final sound product. One of these is the generic type of microphone element. Our professional microphones include both dynamic and ribbon types because we believe that there are advantages for each type in different applications."

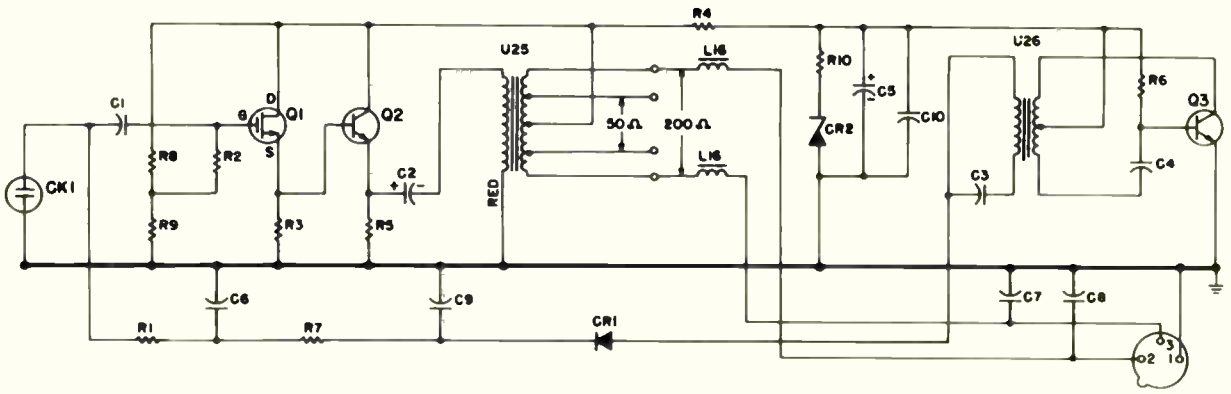
Carr sees a definite trend in current microphone development: "All involved manufacturers —including Shure—would like to see microphone selection simplified with the special features of different types and models incorporated in just one or a few. We're all working in this direction, and this will likely be a major advance in the future. Refinements will continue to be made in size, reliability, mechanical noise susceptibility, level and directional properties."

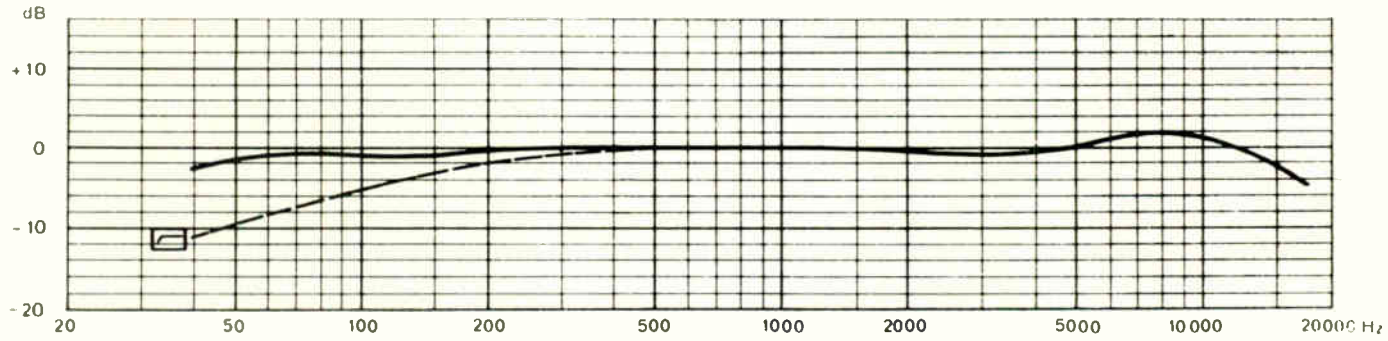
Old Standbys Get Better

The condenser microphone—long the favorite workhorse of the recording industry in spite of its bulk and high price—has become more streamlined, reliable and cheaper. Refinements include FET (field-effect transistor) inputs, built-in preamp circuits, and self-contained battery power supplies. Also new on the scene are AKG's building-block condenser mikes that assemble in screw-together modular sections. The Neumanns —physically the biggest of the bunch—have switch-selectable pickup patterns, giving the recording engineer lots of versatility. In the same mike, he can have his choice of omnidirectional, figure-eight and cardioid pickups.

Some of the new condensers are truly miniscule—with pickup heads no larger than the recording engineer's thumb. These tiny tops are designed to work with an external preamp and power supply—usually no larger than a pack of regular cigarettes. The modular AKG has the preamp in a skinny tube the same diameter as the screw-on head. In another version, a long tube is added to the head to change its pickup char-

C-451E preamp is heart of AKG's modular condenser mike line.





Frequency response of Neumann U87i in the cardioid pickup position.

acteristics—turning it into a shotgun-type cardioid.

Another versatility-adding feature of the condenser type is adjustable frequency response and sensitivity. In such mikes as the Neumann U87i, it's possible to raise the instrument's normal low-frequency rolloff simply by flipping a switch on the mike. This is especially good for close pickup of vocalists, speakers and for killing unwanted background noise. In other situations, this switch will restore low-frequency linearity at the amplifier input when the sound source gets so close that the low end would be boosted.

Also taking advantage of the latest in transistor technology, the series of Sony condenser microphones runs the gamut of capability and price. Starting at an incredible $99.50 (for the C-22), these pickups have the almost-ruler-flat wide-range frequency response that is characteristic of condenser types. The C-22 is a cardioid, as is the much more expensive C-55. More versatile, the C-37 has switch-selected cardioid or omnidirectional pickup patterns.

Frequency-Independent Pattern

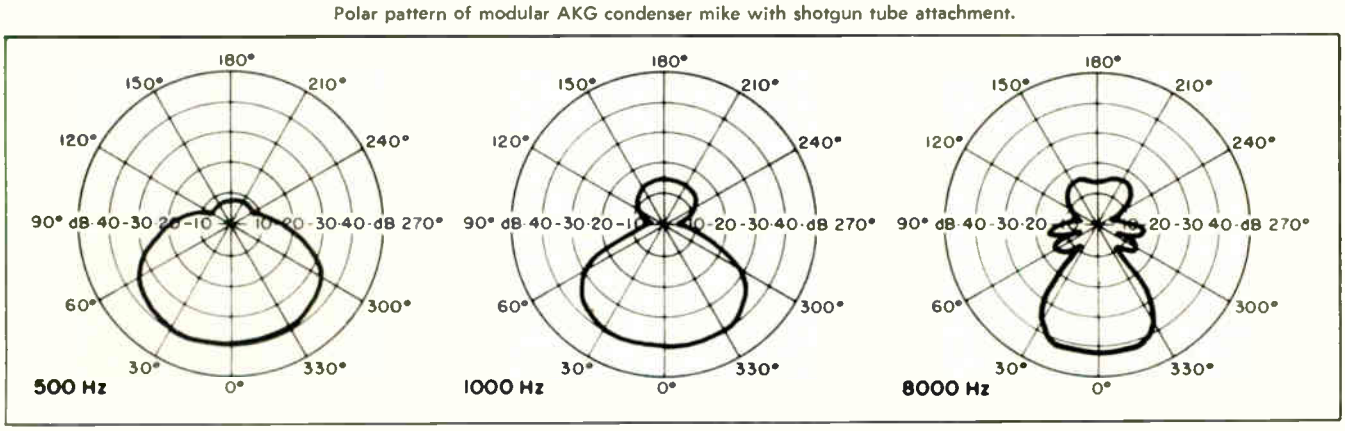
A family of three similar, cardioid dynamics from AKG has the unusual characteristic of a frequency-independent pickup pattern. These units each use two transducers optimized for their respective frequency ranges. The bottom-of-the-line economy model, the D-200E is flat out to 15,000 Hz; the middle model D-202E—especially for overhead boom work—is good out to 16,000 Hz; top-of-the-line D-224E extends frequency coverage to 18,000 Hz. The curves are remarkably uniform, and the crossover frequency is 500 Hz.

Which one to chose? There are so many really great microphones available that this is one question that's got to be up to the engineer with the calibrated ears. Spec sheets may look grand, but it's the subjective eardrum test that's got to guide the ultimate choice. Every transducer type will have its adherents; there are velocity men, condenser men and dynamic believers. If the sound quality and coloration seem virtually identical among several different generic types, then handling, versatility and ruggedness must be considered.

If a mike is slated for outdoor use, chances are you'll have to stick to the ever-rugged dynamic. If boom work at a distance is the end use, then a shotgun dynamic or condenser type is called for. High-quality music recording and broadcasts will demand a mixture of all three types. Some engineers like the warm, rich sound of the velocity for newscasts, while informal talk shows may go back to the dynamic because of uncertain handling situations and possible accidents. The dynamic is a favorite for hand-held use in rock music groups because of the severe beating it must take.

So now what? You pay your money and you take your choice. The ultimate decision is one that can't be made with spec sheets and instrumentation—here's where the calibrated eardrum really comes into its own. But remember—no two engineers have the same hearing, so get a consensus before you buy. **BM/E**

Polar pattern of modular AKG condenser mike with shotgun tube attachment.



Sophistication for Broadcasters

Continued from page 26

of 9.5 and 10.5 kHz signals at a constant flux of 320 pWb/mm versus bias current.

- Modulation noise at constant tape flux of 320 pWb/mm vs bias current.
- A summary of the three groups of curves affecting sensitivity, distortion and modulation noise.
- Third harmonic distortion level (K^3) of 1-kHz signal vs tape flux level and second order intermodulation distortion level of 9.5- and 10.5-kHz signal vs tape flux level.

With the exception of determining operating bias, specific methods of arriving at proper adjustment of operating parameters are discussed. No common optimum for ac bias is reached, although the points are nearly the same. Conclusion is that the only solution is a compromise based on selecting that bias which provides minimum modulation noise at 15 ips.

Nightclub sound reinforcement system. A sound system employing 77 ceiling-mounted distributed loudspeakers has been installed in a 350-seat nightclub. The system detailed by Peter W. Tappan (Bolt Beraneck and Newman), provides directional realism by using the precedence effect. Live sound sources are reinforced by "precedence loudspeakers" over the stage valance, while signals to overhead loudspeakers are appropriately delayed by an acoustical delay unit. Other features include variable electronic reverberation, slightly delayed monitor sound to performers for enhanced self-audibility, and approximately one kilowatt of available audio power.

Stereo/mono disc compatibility. The record industry is now phasing out the mono disc, and the subject of compatibility has once again been raised as it was with the introduction of the stereo disc ten years ago. Then, the problem centered largely around stylus-groove relationships and considerations of trackability; now the problem is mainly concerned with the way a pair of stereo channels combine to yield a suitable mono channel.

J. M. Eargle (RCA Victor Record Division, N.Y.) details six recommended recording practices to minimize specific compatibility problems:

- Proceed cautiously with the spaced-apart microphones where the two overlap substantially in their pickup.
- Consider the use of midside microphone techniques.
- Avoid the use of special out-of-phase coherent signals in stereo recording.
- Avoid excessive monitoring levels during multitrack reduction to two-track.
- Insure that all pairs of stereo transmission and storage channels are properly balanced and aligned, or at least be aware of any fundamental difference which may exist.
- Be aware of trackability problems when high-level stereo records are played on low-priced players.

Compatibility of stereo recording and monaural playback. The decreasing availability of monaural

Continued on page 74

Microphones and Signal Processing

Speaking at a seminar titled "From Studio to Microphone to Listener," Lou Burroughs, vice president of Electro-Voice and John M. Eargle, manager quality—Manufacturing and Recording, RCA Record Division, brought operating personnel attending the AES Convention up to date on modern microphone and signal processing techniques. Some recommendations:

- Try to use as few microphones as possible to do the job.
- Don't overlook the omnidirectional mike; it has fewer built-in problems than almost any other type.
- Limit frequency response to the requirements of the program material. Limiting response is especially important when room acoustics are less than perfect—causing muddy lows or other distortion.

Burroughs emphasized the need for keeping a 4:1 or 3:1 separation ratio between mikes mounted on a lecturn to avoid phase distortion. He demonstrated some interesting telephone effects and distance distortions by connecting two mikes electrically out of phase, holding one stationary and rotating the other axially.

Discussing signal processing, John Eargle pointed out that equalization was formerly done to adjust for frequency deficiencies of storage or transmission media. According to Eargle, equalization used to mean that whole chunks of the program material's frequency range would be boosted or dipped out. Now it's used by listeners and hi-fi buffs who boost or dip out portions of program material at home for effect. Pre-emphasis is the term now in use by the recording industry, but the new term generally means that much narrower portions of frequency range are involved in whatever signal processing is needed. Pre-emphasis typically is used to brighten or tone down one or two specific instruments in a group.

Eargle indicated that there was now widespread use of reverberation, particularly with choral group recording. Techniques thought to be experimental only a short time ago have become standard practices. Decay, delay and cross-patching are now intimately associated with the use of reverberation, and usually used simultaneously. The technique calls for a short decay time combined with a 50-ms delay and cross-patching the direct and reverberant signals.

Look at the Difference

Unretouched photographs of 21" studio monitor. Photographic data: Rolleiflex C-3, CPS color negative film — ASA 100, 1/25 second at f/5.6

...after 3M Color Dropout Compensation

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

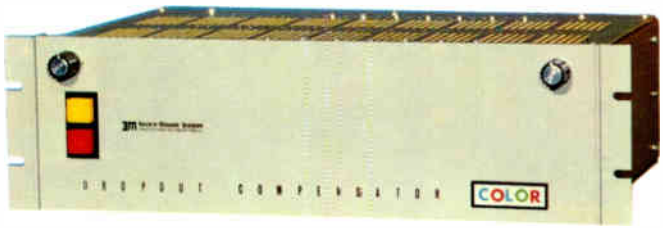
Look at this unretouched composite photograph of a studio monitor. It shows, at the left, a videotape playback with 13 electronically recorded-in dropouts. These dropouts were created by a special test generator which attenuates the RF level to the record driver. On the right, these dropouts have been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

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

Only the 3M Color DOC corrects all these effects.

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

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



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

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

Budget Color—Three Vidicons

Trained on WWJ-TV's newscaster, IVC-120 colorizes the evening news.

Newest competition for the $75,000 studio color camera, the miniscule 65-pound wonder from International Video is winning new adherents daily with its high-quality color and low price tag. A peek under the hood shows some heads-up design that unabashedly compromises where no compromise was thought possible. The result is brilliant NTSC color at a quarter the usual price.

A STUDIO COLOR CAMERA for less than $20 000—impossible you say? Not so when you collect a group of dedicated design engineers with fresh ideas and sights set on a low-budget market.

The IVC-100 started life as a CCTV color camera tagged at $14,000. Since then an NTSC broadcast version has appeared for $18.500 and the newest model—the IVC 200—has more bells and whistles to put it in barefaced competition with the $50.000-to-$80,000 broadcast studio color camera.

Add to this low price a compact, lightweight package (65 pounds), and you have the winning combination for a camera that's setting all sorts of popularity records among CCTV users, CATV operators and, most recently, broadcasters.

The camera does have its limitations for broadcast use, and these are directly traceable to the fact that it uses vidicons. Vidicon lag imposes some restrictions—the camera simply isn't suitable for fast-moving sports events and other situations where the image might change very rapidly and vidicon lag can cause some color streaking.

But plop the camera into a conventional TV studio, let it zoom in on your prize announcer for the 6-o'clock news, and the results are comparable to what you'd expect from a $70,000-$80.000 camera.

Precise Optics

How's it all happen for less than 20 G's? There's no single answer, since the entire concept is new to the industry. For one thing, the vidicon format lets the camera use a relatively inexpensive lens—a lens designed for Nikon 35-mm single-reflex cameras. In the zoom version, an Auto-Nikkor f4.5, 50-300 mm zoom lens does the trick. This lens, as adapted for the IVC camera, has a vidicon f-stop of f1.9 and the zoom range is 18.5 to 111 mm.

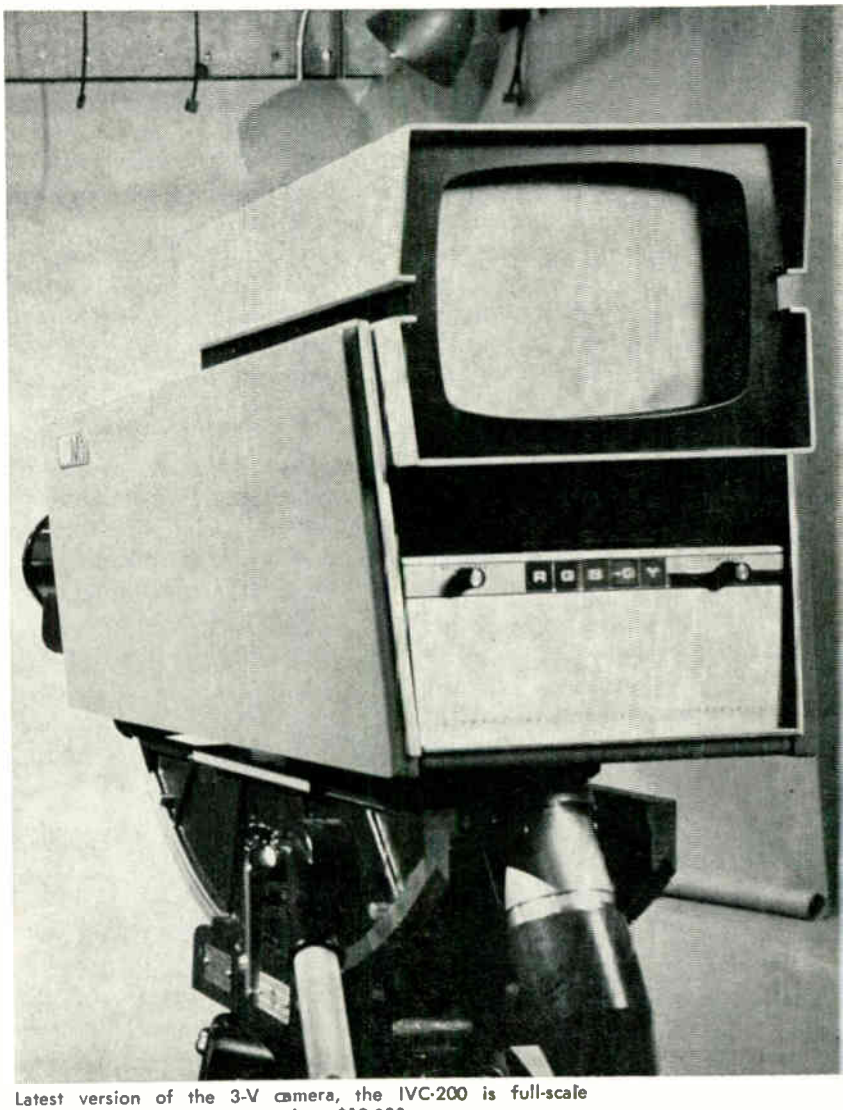
It's in the optics that follow the lens that the "magic" of cost-cutting really comes through.

in a Compact Package

The zoom is backed up by a field lens which makes sure that all the taking lens' light goes to the relay lenses. A system of dichroic mirrors splits up the three primaries, with the green going straight through to the green channel relay lens. The red and blue dichroic systems contain the appropriate filters, and send their signals to the other two relay lenses. The relay lenses provide images to the three vidicons.

The mirror system itself is completely sealed. "We use precision tooling here," says IVC's manager of applications engineering Fred Haines. "The dichroic beamsplitters and trimming reflectors are set in epoxy in slots in the optical assembly base casting," Haines explains. "Not only are no adjustments needed, they're impossible."

Use of this expensive tooling instead of sophisticated adjustments is cited as one of the major cost-cutting factors. Another budgetizing element is the brace of vidicon tubes used for imaging. This concept is one of the keys to the entire price structure, as well as making a compact package so feasible. But the camera's not a panacea; it still suffers from vidicon-imposed image lag. Not only can't the camera be used at sporting events (except possibly for a chess tournament), the camera operator must be carefull not to pan too quickly and to follow action smoothly. Golf matches and surfing contests have already been successfully recorded and broadcast using this camera.



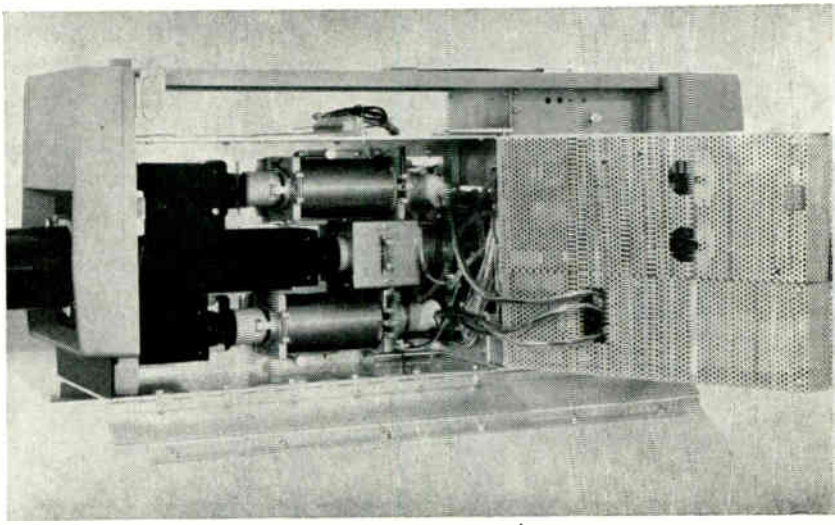
Latest version of the 3-V camera, the IVC-200 is full-scale broadcast color camera tagged at $19,000.

First Broadcast Use

Even so, the camera's potentialities are making it increasingly popular among CATV operators as well as a growing number of broadcasters. One of the first broadcasters to use the camera—Detroit's WWJ-TV (NBC affiliate)—has put the IVC-120 to work in its news programs and plenty of other studio duty. Added to the station's existing G.E. equipment—eight PE-250's and four PE-240 film chain cameras—the IVC-120 is turned on in the morning and left on through the day until sign-off.

Says WWJ-TV's Chief Engineer Ron Renaud, "The camera requires an absolute minimum of maintenance, is highly reliable, and once turned on, needs virtually no attention. Obviously an $18,000 vidicon camera can't have all the features of a $75,000 Plumbicon, but all the important features are there for satisfactory, day-to-day operation."

WWJ-TV is pleased with the picture quality produced by the IVC-120 camera. Using the CBS image enhancer, the camera "produces color pictures that compare favorably with our GE



Electronics door swings aside to give access to camera's guts, showing optical system in black box and vidicons.

IVC Goes International

New cameras for 50-Hertz operation suit the budget color camera for both PAL and SECAM systems used in Europe. Two models, the IVC-101 for CCTV and the IVC-121 for broadcast use, are available.

The export models have all the other features of the IVC line, including 6:1 zoom lens, and switch-selectable viewing of each of the color and luminance channels.

cameras in similar applications, also working with image enhancers," says Renaud.

Compatibility is a key factor. Renaud reports that the color balance between the IVC-120, the GE cameras and network feed is excellent and gives the station a consistently well balanced, true color feed at all times.

High Sensitivity

Camera sensitivity, exceptionally high for vidicon types, is possible because of designed-in colorimetric compromise and very efficient red and blue trimming reflectors. The reflectors are dichroic mirrors which combine with the main dichroic beamsplitters to shape the red and blue light transmission characteristics. This system makes NTSC characteristics possible without lossy trimming filters. This results in greatly increased camera sensitivity.

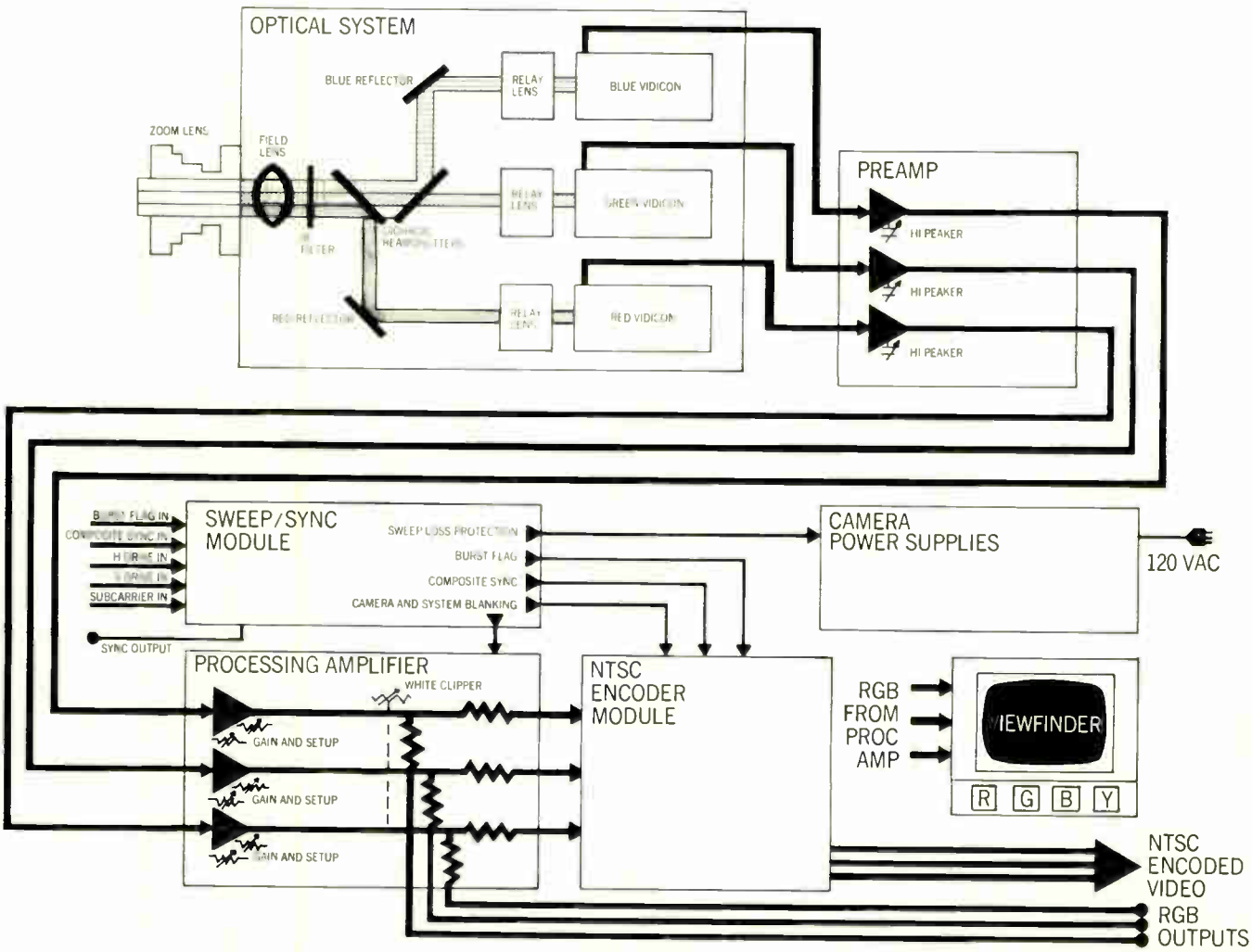
Engineering ingenue shows up all down the line. Instead of trimming the red and green to match blue, blue video amplifier gain has been increased by 6 dB, which naturally results in poorer blue S/N ratio. Since the blue provides only 11 percent of the camera's derived luminance—so the reasoning goes—the overall S/N ratio remains quite good. The result: more sensitivity by 2:1.

Compact Circuits

The entire electronics package can be included in the camera head if desired. The camera is self-contained even so far as to include an internal encoder in the CCTV version. Company officials believe it's the only completely self-contained NTSC color camera that needs just a power cord and a single coaxial cable for the NTSC output. Except for some tie-point assemblies, all circuit boards in the camera are plug-in

Continued on page 78

Block diagram of IVC camera, showing video path for primaries.



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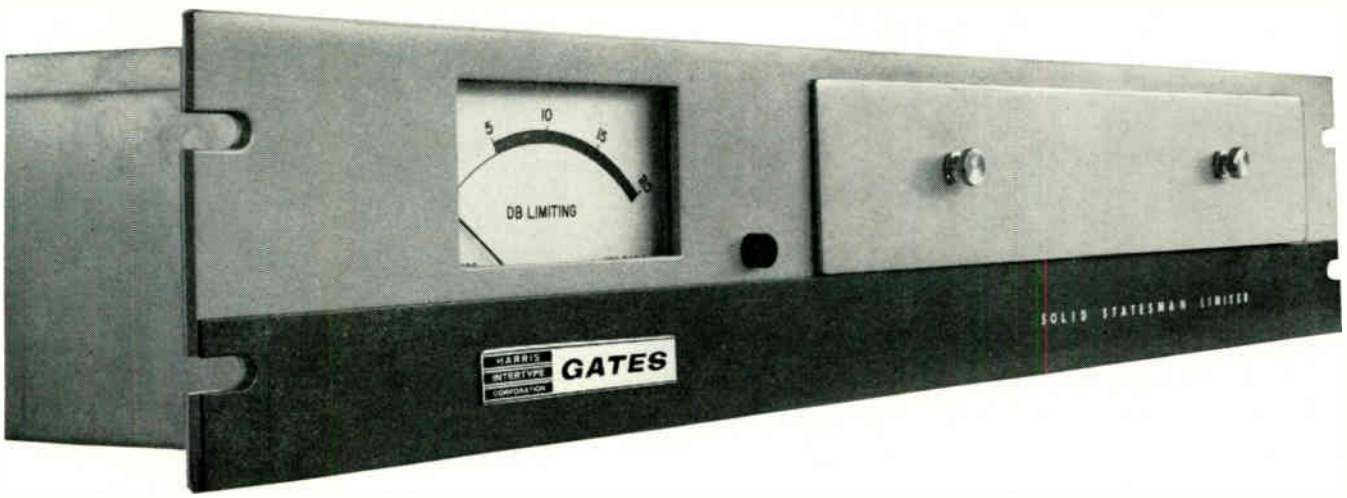
That's what Gates Solid Statesman Limiting Amplifier will do for your station. It brings broadcast signals up to maximum efficiency by controlling audio levels instantaneously, automatically.

The Gates Limiter attacks modulation problems – in just 3 to 5 microseconds (without audible clipping) and a 30:1 compression ratio allows 99.5% modulation.

Asymmetrical limiting is provided for AM stations, permitting positive peak modulation levels of 110% or 120% with negative peaks limited to 100%, thus producing a louder sounding signal.

Want to hear more? Write or call for full information. Gates Radio Company, a Division of Harris-Intertype Corporation, Quincy, Illinois 62301. Telephone (217) 222-8200.



HARRIS INTERTYPE CORPORATION **GATES**

Circle 16 on Reader Service Card

Choosing the Right

By Lon Cantor

Last month, we explained the criteria for solid-state CATV amplifier selection. Now it comes down to the nuts and bolts of who-makes-what. All that remains is a critical comparison of appropriate specs, since by now you should know your way around the spec sheet doubletalk.

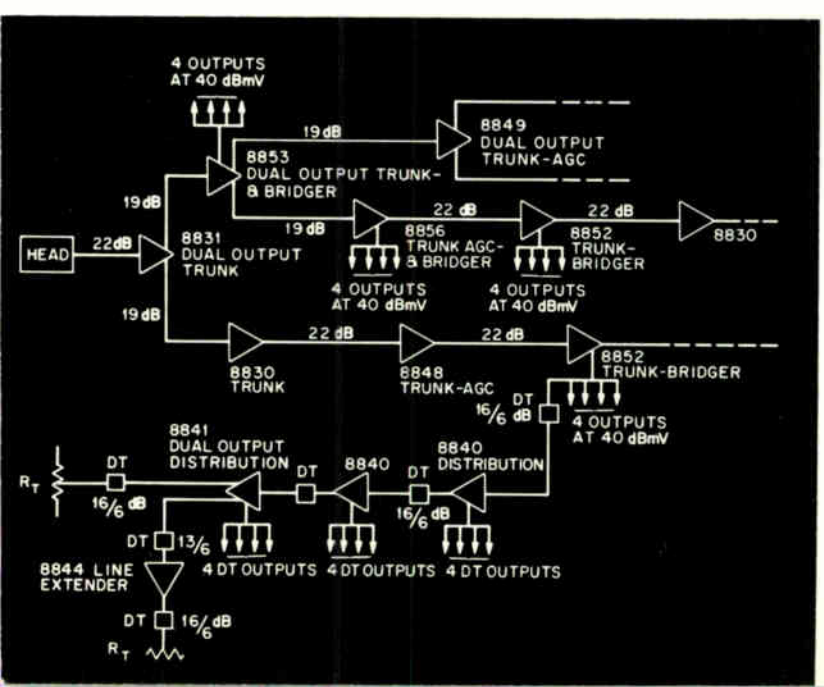
ONCE YOU'VE WADED through those mountains of spec sheets and are ready to make the choice of amplifier, just how do you make the final decision? The specs still need more interpretation, careful weighing, and a very hard look at the tradeoffs you'll be expected to make for some very attractive features.

How to choose? The spec sheets aren't all that clear—even after a close examination. As a purchasing aid, we're showing some condensed manufacturer's specifications for a selected group of amplifiers in the tables on these pages. The descriptions offered in the text are based on the manufacturers' statements and specs, and should reflect the actual performance capabilities of these amplifiers.

AEL. The latest AEL solid-state trunkline equipment, called Colorvue Superband, provides a flat response from 50 to 270 MHz. The extended bandwidth above channel 13—220 to 270 MHz—is provided to accommodate up to 8 extra channels.

In its informative booklet, "Expanded Band CATV Capabilities," AEL makes a strong case against other methods of getting 20-channel capability. Advantages of using the spectrum above channel 13 cited are:

- System can be laid out with conventional 12-channel techniques.



- Proper planning and attention to detail at time of initial construction will permit conversion for band expansion at any time. The initial cost involved in preparing a system for expanded bandwidth can be very minimal—cable manufacturers are now testing cables up to 300 MHz. System owners should specify 300-MHz-swept cable for any new installations.

AEL points out that virtually all methods of obtaining 20-channel carriage require a top-of-the-set converter:

"One interesting solution to the problem is to put complete conversion directly into the TV receiver—manufacture a TV set especially for CATV. AEL has discussed this possibility with several set manufacturers and they are very receptive."

The AEL system is notable for its use of two pilot frequencies—one at 73.5 MHz and one at 269 MHz. Its agc system is able to provide very accurate compensation for changes in cable slope as well as overall cable attenuation.

Colorvue Superband units are housed in heavy-duty cases which open and close with only two bolts. Plug-in modules can be removed and inserted without turning off power, which speeds field servicing.

AEL also makes the plain Colorvue series, similar to the Colorvue Superband except for 20-channel capability.

Ameco. The Ameco Pacesetter ST series can handle up to 27 channels. Its bandwidth is 50 to 200 MHz, but Ameco engineers say it can carry as many as 21 channels in the 126- to 252-MHz octave. The nine models in the Pacesetter series include: a mainline amplifier, an agc amplifier, a mainline/bridger combination, a mainline/bridge combination with agc and a bridging amplifier. All are encased in the same rugged housing, with unitized assembly and don't require equalizers or 5 dB block tilt. Other features include a completely shielded pilot carrier filter (the pilot carrier is at 65.5 MHz), low noise figure and an improved power supply to reduce power drain.

Ameco also markets the Pacesetter line of 12-channel units, similar to their 27-channel Pacesetter series, except for bandwidth.

Anaconda. The 8800 series provides 20-channel capability within the 40- to 250-MHz bandwidth. Anaconda supplies a typical system layout showing the use of all models in the 8800 series, where spacing is 22 dB and agc is used every third trunkline amplifier.

According to a company spokesman, system level stability is achieved through the use of: a pilot carrier agc system which is slope-compensated; thermal equalization in various ampli-

CATV Amplifier—Part II

fier models for complete control.

Mechanical features include: a single-bolt housing, an excellent moisture and rfi shield and siezed center-conductor connectors. There are nine models in the 8800 series: single and double output mainline amplifiers, single and double mainline agc amplifiers, single and double amplifier/bridgers, an amplfier/bridger with agc, and single and double output distribution amplifiers.

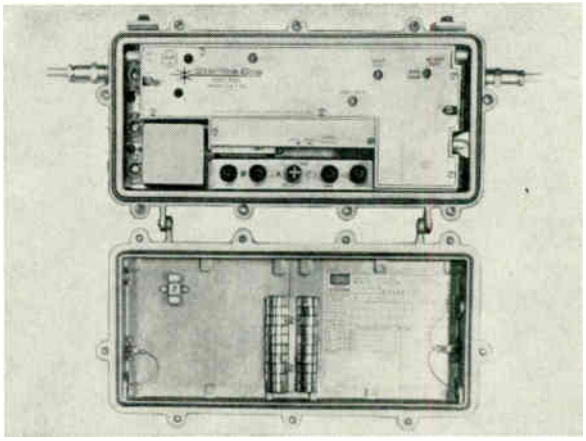
CAS. CAS Mfg. Company introduced at the NCTA Convention its Longline series designed for 12- or 20-channel operation. CAS claims that the amplifier's low operational noise figure and high output make it possible to increase channels later without respacing amplifiers.

CAS uses a temperature-sensing element on each amplifier to compensate for temperature changes. The company claims signal levels are kept more constant than systems using common agc systems every three or four amplifiers. The Longline series can be operated as trunk and bridging amplifiers or as a midband bridging amplifier.

Cascade. Cascade features in its latest trunk amplifier CETA-2/25, a size of only 7½ inches by 9 inches. It has a thermistor probe on each amplifier to sense temperature changes and to compensate for gain. Normal 22-dB spacing is recommended. Universal housing and plug-in modules offer trunk amplifier, high- or low-gain bridge amplifier or combinations.

C-Cor. C-Cor advocates high output for short systems. While all other manufacturers space their amplifiers at about the same distance (22 dB) regardless of how many are to be cascaded, C-Cor varies the spacing with the size of the system.

A company official says, "Using the TA-34 trunk amplifier, for instance, you can space the amplifiers every 34 dB of line instead of the conventional 22 dB spacing. This simply means



Starline 20 series by Jerrold.

that you can cover a greater distance with fewer amplifiers—hence, less initial cost for amplifiers, lower installation costs, and lower maintenance costs over the years."

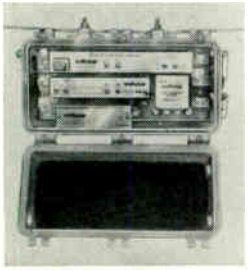
C-Cor makes two basic trunkline amplifiers in the Novacor series. The Model TA-34 provides 34 dB gain and the Model TA-40 provides 40 dB gain. Each unit contains its own agc, which works from a 220-MHz pilot carrier. C-Cor refers to its agc as alc. C-Cor systems have agc in every amplifier, rather than every second or third amplifier.

C-Cor also makes the Model TA-34-SC, which works from two carriers (220 MHz and 73.5 MHz) to compensate for changes in cable slope. The firm recommends that this unit be used as every fourth trunkline amplifier, if a dual-pilot-carrier system is desired.

C-Cor's full complement of bridgers has Novacor units fitting into a universal cast-aluminum housing, featuring a "pressure ridge" seal for weather tightness and a separate rfi gasket.

Conductron. Conductron is new in the field of CATV. It is currently marketing a line of solid-state CATV amplifiers including: a mainline amplifier, a mainline with agc, a mainline/

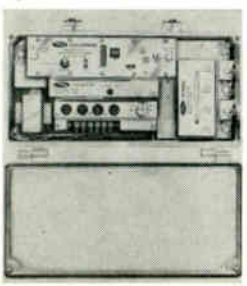
A.



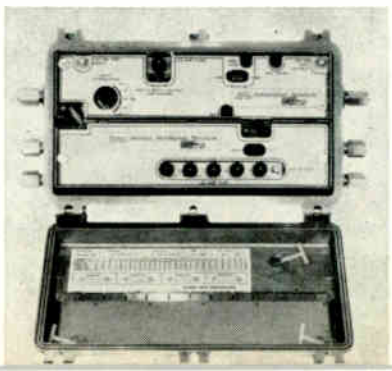
B.

A. Vikoa's 21-channel Futura series.
B. Model TA-34 from C-Cor.
C. AEL'S Model CVT-RBM intermediate bridging amplifier from the Colorvue series.
D. Phoenician series from Kaiser.
E. Entron's Model RB-6T.
F. Housing for all SKL's Colorburst 7000 amplifiers.

C.



D.



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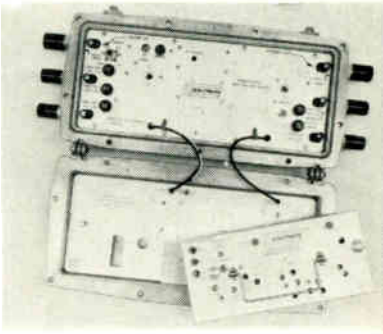

F.

bridger, a mainline/bridge with agc and a distribution amplifier.

Entron. The big feature of the Entron line is closed-loop automatic level and slope control. Automatic level control (flat gain) is accomplished by gating two field-effect transistors with a dc-voltage derived from a 73.5-MHz pilot carrier. Automatic slope control (to compensate for changes in cable slope) is achieved by using a Varicap with a dc voltage rectified from a 225-MHz pilot carrier.

Entron recommends that agc be included at least in every third amplifier, with agc in every amplifier preferable.

In explaining Entron equipment, H. James Carter, a company engineer, says: "Our equipment will hold signal levels very close to a constant value with our dual pilot carrier alc/atc concept. Trunkline signal levels of competitive systems vary 6 dB to 8dB and more. We hold trunkline variation to within 1 dB, occasionally measuring 2 dB at the most. Holding the trunkline signal variation to close tolerances results in improved signal-to-noise ratios and reduced crossmodulation problems, producing a better picture."

Entron makes a full line of solid-state CATV trunkline equipment, including mainliners with and without agc, bridgers and combinations. All are housed in CATV-quality cast aluminum housings.

HTV. HTV is another newcomer to the CATV field. It makes the Vista 20 line of solid state CATV trunkline equipment. A universal cast aluminum case is used to hold a variety of plug-in modules, producing all needed combinations of mainline, agc and bridging amplifiers. The agc works from a single 73.5-MHz pilot carrier.

Jerrold. The Jerrold Starline 20 series provides 27-channel capability. It can carry 12 conven-

AEL Specifications

Bandwidth 50 to 270 MHz
Response flatness ±0.25 dB
Noise figure 7.5 dB
Operational gain 20 to 24 dB
Maximum gain 27 dB
  51 dBmV with—57 dB crossmodulation 12 ch (5 dB block tilt)
  48 dBmV with—57 dB crossmodulation 20 ch (5 dB block tilt)
Input level control Plug-in pads, (0, 3, 6, 9, 12 dB)
Gain control range 0 to 6 dB
Equalization 0 to 24 dB of cable (plug-in equalization and slope control)
Slope control range 0 to 7 dB of cable
Return loss input output 16 dB
Typical output level 32 dBmV
Pilot carriers 73.5 MHz and 269 MHz
Automatic slope control stability ±0.5 dB for ±3 pilot differential
Agc stability ±0.5 dB for ±4.5 dB input change

Ameco Specifications

Bandwidth 50 to 260 MHz
Response flatness ±25 dB
Cross mod. ratio —90 dB @ +32 dBmV output 12 ch.
Noise figure 10 dB Max. ch. 13
Input/output impedance 75 ohms, 16 dB minimum return loss
Input pad 0 to 6 dB
Recommended operating gain 22 dB ch. 13
Gain range ±3 dB
Manual tilt control range+
  +1.5 dB
  —6.0 dB
Automatic gain/slope range ±3 dB cable equiv. (±0.5 dB)
Supply voltage (input) 20 to 38 Vllac
Bridging output tap 10 dB below main output level
Tap output impedance 75 ohms, 12 dB minimum return loss

Anaconda Specifications

Frequency range 40 to 250 MHz
Response flatness
  At operating gain ±0.25 dB
  Over spec gain range ±0.50
Gain control
  Trunk operating gain 22 dB Cable
  a. Pad
  b. Adjustable (minimum) +2, —6 dB
Normal operating level
  12 channels
    Trunk input +12 dBmV
    Trunk output (220 MHz) +34 dBmV
  20 channels
    Trunk input +10 dBmV
    Trunk output (245 MHz) +32 dBmV
Minimum tilt control range (pivot in vicinity of 220 MHz)
  Trunk (at 54 MHz) ±2 dB
Impedance match (return loss referred to 75 ohms)
  Input 16 db Min.
  Output 16 dB Min.
Noise figure
  Channel 2 (maximum) 10 dB
  Channel 13 through 240 MHz (maximum) 12 dB
Crossmodulation *(at operating level)
  Trunk amplifier —87 dB
Thermal equalization 16 dB cable
  Response flatness ±0.5 db
RFI ** Meets FCC Specs
*Crossmod test - 12 channel, 87.5 percent modulation, 15 kHz synchronously modulated, 17.5 percent duty cycle
**Rfi spec - at a distance of 10 ft., FCC req. is 20 uV/m max. for ch. 2 to 6 and 50 uV/m max. for ch. 7 to 13

CAS Specifications

Bandwidth 50 to 240 MHz
Noise figure 10 dB or less
Operational gain 21 dB
Maximum gain 25 dB
Maximum output capability 53 dB 12 channels with operational tilt for 57 dB crossmodulation
Input level content +12 dB, channel 2; +10 dB channel 13
Gain control range to 70 dB channel 13
Tilt control range 5 dB channel 2

Cascade Specifications

Noise figure 10 dB or less
Maximum gain 25 dB
Maximum output +50 dBmV
Input pad to 3 dB
Gain control 6 dB channel 13
Tilt control 5 dB channel 2

C-Cor Specifications

	TA-34/TA-34B
Output level @ —57 dB X-M dBmV (1)	58
Output level - operational	43
Crossmod ratio, ch. 12 (dB)	—87 dB
Measured @ tilt & slope (dB)	17 dB
Amplifier, cascade, max. number	32 (2)
Noise figure, ch. 13 (max dB)	8
ch 2 (max dB)	10
Gain, min. spacing/operational (dB)	34
Gain control, manual range (db)	4
Plug-in pads available (dB)	0, 3, 6
Gain control, automatic (dB)	±3
Bandpass (MHz)	50 to 220
Slope control range, cable length in dB at ch. 13	28 to 34

Conductron Specifications

Frequency band 50 - 240 MHz
Minimum full gain 26 dB
Minimum return loss 16 dB
Maximum Noise figure
  ch. 2 7 dB
  ch. 13 9 dB
Minimum output capability 48 dBmV (12 ch. —57 dB crossmod.)

Entron Specifications

Bandwidth 50 MHz to 230 MHz
Frequency response ±0.25 dB

tional vhf channels plus six channels in the 220- to 260-MHz range and nine channels in the midband.

Jerrold feels it has solved the problem of second-order distortion in the midband by using push-pull amplifier modules. According to a company official, push-pull circuitry assures suppression of second order beats to a point well below crossmodulation.

The new push-pull Starline 20 amplifier modules are easily interchangeable with ordinary Starline 20 modules. Thus, an existing 20-channel system can add channels at any time simply by adding head-end equipment and replacing old amplifier modules with push-pull modules.

Features of the Starline 20 include a rugged, well-sealed case, plug-in modules, siezed center conductor connectors and unusually good rfi suppression. As for agc, a company engineer says, "The unique combination of a differential agc amplifier and the original Jerrold unijunction bridged attenuator provide the finest in ultraflat gain control over the entire automatic gain control range."

The Starline 20 series comprises six basic models: a trunk amplifier, a trunk amplifier with agc, a trunk amplifier/bridger, a trunk amplifier/bridger with agc, a high gain distribution amplifier and a low gain distribution amplifier.

In addition to the Starline 20, Jerrold also makes the Starline One series. Since the frequency response of Starline One is restricted to 50 to 220 MHz, it is basically intended for 12-channel operation. However, new push-pull amplifier modules can be used, adding the nine midband channels and enabling a Starline One system to carry up to 21 channels.

A Jerrold CATV spokesman says: "Jerrold Starline 20 amplifier stations, each designed for a specific task along a system's main trunk line, are the most reliable solid-state modular CATV equipment presently on the market. Mechanically and electronically, Starline 20 equip-

Tilt, factory adjusted, ch. 13/ch. 2 10 dB
Tilt control range, manual —5 dB (10 dB to 5 dB ch. 13/ch. 2)
Gain at channel 13 picture
Operational 25 dB
Maximum 28 dB
Gain control range (manual gain position) 8 dB
Gain stability for ±10 percent LINE VOLTAGE VARIATION ±0.1 dB
Alc stability +0.5 dB for +3 dB, —0.8 dB for —3 dB[2]
Slope stability ±0.5 dB for ±3 dB
Input level control, switchable pads 0 to 7 dB in 1 dB steps
Output level control range (alc position) ±2 dB
Impedance, input and output 75 ohms
Return loss, input and output 20 dB
Noise figure 14 dB
Recommended input levels
Each channel +10 dBmv
Distortion characteristics[2]
Crossmodulation ratio guaranteed less than .05623 percent (—65 dB) under the following recommended operating conditions:
Output level at ch. 13 35 dBmV
Number of standard TV channels 12
Output tilt 10 dB ch 13/ch 2
Amplifier slope 10 dB

[1]With correction to maintain all signals in the passband within +0.5 dB for a +3 dB and —0.8 dB for —3 dB level change at ch 13.
[2]Tested in accordance with NCTA Standard "CATV Amplifier Distortion Characteristics," published 3/27/67. (12 channels, sync-sync) Under normal field operating conditions (random sync), crossmodulation will be down more than 75 dB.

HTV Specifications

Frequency range 50 to 220 MHz
Output capability (12 ch. 157 dB crossmod.) 48 dBmV
Minimum gain (ch. 13) 27 dB
Gain, operational 22 dB
Agc compensation
±5 dB input variation ±0.5 dB
Manual gain control 8 dB
Response flatness ±0.25 dB
Noise figure
ch. 2 8 dB
ch. 13 9 dB

Jerrold Specifications

Output capability (for —57 dB crossmod.)
Tr. amp. (per ch. for 20 ch.) 46 dBmV
Tr. amp. (per ch. for 12 ch.) 49 dBmV
Gain, operational, meas. at 240 MHz, station input to tr. amp out (no equalizer) 22 dB
Equalizer loss 1 dB nom.
Gain, operational, agc. (no equalizer) 22 dB
Operating levels, typical 20 ch. operation 1 dBmV in, 29 dBmV out
Operating levels, typical 12-ch. operation 9 dBmV in, 31 dBmV out
Noise figure 9 dB

Kaiser Specifications

Gain (min. full gain @ channel 13): 30 dB
Recommended spacing: 24 to 27 dB @ channel 13
Max. output capability (for —57 dB crossmodulation): +50 dBmV/channel for 12 channels
Recommended system operating level +35 dBmV @ channel 13 (half tilt)
Noise figure @ maximum gain: 10 dB @ channel 13 16 dB @ channel 2 max.
Bandwidth 50 to 220 MHz
Response flatness ±0.25 dB (54 to 216 MHz)
Agc. range Less than 1 dB output change with up to 6 dB (cable equivalent) input change (automatic gain and tilt)
Input match 18 dB return loss (vswr 1.3:1)
Output match 15.5 dB return loss (vswr 1.4:1)

SKL Specifications

Frequency band (MHz) 50 to 220
Response flatness (dB) ±0.25
Min. full gain (dB) (at ch. 13) 26
Gain adj. PLUG - IN PAD 0, 3, 6, 9, 12
Range (dB) VARIABLE 0-7
Slope range (dB)
FIXED 8/17.0/12
VARIABLE 0-7
Min. return loss
In 16
rel. to 75 ohms (dB) Out 16
Max. noise figure (dB) ch. 2 8
At full gain ch. 13 11
Min. output level 48 dBmV
Alc pilot 205.25 MHz
Control (±4 dB input) ±0.5 dB output
Asc pilot 73.5 MHz
input slope variation, 3.5 dB ±0.5 dB output

Vikoa Specifications

Frequency range 50 to 225 MHz
Gain (operational) 22 dB
Gain control, variable, manual 0 to 8 dB
Gain control, fixed plug-in 0, 3, 6, 9, 12 & 15 dB
Distortion characteristics (2)
maximum output level 50 dBmV
Crossmodulation —57 dB
Second order beat —60 dB
Second harmonic —66 dB
Operational output level 32 dBmV
Crossmodulation —93 dB
Second order beat —78 dB
Second harmonic —84 dB
Noise figure maximum 10 dB
Agc compensation level control ±4 dB input = ±0.5 dB output
Tilt control 3 dB input tilt = 0.5 dB output tilt
Tilt control, variable
Trunk or extender (continuous 0 to 7 dB of cable
Bridger (continuous 0 to 7 dB of cable
Tilt control, fixed 3, 6, 9, 12 and 15 dB of cable
Impedance match (min. return loss) 18 dB
Amplifier spacing w/equalizers 22 dB

Specs Available

For more information and detailed spec sheets, write directly to these manufacturers:

AEL
P.O. Box 552
Lansdale, Pa. 19446

Ameco
P.O. Box 13741
Phoenix, Arizona 85002

Anaconda
1430 S. Anaheim Blvd.
Anaheim, Calif. 92803

CAS
P.O. Box 47066
Dallas, Tex. 75247

Cascade
Electronic Ave.
Port Moody, B.C.
Canada

C-Cor
60 Decibel Road
State College, Pa. 16801

Conductron
3475 Plymouth Rd.
Ann Arbor, Mich. 48107

Entron
2141 Industrial Parkway
Silver Spring, Md. 20904

HTV
210 Boxart St.
Rochester, N.Y. 14162

Jerrold
4th & Walnut Sts.
Philadelphia, Pa. 19105

Kaiser
2216 West Peoria Ave.
Phoenix, Ariz. 85020

SKL
1360 Soldiers Field Rd.
Boston, Mass. 02135

Vikoa
400 Ninth St.
Hoboken, N.J. 07030

ment meets the requirements of the future when installed today. The very latest push-pull versions of both Starline One and Starline 20 amplifier stations reduce second-order beat distortion to an absolute minimum."

Kaiser. Kaiser makes two types of Phoenician series CATV trunkline equipment. The KG series is designed for standard 22-dB spacing; the KC series is designed for 25-dB amplifier spacing. Both use single pilot carrier agc (166.5 MHz).

According to a Kaiser spokesman, "The Phoenician series trunk amplifiers are modular in design and use one universal housing. The plug-in construction allows interchangeability from trunk amplifier to 2- or 4-output bridging amplifier, or combinations of trunk and bridging with or without automatic gain control. This interchangeability simplifies maintenance, system expansion and reduces spare parts inventory."

Kaiser explains a typical CATV system layout using its equipment: "The first trunk cable section should be 2300 ft, plus or minus 200 ft in length. Although adequate signal levels may be available from the head-end to extend this length to over 3000 ft, future addition of auxilliary channels or special filter and trap requirements may reduce this output level. The reserve signal level may be easily attenuated to the requirel level at the head-end before connection to the trunk.

"The maximum number of trunk amplifiers in tandem for 12 channels plus fm should be limited to 64. Either two- or 4-output bridging amplifiers may be installed at any trunk amplifier location to provide the required distribution legs.

"Length of individual distribution legs is limited to a total of 60 dB (at channel 13) of cable to limit the extent of the level variation due to the effect of temperature upon the cable attenuation. The addition of up to three line-extender amplifiers can be used to extend the length of the distribution legs while maintaining a total of 60 dB without appreciable effect upon the signal. This results in a maximum distribution leg length of approximately 3700 ft."

SKL. The outstanding feature of the SKL Colorbrust/7000 series is dual pilot carrier agc. A 205.75 MHz pilot is used to control flat gain and a 73.5 MHz pilot controls the slope.

According to company engineers, "The SKL/7027K output level remains constant within ±0.5 dB for a flat level variation of ±4 dB and a slope variation of 3.5 dB. To insure the highest reliability is boosted by processing detected pilot signals by differential operational amplifiers in a monolithic IC. These in turn control linear variable resistors which provide the alc (agc) and asc (automatic slope control) action without introducing distortion or affecting any other trunk amplifier parameters."

SKL approaches 20-channel capability via an unusual route. Company engineers propose converting *all* vhf channels in a system to non-standard frequencies. Carrier frequencies are carefully chosen within the normal 50- to 220-MHz spectrum, so there can be 18 channels with no second-order beats within the passband of any channel. More than 18 channels can be accomodated if the bandwidth is extended above 220 MHz.

Vikoa. Vikoa's Futura 21 series is similar to its Futura 12 series, except that its made to handle 21 channels, including nine channels in the mid-band.

Using modular plug-in construction with a heavy duty cast aluminum housing, the Futura series includes trunk line amplifiers, bridging amplifiers and combinations, with and without agc. Dual pilot carriers (112.5 MHz and 225 MHz are used for agc. **BM/E**

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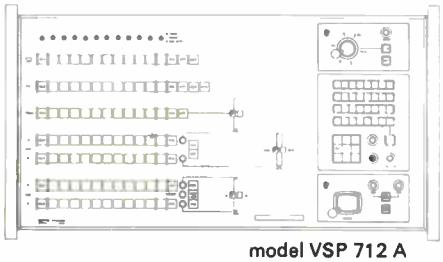
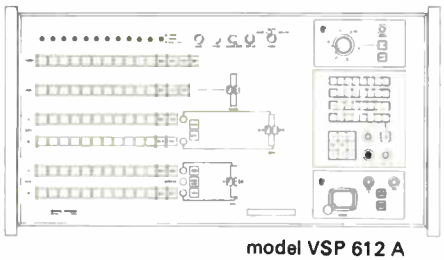
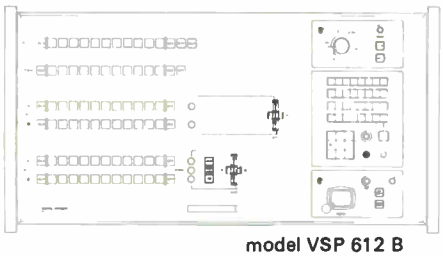


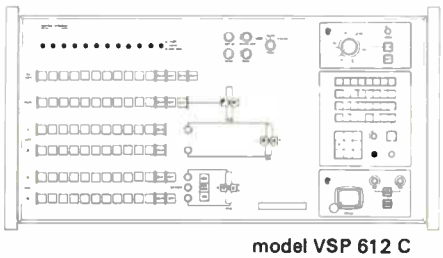
model VSP 712 A



model VSP 612 A



model VSP 612 B



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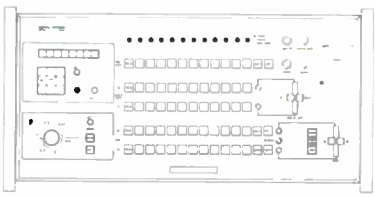
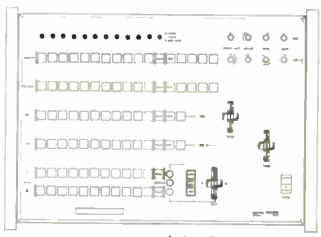
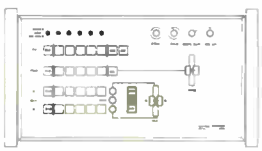


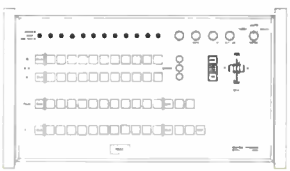
model VSP 512 A



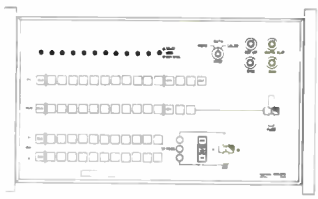
model VSP 612 D



model VSP 406 B



model VSP 414 B



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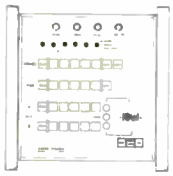

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TV Engineering

Mini Connectors for Mini Equipment

Television control room equipment such as mixers, filters, patch panels and power supplies, can be designed smaller and smaller, but unless the connectors used with them are smaller too, the resulting weight and space savings are of no value.

Until recently the standard coaxial connector for control room and studio use has been the uhf type. However, to take advantage of the space savings offered by newer solid-state equipment, the American Broadcasting Co. has switched to crimp-type BNC coaxial connectors. These units not only require about one third the space of the old uhf's but also provide other significant advantages, according to J. Herbert Riedel, manager of TV engineering maintenance.

"Using crimp-type connectors gives us a quality connection that we know is good. There's no guesswork involved as with soldered connections and the crimp connections do not work loose with vibration and constant mating and unmating," Riedel said.

Crimp units, such as the BNC manufactured by Amphenol RF Division of Amphenol Corporation, make terminating coax cable just a matter of seconds rather than five minutes or more with solder-type connectors, Riedel added.

Not only are the crimp connectors being phased in to all master control room applications requiring them, but they are also used in new studio construction and when older studios are remodeled.

TV Engineering

Ultrasonic Cleaning Restores Videotape

Though videotape has not been with us long, the possibilities were recognized early by the TV industry, whose recording and broadcasting flexibility has been revolutionized by its far-reaching potentials. But, as with movie film that revolutionized an age before it, videotape sometimes falls prey to attacks by dust, scratching, and other contaminating influences introduced during normal handling and mechanical operation. Abrading or chemically attacking the magnetic emulsion either weakens or destroys some of the thousands of vital electrical signals needed. The resulting dropouts affect the commercial life of the tape, often to the point at which it must be discarded as unacceptable.

Granada TV of Manchester, a British independent television company handling major programs for the country's independent network, had been storing videotaped programs since their first inception as a recording medium. An opportunity to replay some that had been in storage for several years unexpectedly presented them with a serious problem that could have had far-reaching effects on the practicality of videotape storage. Dirt and finger residue, plus other tape contamination, required an extensive cleaning operation, but previous laborious and damaging hand-cleaning methods were unacceptable. However, the tapes still carried material of great value, especially in light of technological developments that had simplified the transition of video signals from the English to the American system, for rebroadcast in the U.S.A. Granada had been using a Lipsner-Smith CF_2 cleaner for cleaning its filmed commercials. Why not try it on the soiled videotape?

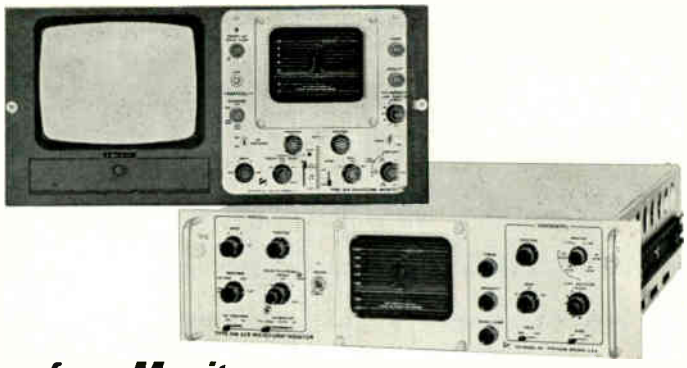
Dust and dirt particles can produce scratches that will harbor more dust and dirt, so where high tape quality is important, they must be removed by some other method than hand-wiping. Solvent rinsing or water cleaning are ineffective because the drying process leaves a film that retains the dirt. A satisfactory machine to remove such soil, as well as fingerprints, greases, adhesive, lacquer, and similar contamination, was developed by the Lipsner-Smith Corporation of Chicago, Illinois. The device has been employed for cleaning motion picture film, audio tape, computer tape throughout the world, and now it's being applied to videotape.

The CF_2 cleaner gets its name from the Freon-containing, specially formulated solvent used in the cleaning bath. Freon, an odorless, colorless gas boiling at —29°C, imparts a high volatility to the cleaning solvent, which is important to the rinsing operation. The cleaning bath employs ultrasonic transducers operating from an electrical oscillator, to produce intense sound waves that form minute bubbles of vapor. These bubbles collapse implosively, producing intense shock waves that dislodge the dirt. The solvent is continuously filtered to remove the dislodged particles and keep the cleaning bath clear of any soil.

Efficient tape cleaning requires a method for removing the solvent from the tape before it evaporates and redeposits any soil. As the tape leaves the cleaning bath, it passes through a pressure rinse that leaves a controlled, thin, surface layer of solvent, and then passes between high-volume warm-air jets that remove solvent and any dispersed soils. It is here and in a following heated-air drying operation that the high volatility of the Freon produces an instant evaporating action. The tape runs automatically through the cleaning process, unwinding from the soiled spool and rewinding on a clean one. Electronic controls and safety devices control its run, which may be set for 20 ft/min. to 120 ft/min, depending on its soiled condition. Important in videotape handling is the fact that no dust-attracting static charge is left during the process.

Applied to television motion picture film, the Lipsner-Smith CF_2 cleaner has improved sound and picture quality of millions of feet, and in some cases is being used by broadcasters on every foot of film aired. In this role it has won an Oscar Award for outstanding technical achievement. But its application for videotape cleaning has great promise.

measuring picture quality in terms of K-factor



...with a Tektronix Type 529 or RM529 Waveform Monitor

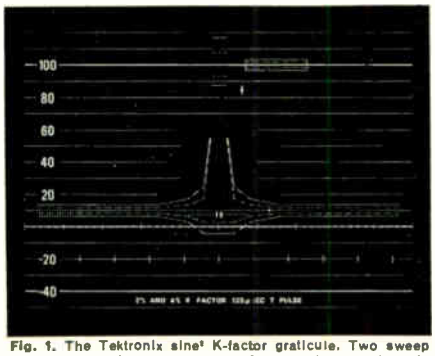


Fig. 1. The Tektronix sine² K-factor graticule. Two sweep speeds are provided on these waveform monitors so that this graticule can be used for 0.125 μs T-pulse testing on such applications as studio and network transmission lines, and for 0.250 μs 2T-pulse testing on such applications as video tape recorders and transmitters.

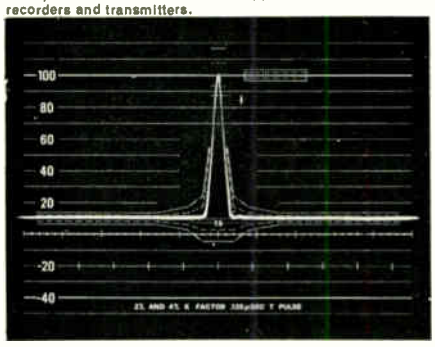


Fig. 3. Display of an undistorted 0.125 μs sine² pulse at 0.125 H/cm magnified 25X. A T-pulse with its base on the +10 IEEE unit line will reach the +100 IEEE unit line if the video system has 6.7 MHz equivalent bandwidth. At 4 MHz, pulse height will be reduced by 18%.

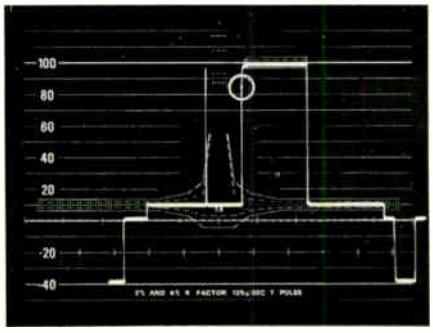


Fig. 5. Display of a bar signal at 0.125 H/cm with the base on the +10 IEEE unit line and the rising edge aligned with the arrow (encircled). The top of the bar signal should be at the +100 IEEE unit line. The inner and outer lines of the box at this point show the 2% and 4% K-factor limits.

Measurements of TV picture quality in terms of K-factor can be made simply and precisely using the sine² graticule of a Tektronix Waveform Monitor. These measurements can be made when a sine² pulse and bar is transmitted during the vertical blanking interval of normal broadcast operation.

Figure 1 shows the sine² graticule — marked in percent of K-factor for signal-distortion measurements when using a sine² pulse and bar and also marked in standard IEEE units for normal signal-level measurements. Figure 2 shows an undistorted sine² pulse and bar.

T-pulse measurements. The phase response of a video system can be determined by observing the leading and trailing edges of the sine² pulse. Figure 3 shows an undistorted pulse. Phase distortion causes asymmetrical aberrations, such as shown in Figure 4. Any display of symmetrical ringing on both the leading and trailing edges of the pulse indicates bandpass degradation without phase distortion.

Bar Measurements. The critical mid-band frequency and phase response of a video system can be determined by observing the amount of tilt in the flat-topped portion of the bar. If the video system has ideal response, the bar will be transmitted as shown in Figure 5. Impaired response in the system will cause tilt or sag, such as that shown in Figure 6, with streaking or smear in the picture.

Type 529 Waveform Monitor $1085
(8¼" high, 8½" wide, 19" deep, weighs 24 lb.)
Rack Mount Type RM529 . . . . . $1135
(5¼" high, 19" wide, 20" deep, weighs 27 lb.)
Power consumption of each model is ~80 watts — no fan used.

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

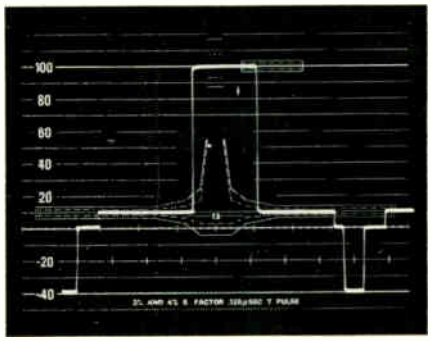


Fig. 2. Display of a sine² T-pulse and bar. Waveform shows the following: the horizontal sync pulse on the —40 IEEE unit line, the backporch on the 0-level line, the 10% offset or base for the pulse and bar, and the sine² or T-pulse on the +10 IEEE unit line, and the bar on the +100 IEEE unit line.

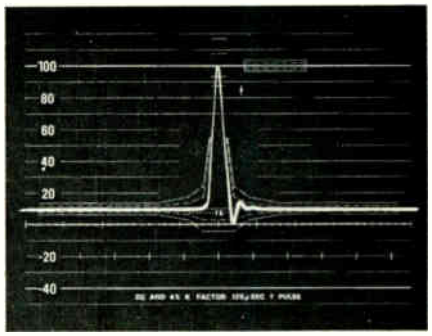


Fig. 4. Display of a sine² T-pulse showing some phase distortion. Phase distortion will appear as aberrations on the leading or trailing edges of the T or 2T-pulse. The K-factor system relates the amplitude of ringing vs the displacement of the ring from the transient in terms of picture degradation.

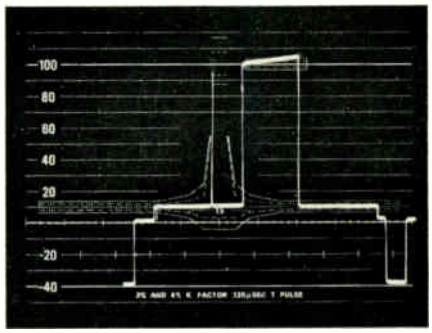


Fig. 6. Display of a bar signal at 0.125 H/cm, showing tilt which exceeds the 2% to 4% K-factor tilt limits.

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

Exacting standards of component manufacture

... part of the Tektronix commitment to technical excellence

Circle 21 on Reader Service Card

BROADCAST EQUIPMENT

Low cost NTSC helical scan VTR

Model 6403 helical-scan videotape recorder is a color recording rotary two-head system using 1-in.-wide longitudinally oriented tape. VTR records NTSC directly and plays back with an accessory adapter. System has playing time of 96 min with 3600 ft of tape on 9.5-in. reels. VTR accepts EIA or FCC standard signal. Resolution is 400 horizontal lines of monoscope test pattern on playback

mode. Additional second audio channel optional. Frequency response on first channel is 60 to 10,000 Hz ±4 dB, lower on second channel. Operational features include a double capstan drive and skew control. START, STOP, FAST FORWARD, PLAY, RECORD and REWIND can be operated with cover of unit in place. Other features include recording of audio and video portions independently of each other, built-in remote control capability, slow motion and still picture playback. Model 6403 measures 25 × 21 × 18.5 in. and weighs 160 lb. Price is $4000. Craig Corporation. Los Angeles, Calif. 90021.

Circle 101 on Reader Service Card

Remote stereo console

Model TACS-3 solid-state console for stereo or dual channel operation has two high-level inputs and four low-level inputs to provide three stereo channels or six mono channels. It incorporates attenuators as faders and each fader has a cue position. Less than ½-percent distortion is introduced at 8 dBm from 20 Hz to 20 kHz with frequency response of ±1 dB from 20 Hz to 15 kHz. All channels can be switched to OUTPUT A, OUTPUT B, OUTPUT A AND B AND OFF. Unit measures 18 × 12¼ × 9¼ in. and weighs approximately 20 lb. Price is $995. Wilkinson Elec-

tronics, Inc., Woodlyn, Pa. 19094.

Circle 103 on Reader Service Card

Telephone in attache case

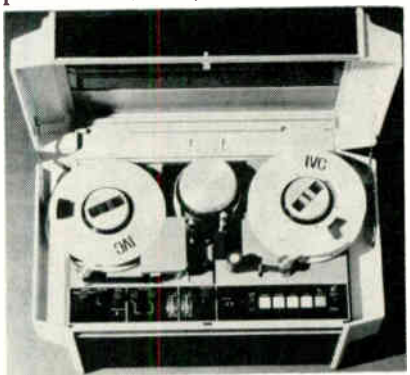
Portable Executive Telephone operates like a mobile radio telephone, and is mounted in an attache case measuring 17½ × 12 × 4 in. Unit received operational acceptance from the FCC in January, 1968, after three years of research and development by International Systems Ltd. of Canada. Power output is 25 W. User places a call by selecting one of the unit's 11 channels and signals a mobile telephone operator who connects him with desired number. Incoming calls are signalled by a buzzer and a light. Power is provided by rechargable nickel cadmium batteries. Telephone service is by Bell or independent companies and is also available through the Radio Common Carrier Interconnected network.

PET's purchase price is $2160; it can be rented for $49.50 per month on a five-year term. A lease with option to buy is also available. Portatronic Systems, Inc., New York, N.Y.

Circle 100 on Reader Service Card

IVC VTRs for PAL, SECAM, NTSC

Fifty-Hz versions of the IVC-800 series VTRs now are available for operation on the PAL, SECAM as well as the NTSC system. The IVC-801, a modified version of the monochrome Model 800, records and plays back SECAM color. Only minor changes are required to make the Model 800 operate on SECAM because of the basic simplicity of that system. Model IVC-811 is designed for operation on the PAL color system; the IVC-810 is now in operation in the U.S. on the NTSC system. The recorders weigh 59 lb (cased) and 58 lb (uncased) and measure 19 × 12¼ × 9⅝ in. high (uncased). A plug-in color processor printed circuit board is required for color playback on NTSC or PAL. The SECAM system does not require a color processor. Recorders can be upgraded for color in the field by adding the board at a cost of $500. The IVC-801 is priced at $4500; the IVC-811 at

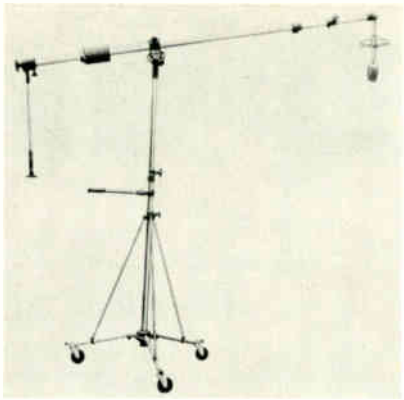


$5000. Optional slow motion is available for an additional $350. International Video Corp., Mountain View, Calif.

Circle 106 on Reader Service Card

Portable mike boom

Porto-Boom Model BS-37 portable boom microphone stand, designed for all studio applications, extends to a maximum of 18 ft, and is collapsible



to 7 ft. Maximum height extension is 9 ft, collapsible to 5¼ ft. The Porto-Boom can be knocked down or reassembled in a few minutes without the use of tools. All controls are noise-free, smooth in action and balanced. A 2-position, dual control microphone "gunning device" rotates the mike through a 360-degree arc. Device has an internal telescoping linkage which functions continuously at any boom extension. Boom has 4-in. ball-bearing rubber casters. Porto-Boom weighs 73 lb, including a 22-lb counterweight. Price is $861. Atlas Sound, Parsippany, N.J. 07054.

Circle 104 on Reader Service Card

Two-in. recorder with 16 tracks

A compact 2-in., 16-track professional recorder/reproducer, featuring an integrated overdub control for remote synchronization of tracks, was recently made available at the AES show in New York. Model 401, smaller than other professional recorders, has vu meters that are numbered and arranged in a double row

THIS FEATURE-FILLED MIXER/REMOTE AMPLIFIER HAS AN UNEXPECTED* PRICE TAG

*Unexpected? Judge for yourself: the Shure M67 Professional Mixer/Remote Amplifier has virtually *every* important feature asked for by broadcasting and recording studios and sound installers. It can be used as a complete, compact console for studio, remote, or original installation use—or as an "add-on" mixer for expanding existing facilities and providing additional microphone inputs with tape recorders and VTR's.

It features 600 ohm line and microphone level outputs; an illuminated VU meter calibrated for +4 and +10 dbm; four low impedance microphone inputs, each with individual low-frequency filter inputs—plus one input convertible for line bridging, or 600 ohms; built-in tone oscillator to provide calibration signal to set signal levels; extremely low noise and RF susceptibility (noise level −126dbv); female Cannon connectors, two-level headphone monitor jack and many other features.

Its distortion level is UNDER 1% from 20 to 20k Hz at +10 dbm out! Clipping level is +18 dbm. It also features a unique *noiseless* automatic switchover to battery if the AC line fails. (Battery pack optional.)

It is not much larger than two cartons of cigarettes (11⅜" x 7½" x 2½") and weighs just 4 lbs. 4 oz.

Incredibly, this truly professional, compact, complete mixer/remote amplifier has a professional net price of only $147.00!

Write Professional Products, Shure Brothers, Inc.
222 Hartrey Ave., Evanston, Illinois 60204

SHURE M67 new

PROFESSIONAL MICROPHONE MIXER/REMOTE AMPLIFIER

OTHER SHURE PROFESSIONAL MICROPHONES . . . FOR SUPERIOR AUDIO

MODEL SM5
CARDIOID BOOM DYNAMIC

Because its cardioid directional pattern is uniquely uniform with frequency and symmetrical about its axis, the SM5 is singularly independent of the effects of environment. Even in extreme shooting situations (such as with tight sets, low ceilings, hard walls, low microphone angles, traffic or air-conditioner noise and rumble and changing distance) the SM5 minimizes sound coloration and ambient noise pickup.

MODEL SM76
¾" OMNIDIRECTIONAL DYNAMIC

Ideal for interviews and audience participation, yet unusually smooth wide range response (40-20 KC) for critical music reproduction. Instantly detachable from stand. Steel case with Cannon connector.

MODEL SM50
OMNIDIRECTIONAL DYNAMIC

Self-windscreened and pop-free for news, sports, remotes, and interviews. Also ideal for many studio and control room applications. Comfortably balanced for hand or stand use. Natural response.

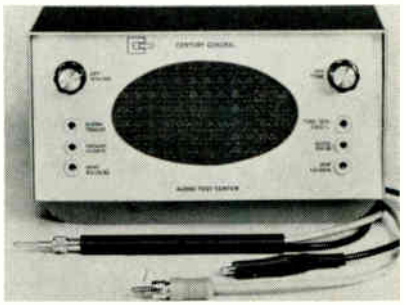
Circle 24 on Reader Service Card

of eight. The remote overdub control measures seven inches square by four inches deep. Controls and adjustments are located on the front of the recorder. Other features include the simplified "Isoloop" drive and dynamic braking. Printed circuit boards are, in most cases, interchangeable with other 3M professional recorders. Price is $25,600. 3M Co., St. Paul, Minn. 55101.

Circle 102 on Reader Service Card

Audio test center

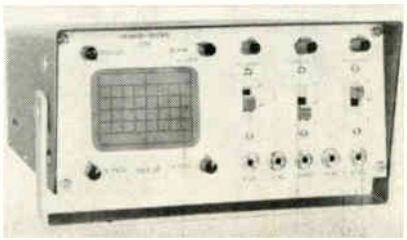
Model 140 solid-state Audio Test Center incorporates an rf/i-f/af signal tracer, tone generator, multi-input amplifier, and scope preamplifier. Rf/i-f/af signal tracer consists of crystal diode connected to a high-gain amplifier for signal tracing all rf/i-f/af circuits. Tone generator provides 1000-Hz audio signal for signal injection tests on all types of audio amplifiers and tape recorders. Audio amplifier has 70-dB output ±3-dB from 100 to 12,000 Hz at 200 mW. Scope preamplifier provides 70-dB output with 500-ohm impedance. Price is $48. Century General Corp. 570 Seventh Avenue, New York, N.Y. 10018.



Circle 105 on Reader Service Card

Solid-state, 7-lb portable scope

Weighing less than 7 lb, yet with almost all the features of larger scopes, Model 300 solid-state portable oscilloscope has identical dc vertical and horizontal amplifiers and a sensitivity of better than 10 mV peak to peak. Display is a 3-in. CRT with a ¼-in. divided graticule. Housing measures 3½ × 7½ × 12. Vertical and horizontal amplifier response is 0 to 100 kHz (–3 dB) dc and 10 Hz to 100 kHz (–3 dB) ac. Attenuation in both planes is in three steps of approximately 20 dB plus 25 dB in gain con-



Circle 26 on Reader Service Card →

ACCESSIBILITY

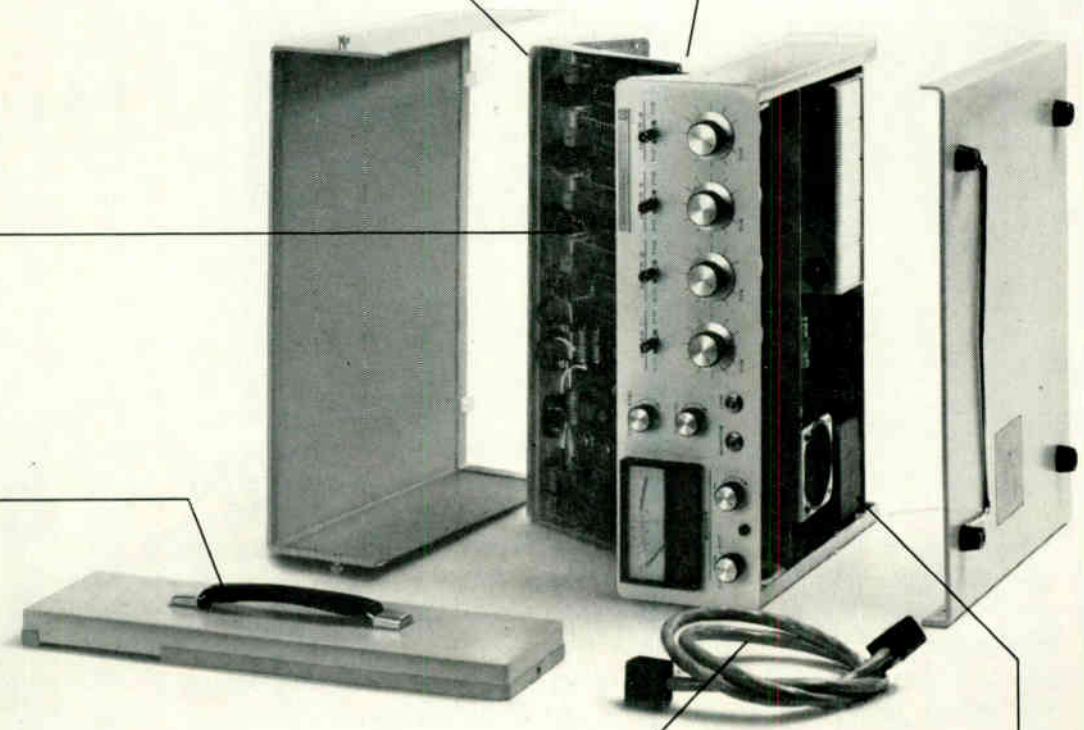
Top and bottom covers removed individually to expose all components. Circuit board hinged for easy access to reverse side and cables.

FLEXIBILITY

- 4 switch-selectable inputs: hi-level/ mike/equal phone cannon XL connector/barrier strip input.
- External studio and local speaker.
- P. A. output (public address).
- Muting relay contacts on barrier strip.

ELECTRONICS

- Etched-epoxy circuit board.
- Plug-in silicon transistors.
- 4 preamplifiers (each normal on equal RIAA phono).
- 1 program amplifier.
- 1 monitor amplifier.
- Speaker muting relays for local and studio speakers.
- May be strapped to operate from any mixer.
- Two-speaker muting.



PORTABILITY

Weight: 28 pounds.
Height: 5".
Width: 14".
Length: 17".

PARALLEL OPERATION

Optional plug-in cable allows parallel operation of two 212J-1's. Arrangement provides 8 input channels (hi-level/mike/phono), two metered program output channels, and two switchable input monitor channels.

OPTIONAL POWER SOURCE

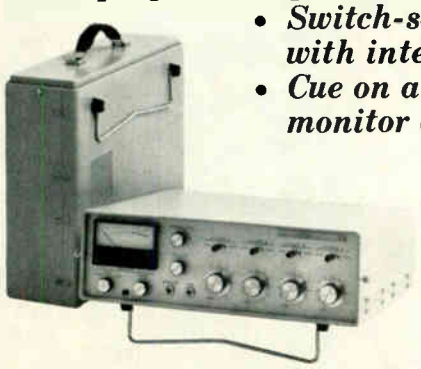
Self-contained power supply that operates the unit on AC also serves as charger for optional internal nickel-cadmium 12-volt battery. Unit switches automatically to battery in the event of an AC power loss. Unit also operates on external 12-volt battery.

a studio production console and remote pickup amplifier in one unit

That's the combination you get in Collins' new 212J-1 Console. Produce spots, conduct remote pickups, or operate the control room in emergency situations.

Completely solid-state, the 212J-1 offers:

- ***Four input channels, each with selectable switches for hi-level, microphone, or phone (RIAA equalization).***
- ***One program output channel.***
- ***Switch-selectable monitor amplifier with internal speaker.***
- ***Cue on all mixers overriding into monitor channel.***
- ***Local and studio speaker muting.***
- ***Public address system feed with level control.***



COMMUNICATION / COMPUTATION / CONTROL

COLLINS

HICKOK

DP160

80 MHz COUNTER PLUG-IN

(for DMS 3200 Digital Measuring System)

DP160 Plug-In
$395.00

Frequency measurements up to 80 MHz with 0.00005% (0.5 ppm) accuracy and seven-digit resolution are possible with the Hickok DP 160 80 MHz Counter when used with any Main Frame of Hickok's Digital Measuring System. With a DMS 3200A or P Main Frame its upper limit of measurement is extended to 100 MHz. The instrument is direct-counting and utilizes no heterodyning to achieve its measurement capability. All circuitry is built into a compact plug-in which fits into the plug-in port of the main frame.

This highly accurate counter possesses overrange capability whereby the normal 3-digit display of the main frame can provide up to 7-digit resolution. A front-panel push-button selector switch permits readout of any 3-digit sector of a 7-digit input signal being measured, thus achieving the resolution specified. Alternatively, a slave output permits its use with a second DMS Main Frame and DP 140 Slave Plug-in combination to provide a full 6-digit simultaneous display, if desired.

- **Frequency measurements to 80 MHz (100 MHz with DMS 3200A or P)**
- **Accuracy of 0.00005% (0.5 ppm) of reading ±1-digit**
- **Up to 7-digit resolution using overrange capability**
- **Frequency measurements down to 0.1 Hz**
- **High sensitivity — will accept signal levels down to 20mv rms**
- **All solid state for highest reliability and stability**
- **High input impedance — 1 megohm shunted by 25 picofarads**
- **Direct-counting circuitry — no heterodyning**
- **Wide temperature operating range: +10° to +50° C**
- **Automatic decimal point display on main frame**
- **Time-base reliability assured by precision, low-drift crystal, metal film resistors, and temperature compensation**
- **Internal test to check for proper count circuitry operation**
- **Front-panel input signal attenuator accommodates wide range of input signal levels**

Other Plug-Ins Available

DP100 DC Voltmeter
DP110 DC Microvoltmeter
DP130 AC Voltmeter
DP140 Event Counter
DP150A 1MHz Counter
DP170 Ohmmeter
DP200 Capacity Meter
DP210 Time Interval Meter
D310 DC Current Meter

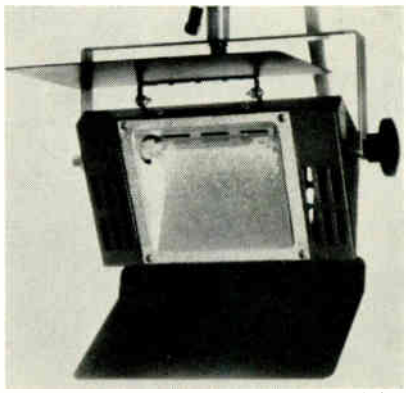
HICKOK ELECTRICAL INSTRUMENT COMPANY, 10514 Dupont Ave., Cleveland, Ohio 44108

Circle 27 on Reader Service Card

trol. Input impedance is 0.5 megohm shunted by 100 pF. Scope sweep is automatically synchronized and repetitive and is continuously adjustable from 10 Hz to 20 kHz in three steps. Power requirement is 115/230 V ac, 50 to 400 Hz, 25 W. Price is $169.50. Measurement Control Devices, Inc., Philadelphia, Pa. 19153.
Circle 107 on Reader Service Card

Lamp for background lighting

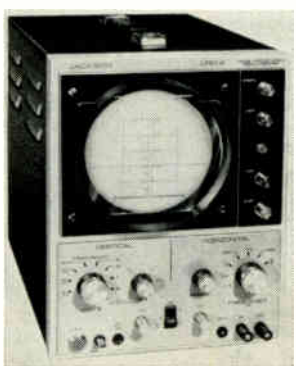
Smooth and flat background lighting, with sharp barndoor cutoff, is provided by Model LQB-BA. Fixture weighs less than 5 lb and is well ventilated for continuous duty operation. Five-hundred- to 1000-W tungsten-halogen "quartz" lamps are available operating at 120 or 230 V ac/dc. Set



light can be mounted, supported by standard grip equipment or positioned for floor use. Compact unit measures 4¼ in. deep, and lends itself to easy concealment and use in areas too small for conventional lights. Stand-mounted model is priced at $54.90; LQB-BA/TV hanging model, $58.00. Berkey-ColorTran, Inc., 1015 Chestnut St., Burbank, Calif. 91502.
Write on company letterhead stationery.

Oscilloscope/ Vectorscope

Model CRO-4 wideband oscilloscope/Vectorscope features easily removable graticule with two sets of calibrations exactly like a meter scaleplate and a voltage range selected on the VOLTS switch. Mag-



Circle 28 on Reader Service Card →

Compact, fully equipped, easy to operate . . . with superb taste in color . . . she's called the IVC-200. She is our teleproduction color camera . . . available today at one-third the price of comparable cameras. Based on IVC's unique new camera technology, IVC-200 has ALL the operating features a broadcaster needs for studio and location production.

BRIGHT, 9" VIEWFINDER with built-in, extendable hood for outdoor operation; VAROTAL XX, 10:1 ZOOM LENS with local or remote servo-driven iris; 3-STEP GAMMA CORRECTION (0.5, 0.65, 1.0) for natural gray scale rendition in any light level; FULL SHADING CORRECTION for complete compensation of color-shading effects; BUILT-IN FILTER WHEEL, operable from camera exterior, provides selection of neutral density and/or color correction filters; NEGATIVE REGISTRATION FEATURE allows sensitive, accurate and rapid color image alignment on viewfinder monitor; RGB SEQUENCER OPTION for convenient signal amplitude adjustment via waveform monitor display.

Other IVC-200 features include: totally solid-state design with low-noise FET preamps (3 special vidicons and viewfinder CRT are ONLY tubes in camera); compatibility with popular image enhancers; high-visibility camera tally light; multiple outputs for picture and waveform monitors.

Take a look at our new beauty soon. She's the leading lady in IVC's Color Camera Carousel. Turn the page for the complete line.

IVC
International Video Corporation

We're introducing our new studio model.

IVC color camera carousel.

1.
IVC-200
Fully equipped camera for multiple-camera studio and location production. Price ranges from $19,000 to $25,000, depending on options.

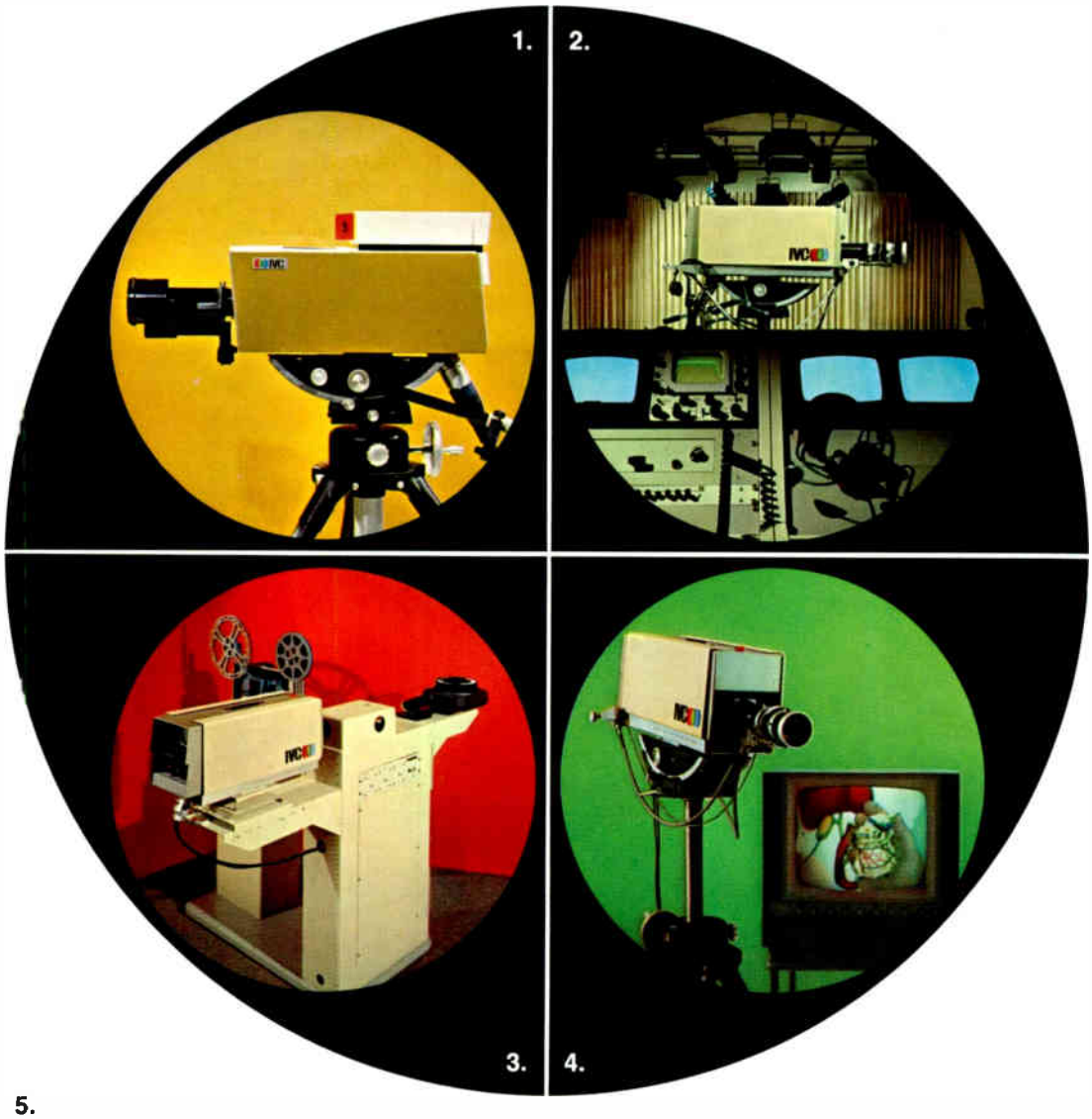
2.
IVC-120
General purpose camera for small-to-medium sized broadcasters — or single-camera fixed installations such as weather and news stations. Priced at $18,500.

3.
IVC-110/111
Film chain cameras for use in either IVC Film Chain or chains of other makes. IVC-110: a basic, fixed-lens camera priced at $12,500. IVC-111: a convertible film chain/studio camera with fixed and 6:1 zoom lens, priced at $14,600.

4.
IVC-100
Self-contained camera with built-in color encoder and sync generator. A single output cable provides NTSC encoded signals. Used in CATV origination (cablecasting) and broadcast preview. Priced at $14,000.

5.
Unretouched, off-the-monitor photos demonstrate excellent color quality and sensitivity of 3-vidicon design used in ALL IVC cameras.

For a demonstration of the IVC-100, 120 or 200 color cameras, contact the IVC office nearest you.



fashions by Joseph Magnin

International Video Corporation
67 East Evelyn Avenue, Mountain View, California 94040 • Phone (415) 968-7650
690 North Broadway, White Plains, New York 10603 • Phone (914) 761-7820
2200 East Devon Avenue, Des Plaines, Illinois 60018 • Phone (312) 297-5158

nitude of voltage (peak-to-peak) is read directly on calibrated gratieule. Oscilloscope includes vertical amplifier with response out to 5.8 MHz ±3 dB, a sensitivity of 5.8 mV rms/cm, and rise time of 0.06 μs. Acceleration voltage is 1500 V and horizontal sweep-frequency range is 5 Hz to 500 kHz. CRO-4 is a complete Vectorscope with inputs at front panel and with simplified Vectorscope calibration facilities. Rear inputs include Z-axis modulation and direct access to deflection plates. Measurements are 11¼ × 9 × 16, in.; weight, 23 lb. $249.95. Jackson Electrical Instrument Co.

Circle 126 on Reader Service Card

Digital panel meter

Model 2800 digital panel meter is completely solid-state with the exception of readout lights. Three full-time digits employ cold-gas glow tubes with a rated life of 200,000 hr. Unit requires panel space of 2.84 × 4.75 × 7.36 deep. Meter is available in five dc ranges covering voltages from 0 to 99.9 mV and 0 to 999 V, and 5 direct current ranges from 0

to 9.99 μA and 0 to 99.8 mA. Linear overrange to 180 percent of full scale is offered as standard. Accuracy is ±0.1 percent full scale ±1 digit. Resolution is one part in 1000, and sample rate is five readings per s. Power required is 117 V, 60 Hz, 9 VA. Special features are available. Simpson Electric Co.

Circle 125 on Reader Service Card

Transistor checker doubles as dc VM

A new, compact transistor analyzer —capable of doubling as a dc voltmeter—has been developed by Amphenol Corporation's Distributor Division, Broadview, Ill. The checker can: check high- and low-power npn and pnp power transistors for in-circuit dc beta characteristics; check high- and low-power npn and pnp transistors for out-of circuit for dc beta I_{CBO} and I_{CEO} leakage; check diodes and rectifiers for in-circuit open conditions, shorts and ability to rectify; and check diodes out-of-circuit for forward and reverse currents. The Transistor

← Circle 28 on Reader Service Card

Commander is 9¼ in. wide, 5¾ in. high and 6⅜ in. deep. It weighs 3 lb —complete with built-in, 117 V ac power supply. Price is $79.95.
Circle 126 on Reader Service Card

CCTV switcher

Solid-state Model SW-3 features looping inputs, 800 lines horizontal resolution, high isolation and add-on capability for more inputs/outputs. Switching is done by combining diode bias action with video transmitter turn-on/off. Remote control allows convenient location for optimum cable routing. SW-3 is designed for three inputs and one output. Purchase price includes uhf-type connectors, terminating switches, pushbutton selector, remote cable and power supply. $124.50. Alaun Engineering.
Circle 127 on Reader Service Card

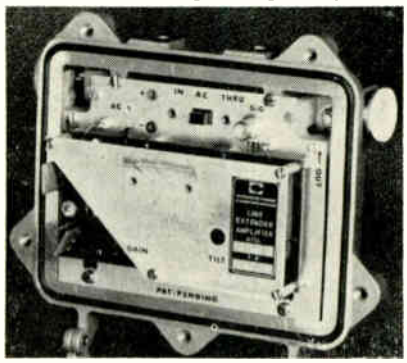
Low-cost, compact color film processor

A compact, low-cost color film processing system, trade-marked "Mini-Color" has rapid access capabilities while processing Super 8 and 16mm perforated Ektachrome ME4 color reversal materials at a speed of 15

ft/min, with 27-min dry-to-dry time. Processing speed is obtained while meeting all of Kodak's processing specifications. All stations and processing areas on the Mini-Color processor are immediately accessible. Impingement film dryer is complete with thermometer and controller, and processor itself is mounted on casterable wheels. Load magazine, takeup reel and simple control panel on Mini-color are located at one end. Electrical power for processor is 230 V, 3-wire, 60-Hz, single phase at 35 A. Mix tank requires 115 V, 60 Hz, single phase at 4.8 A. Price is $12,-000. Houston Fearless, Los Angeles, Calif.
Circle 108 on Reader Service Card

Line extender expands capabilities

Line extender C-701 has an expanded bandwidth range of 50 to 270 MHz, providing the capability of handling eight additional channels above channel 13. Output capability also



has been increased, limiting individual channel loss to 1 dB with the added eight channels. Band remains flat within 0.25 dB and minimum return loss is 17 dB at most unfavorable tilt/gain combination. Conductron Corp.
Circle 128 on Reader Service Card

The Performance Picture Looks Great with BIALKON Orthicons

- New warranty—now extended to 1800 hours
- New non-stick capabilities mean long, long life
- No linear decline in sensitivity
- Five BIALKON camera tube types* now can replace 80 industry types

You get more with RCA BIALKON orthicons—in initial performance, hours on-air per your dollar, and in-camera stability.

See your RCA Field Engineer for full information about the five BIALKON camera tube types, now available from your RCA Broadcast Tube Distributor.

RCA Electronic Components, Harrison, N.J. 07029.

*Bialkali photocathode, electronically conducting glass target image orthicon

RCA

BROADCASTERS SPEAK

Sirs:
In your October issue, the KZEL story the author said. "Cotton also features the only regularly scheduled sponsored poetry recitation in the United States."

Please be advised that KTIL has a 15-minute poetry show aired Monday through Friday from 10:15 to 10:30 A.M. The program is completely sponsored and has been since its inception in 1964.

Robert Douglas
Vice President & General Manager
KTIL, Tillamook, Ore.

Sirs:
Excellent coverage of convention in your August issue! Also please keep up coverage of CATV— most important.

Harry V. Seaman
Engineer
WGLI
West Islip, N.Y.

Sirs:
The article "compact Video Mobile on a Tight Budget," which appeared in your September 1968 issue, was especially interesting to us, since Sylvania has had a great deal of experience in building television vans of this type.

We certainly acknowledge Mr. Berliner's accomplishments in building this van. Sylvania has fabricated vans which include not only the functions of the van in the article but also include special effects, a self-contained power generator adequate to power all of the equipment plus the van air conditioner and the portable lighting kit. We are able to provide an esthetically pleasant appearance with wood-grained formica paneling and wall-to-wall carpeting.

We have shown various versions of this van at both NAB and the NCTA conventions, and also at the recent NAEB convention in Washington.

We feel that our approach to mobile television production vans is the best method for a complete, functional and self sufficient mobile television system.

Robert L. Curwin
Manager, Applications Engineering
Commercial Electronics Division
Sylvania Electric Products, Inc.

Sirs:
Referring to September/68 *BM/E*, page 80, "From the Editor," the next-to-last line in the third paragraph has the words "with his Marti remote pickup gear."

We are aware of the existence of Marti gear, but have not been able to run down the address of the manufacturer. We would be very pleased if you could give us this information at your earliest convenience, as it will help us in discussions regarding obtaining additional gear of this type.

We should be very pleased if you could also notify Marti of our immediate need for full information and prices on the remote pickup gear they have available.

John G. A. Roe
Radio Guardian
Port-of-Spain, Trinidad

Marti's address is Marti Electronics, 105 Poindexter, Cleburne, Tex. 76031.

Sirs:
The air pollution feature section in your October issue has been too long in coming. It contains good technical data. Incidentally, the closing paragraphs of the editorial on page 78 contain the meat of what I think might make an interesting article.

M.J. Kleeman, General Manager
S&F Telecom Labs
Syracuse, N.Y.

Sirs:
I found "C&W Format Puts KZEL in the Black," published in your October issue, much to my liking. I find articles on small market stations, their problems and how they solve them, very interesting.

R.O. Walters
Engineer/Announcer
KNJO (fm), Woodland Hills, Calif.

Circle 32 on Reader Service Card →

The Year-'Round Lavalier

Around most TV stations, E-V lavaliers are taken pretty much for granted. Just hang one around your neck, or clip it onto lapel or pocket—and start talking.

Nothing could make us happier. Because we take great pains to insure the absolute reliability of these tiny microphones. And frankly, no other type of microphone poses a bigger design problem. The lavalier gets dropped, stepped on, swung by its cord, smashed and banged—not once, but often during its life. Most of the abuse is accidental—but inevitable.

So we developed a "nesting" principle of construction that is based on tolerances so tight that the internal element acts as a solid mass, reducing damage due to shock. And we use nothing but Acoustalloy® diaphragms . . . almost indestructible despite heat, humidity, dirt, or high intensity noise or shock.

We've also spent years developing cable specifications—and methods for attaching it. We've taken into account all the tugs and twists that are the fate of any lavalier cable. That's why our strain relief is so effective. And knowing that no cable can last forever, we've made replacement easy and fast.

Of course reliability by itself is not enough. So our field testing of E-V lavaliers is also devoted to sound quality. We must satisfy major network and independent stations on every score. As a result, E-V lavaliers can be mixed in the same program with stand microphones with no change in voice quality.

In the process of developing the lavalier, we've also made it smaller. Our original model was 7″ long and 1″ in diameter. Today's Model 649B is just 2-1/4″ long, 3/4″ in diameter, and weighs a mere 31 grams!

Normal trade discounts apply to list prices shown.

Of course TV studios aren't the only places you'll find E-V lavaliers. They're used in classrooms, lecture halls, conferences, stages and business meetings. And they offer the same year-round reliability with no compromise of sound quality.

Every E-V professional lavalier is protected by our unique 2-year unconditional warranty against failure of any kind, plus the lifetime guarantee of workmanship and materials that is an integral part of every E-V microphone. Full details are waiting at your nearby Electro-Voice microphone headquarters. Or write us about your special needs. We're ready to solve the toughest sound problems—off the shelf—all year 'round!

high fidelity systems and speakers • tuners, amplifiers, receivers • public address loudspeakers • microphones • phono needles and cartridges • organs • space and defense electronics

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614 Cecil Street, Buchanan, Michigan 49107

Continued from page 8

came in the form of a letter from AT&T Vice President J. Kenneth Looloian to Frederick W. Ford. Encouraged by the decision, Ford saw the policy shift as "the possible forerunner of a bright new era in cable industry-phone company relations."

Program ownership argument put off

The Commission has rescheduled argument for May 12, 1969, on a pending proposal to amend Part 73 of the Rules to limit network ownership of evening programming and to prohibit networks from syndicating and from foreign market distribution of programs produced by others. Also extended, to March 17, 1969, was the time for filing comments and to submit relevant information. Filing date for reply comments was extended to April 14, 1969.

The Commission further stated it does not intend "to confine its consideration of this most important matter to any narrowly restricted course within the subject and issues involved . . . It may well consider several variants of the so-called Westinghouse proposal," which CBS and NBC allege as being ambiguous and needing clarification. "Included would be limiting the total network programs derived by a television station from all three networks during a stipulated period of time," says the Commission.

G.E. plumbs color tube market

Newest in the family of available lead-oxide mesh vidicon tubes are members of a series being introduced by General Electric.

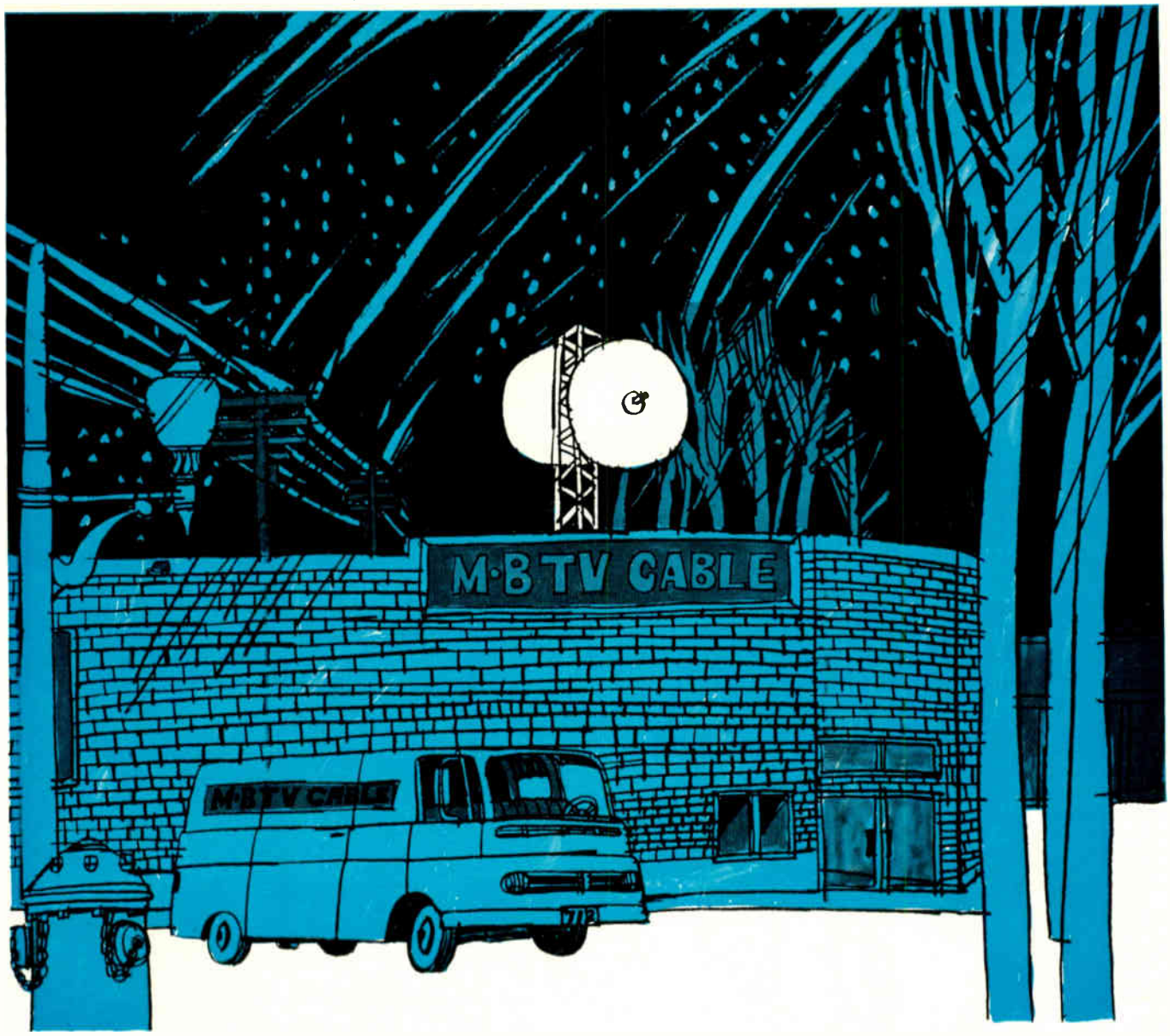
First displayed at NAEB last month, the tube line includes miniature types such as Z-7946 for portable color cameras, and the Z-7999—a direct replacement for the Philips tube currently used in G.E.'s PE-250 and retrofitted color cameras. The Z-7999 will be available by midyear, and will carry the same price tag as the Philips tube. Other tubes in the line include the Z-7870, a separate field mesh vidicon with magnetic focus and deflection for a flat field and high-amplitude response. This tube is available immediately. The lineup of lead-oxide vidicons will fill supply pipelines for new and existing cameras.

NAB asks delay on reduced rates for ETV

The National Association of Broadcasters has asked the FCC to postpone a proposed rule that would permit telephone companies to give free or reduced rates for educational television or radio, until the Commission studies the facts and sets up proper standards and guidelines.

Although NAB supports the Public Broadcasting Act of '67, it would like to see the FCC study the proposed rule, says Douglas Anello.

Factors Anello would like to see studied include, ". . . new facilities that may have to be constructed, the nature of the proposed preferential rates, the extent to which preferential rates will result in failure by carriers to obtain their rates of return on such facilities, and persons or classes of persons who will bear the costs of construction and use which may not be borne by the noncommercial use."



The weather may be unpredictable. But that doesn't mean your microwave has to be.

With Lenkurt's 76E microwave radio system, you can always forecast reliable video transmission.

That's why major networks have used it for years for studio-to-transmitter links. And that's why you can rely on it to get the best video through to your CATV and ETV customers.

The 76E operates in the 12.2–13.25 GHz frequency range. Its r-f manifold is factory tuned to the frequency you specify—and it never needs retuning. Drift is no problem. And differential phase and gain are better than industry standards—giving you consistently superior color transmission.

So if you'd like predictable transmission for your customers, call or write Lenkurt Electric Co., Inc., San Carlos, California.

LENKURT ELECTRIC

Subsidiary of

GENERAL TELEPHONE & ELECTRONICS

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NAMES
IN THE NEWS

James T. Fulton

Lee Zemnick

James T. Fulton has been named general manager of Intelligence Systems Research and Engineering for CBS Laboratories, according to CBS Laboratories President Dr. Peter C. Goldmark.

Robert H. Beisswenger, president of The Jerrold Corporation, has announced the appointment of **Lee Zemnick** as executive vice president.

Samuel M. Merion, vice president, marketing, of American Electronic Laboratories, has announced the appointment of **I.A. Faye** to the post of director, commercial marketing.

Jerrold Electronics Corporation has created three new district managerships and appointed CATV systems managers to fill them: **Mark Weber** (eastern); **Clarence Ross** (central); and **Erwin Sharp** (western).

Ralph Lowell has been named educational broadcasting's Man-of-the-year, according to William G. Harley, president of the National Association of Educational Broadcasters.

Jackson F. Lee has been elected president of the North Carolina Association of Broadcasters.

Vice President and General Manager of Indianapolis based Time-Life stations, Eldon Campbell, has announced the appointment of **James B. Mathis** as commercial manager of WFBM-TV.

Bill E. Cook was named to the Texas Association of Broadcasters' board of directors.

Andrew Fisher IV has rejoined the staff of WIP News after three years of active duty with the U.S. Army.

Don Bruck, vice president of Friendly Broadcasting, has announced that **John B. Slade** is the new station manager at WJMO, Cleveland, Ohio.

Ed Harrington joined WTCN, Minneapolis, Minn., as assistant sports director.

Robert W. Byloff, president of Reeves Video, has announced the appointment of **Thomas L. Cook** as sales executive of Reeves Video Division.

D. W. Steele

Frederick Garza

Ameco has made two new appointments: **Donald W. Steele** as advertising manager and **Frederick Garza** as product sales representative.

James T. Luker has been named manager of the Winchester, Ind., cable television system of GT&E Communications Inc.

Continued on page 72

Creative Mixing from the Innovators at Norelco

Meet our third generation MD-Range Audio Mixing Desk. Another innovation from the company whose broadcast system capability is relied on by all three networks, independent and educational broadcasters.

Extremely compact, plug-in modular construction. Solid-state printed circuit electronics. Greater flexibility and integrity. It's what you expect from the Innovators, and precisely what you need in a radio or TV studio, broadcast van, large theater or film and sound dubbing studio. Norelco's MD-range Audio Mixing Equipment is, in fact, the most advanced sound control equipment in its class.

The MD Series features true *current dependent* mixing. You can add input blocks to expand capacity without readjusting bus bar impedance and intermediate amplifiers which you must do with voltage-dependent mixing.

Each channel can be switched to as many as four outputs in any combination simultaneously without crosstalk. There's a separate reverberation return master channel and four extra inputs for stereo and two-channel monitoring.

A pre-listening push button for each channel permits you to check inputs instantly without interfering with the program in any way. Available in four standard models with as many as twenty-four inputs for twelve active channels.

Let our engineers help you select a mixer for your specific system requirements. Our complete line of audio mixing units includes a Portable 12-Channel System suitable for studio or field; an 8-Channel Solid-State Mixer for remotes or small studios; a light compact 4-Channel Mixer that may be battery operated. Whatever your audio needs, there is a sound reason why the Innovators at Norelco meet them best.

Norelco® PHILIPS BROADCAST EQUIPMENT CORP.

299 Route 17, Paramus, N. J. 07652 • 201/262-7300

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Albert Finkel

A. Shahinian

President of Riker Video Industries, Robert Dressler, has announced the election of **Albert Finkel** and **Andrew Shahinian** to Riker's board of directors.

Leonard R. Harris has been named chief engineer and **James C. Harper** sales manager of channel 51, WSMS-TV, Fort Lauderdale, Florida, according to Barney Kobres, channel 51 general manager.

George Townsend, manager of the RF systems department of the Ampex Corporation video products division, has announced the appointment of **Edward L. Shuey** as manager of RF applications.

Patricia R. Harris, former ambassador to Luxembourg; investment banker **Edward A. Schrader;** and **William H. Schuman,** president of Lincoln Center for the Performing Arts, have been elected to the board of directors of National Educational Television.

Glen F. Wallichs, president of Capitol Industries and chairman of the board, has been elected president of Audio Devices.

G.D. Speake has been appointed general manager, telecommunications, of The Marconi Company.

Donald W. Rada has been promoted to marketing manager of 3M Company's background music project.

Dr. Robert L. Hilliard has been re-elected to his third term as chairman of the Federal Interagency Broadcast Committee.

Visual Electronics Corporation has appointed three new members to its staff: **C.J. Wickham** is manager, customer service administration; **Kenneth B. Schneider** is district sales engineer for Georgia and Florida; and **Joseph H. Cohen** is custom audio systems product manager.

Hazard E. Reeves, chairman of Reeves Broadcasting, has announced the appointment of **John F. Vorisek** as president of Reeves Sound Studios.

Anaconda Wire and Cable Company has named **Konrad Loebl** manager of the central sales region, **Robert A. Duryea** district manager for Chicago and **Roy H. Nelezen** district manager for Milwaukee.

L. E. Steadman

L. H. Williams

Loren E. Steadman has been appointed executive vice president of Berkey-ColorTran, according to President Milton Forman.

William J. Overhauser, president of Sparta Electronic Corporation, has announced the selection of **Loren H. Williams** as manager of international and contract sales.

The instant title... just type it.

We've developed a faster, more flexible display system to make titling as easy as typing.

Now you can type on your preview monitor, then flash up-to-the-second information on the screen.

No costly artwork preparation. No shuffling dropcards. No extra camera equipment. No more problems trying to anticipate.

Here's how the Videograph® system works: New data is typed on a keyboard. The Display Control Unit then instantly regenerates this information in the form of television signals. It's like typing on the TV screen. Just the thing for sporting events, interview shows and special bulletins.

Besides flashing information on the screen as it develops, it can be used to recall prerecorded information for on-air presentation, too.

If you watch the AFL game this Sunday on NBC, you'll see how flexible the A. B. Dick Videograph Display System can be. For all the specs and all the options, return the coupon or contact Visual Electronics Corporation. No reason to wait for Sunday to do that.

Mr. Charles X. Hurst, Videograph Marketing Manager
A. B. Dick Company, 5700 West Touhy Avenue
Chicago, Illinios 60648

☐ Please send me literature on the Videograph Electronic Display System.

☐ Have your representative contact me. My phone number is_____

NAME

TITLE

COMPANY

ADDRESS

CITY STATE ZIP

A·B·DICK®

IN ELECTRONIC COMMUNICATIONS, TOO.

Circle 39 on Reader Service Card

Continued from page 38

recordings has raised the important question of the compatibility of the stereo recording when played back with the vast number of monaural pickup cartridges currently in use. I. J. Soebel and Ronald Kneubel (The Astatic Corp.) discuss quantitative data showing the effect on stereo recordings of several monaural cartridges requiring a range of vertical tracking force.

The results show a rather wide range of effects from minimal wear to very rapid deterioration when stereophonic recordings are reproduced with a low compliance cartridge requiring heavy tracking force.

- The degree of distortion has not grown to unmanageable proportions.
- In the high frequency region, where the worst distortion takes place, the response of the inexpensive phono system is greatly reduced and should not add much in deteriorated performance due to worn records.
- The high quality monophonic cartridge that requires reasonably low tracking force will do little damage to stereo recordings. The cartridge with high mechanical impedance that requires high tracking force will seriously damage recordings within 10 plays, probably less, depending on how subtly the vertical tracking is adjusted. The comparison of compliance with the distortion due to wear tests, indicates that compliance alone is not a sole criterion of wear phenomena.
- The medium range cartridge is somewhat more difficult to categorize.
- Solutions to the problem of stereo recording destruction include the use of monophonic cartridge that is designed with a reasonably low vertical impedance and the use of a stereo cartridge, designed with reasonably low impedance initially, with parallel connection of the two channels, to give a monophonic signal.
- Original equipment manufacturers can readily seek a cartridge with low dynamic mechanical impedance in their new designs.

Solid-state transducers in mechanics and acoustics. Semiconductor and solid-state devices have been extensively used to measure and generate stresses and stress waves in solids, liquids and gases. Semiconductor devices have been used as strain gages to measure strains and to respond to acoustic pressures. Type p silicon has a gage factor over 100 times that of a metallic strain gage. By using the amplifying regimes of Esaki diodes and transistors, a great increase in sentitivity is obtained and microphones have been constructed that are more sensitive than the carbon microphone. Warren P. Mason (Engineering and Applied Physics, Columbia U.) concludes that with the advent of monolithic transistor on singlechips and films, the most stable and economical devices are obtained by separating the pickup and amplifying functions. **BM/E**

Spin a professional test record and check out your entire sound system!

Our Broadcast Test Record (BTR 150). A single 12-inch record that gives you a convenient signal source for testing and adjusting *all* your sound equipment – from pickup right through your whole audio chain. It's fast. Simple. Easy to use.

It's just one of *nine* in a series of professional test records we make at CBS Laboratories. Unique high-precision tools designed for a rapid evaluation of audio components, equipment and systems.

Each record contains a complete series of tests. Eliminates the need for elaborate equipment. Saves you studio space. Saves you hours of time.

Order a quantity of CBS Laboratories' Test Records *now*, and get a liberal discount. (Only $10 buys our BTR 150. Buy 10 records and save $20!) Ask for our complete Test Record Catalog *today*.

PROFESSIONAL PRODUCTS
CBS LABORATORIES
Stamford, Connecticut 06905
A Division of Columbia Broadcasting System, Inc.

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LITERATURE of INTEREST

For additional data, circle number shown on Reader Service Card.

Electrical measurements that can be made with Model 1024 sine-random generator are described in eight-page booklet from B&K Instruments. **150**

"Quick Reference Product Guide" from Sparta Electronic Corp. covers wide range of mono and stereo audio consoles, tape cartridge equipment, turntables, accessories and cabinetry. **151**

Composite Aural STL made by Moseley Associates is described in question and answer format in Application Notes 222X. **152**

Television, motion picture and audio visual accessories (more than 1000), including lenses, stop motion projectors and underwater lights, are listed in 44-page catalog from Birns & Sawyer. **153**

Punch card reader (Model 960 M), with applications in radio and TV automation, is presented in illustrated data sheet from Hickok Electrical Instrument Co. **154**

CATV product catalog from Anaconda Electronics, consisting of loose leaf binder and data sheets, is now available. **155**

Cable splicing tape rated at 69 kV is presented in 8-page illustrated data sheet PD-1303 from GE Insulating Materials Department. **156**

"Equivalents Index" from English Electric Valves contains listings of over 2000 equivalent tubes. **157**

"Innovators for Industry," vol. no. 4, from Belden contains an article entitled "A Study of the effects of Long Term Exposure to Rated Operating Temperature Upon Electrical Properties of Lead Wire Insulations." **158**

MATV systems and components are presented in illustrated brochure from JFD Electronics Systems Division. **159**

Sideband filters, diplexers, power combiner and transmission line for TV and fm applications are presented in 25-page catalog from Micro Communications. **160**

"A Receiver For Precise Time Calibrations" is the title of an article describing Type 1124 receiver and a time calibration system. Article is contained in vol 42, no. 3 of the "Experimenter." **161**

"1968 Wholesale Electronic Tube, Semiconductor and Integrated Circuit Purchasing Guide" lists over 7000 devices by type and their prices. Booklet is available from Thor Electronics. **162**

Logarithmic diode converters LD-107 series, for analog computation, network shaping and function generation is topic of technical bulletin issued by Computer Diode Corp. Numerous applications in which log diodes are used are included in the bulletin. **163**

Right-angle cable plug is topic of ConheX Product Bulletin CX-109A from RF Components Division of Sealectro Corp. **164**

Coax switching matrices for use in video, telemetry data and rf switching systems are topic of discussion of Trompeter Electronics M-5 Catalog. Also mentioned are low noise triax and twinax switching systems for use in low noise and secures transmission systems. **165**

Semiconductors available in microminiature LID packages are listed in catalog/brochure from Amperex Electronic Corp. In addition to the product listing, an interchangeability chart is provided showing the LID replacement for discreet semiconductor types that they functionally replace. **166**

Air filtration media incorporating water-washable polyethylene fibres are the subject of two catalogs available from Pliotron Corp. Diagrams of the system are included. **167**

Electronic tubes are the topic of directory made available by Metropolitan Supply Co. Approximately 5000 industrial, entertainment and military tube types are listed in alphanumerical order along with quantity discount prices, manufacturers of each type and their availability from Metropolitan. **168**

Rack-and-panel connector series, featuring ribbon contact principle for longer life and lower cost, is described in catalog published by the Amphenol Industrial Division of the Bunker-Ramo Corp. Catalog R-22 is illustrated with photos and dimensional data. **169**

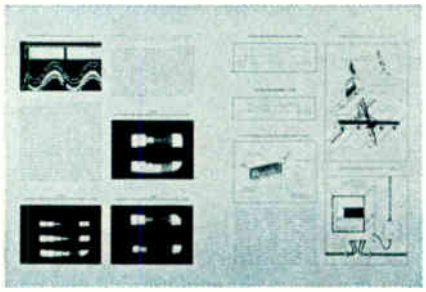
Mixer preamplifiers are topic of product bulletin from RHG Electronics Lab, Inc. Photos, curves, detailed specs and performance charts illustrate the basic RHG mixer preamp series. **170**

Add this free book on video cable transmission to your technical library

This new book "Video Transmission Techniques" will be coming off the presses shortly. Reserve your *free* copy now. Published by DYNAIR, this book covers problem areas such as hum, equalization, resolution/bandwidth, balanced-line transmission and many others. This is a limited printing . . . order your copy today.

Yes, for a limited time only, you can receive a free copy of this helpful new book, with absolutely no obligation! Just mail the coupon, use the literature request card or drop us a note and we'll reserve a copy for you.

Published by DYNAIR, a pioneer in the field of solid-state video cable transmission equipment, this book covers in detail the problems encountered with routing video through cables . . . and presents the solutions!



The photographs shown are sample pages reproduced directly from "Video Transmission Techniques" and are typical of the material presented. Pictorial diagrams, supported by easy-to-understand text and numerous photographs, charts and tables, make system design simple.

This book includes useful design information for a multitude of systems, both unbalanced and balanced . . . simple and complex. It covers everything from cable types to complex electronic terminations. The problems involved in selecting the equipment for a particular application are discussed with the exact equipment detailed for many systems.

DYNAIR video transmission equipment is installed in numerous facilities throughout the world. We have supplied systems for transmitting video information over many miles of cable. DYNAIR systems are available with video bandwidths as great as 30 MHz, providing optimum high-resolution performance.

The practical building-block construction techniques used in solid-state DYNAIR equipment allow systems of virtually any size to be easily assembled. Plug-in modular etched circuit boards are used in most cases, assuring ease of maintenance. Equipment can be provided to suit almost any system requirement.

DYNAIR also manufactures a variety of other solid-state television equipment, including modulators and demodulators, video and pulse amplifiers, local and remote-control switching systems, switcher-faders,

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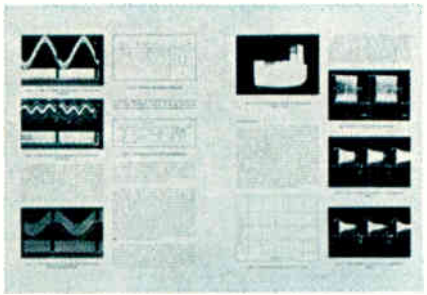


special effect generators, sync generators and sideband analyzers.

If you use this type of equipment, you might like to receive either our complete catalog or literature on specific devices; DYNAIR product information is available upon request —just write, outlining your needs.

DYNAIR
ELECTRONICS, INC.
SAN DIEGO, CALIFORNIA

6360 FEDERAL BLVD., SAN DIEGO, CALIF.
ZIP 92114 PHONE (714) 582-9211

Please send free copy of "Video Transmission Techniques"

Have you seen "Video Switching Techniques"?
Yes ☐ No ☐

NAME_____

TITLE_____

COMPANY_____

ADDRESS_____

CITY_____

STATE_____ ZIP NO._____

Three-Vidicon Color

Continued from page 42

types and are easily replaceable.

The camera's three primary color signals are sent to the viewfinder where the operator can switch-select any one or them or combination of them for viewing on the finder screen. Each signal has a source-terminated output at a coax connector at the camera's bottom. These signals can feed directly to any color monitor with sync input and separate R-G-B inputs. With displays of this type, no encoder is needed.

The three video signals are also fed to a self-contained encoder board in NTSC versions of the camera. The encoder combines R-G-B to make a standard NTSC signal. Also self-contained is a sync generator and burst flag source. If desired, an external EIA sync generator and encoder can be used.

In its studio version, the camera uses a 50-conductor studio cable which includes the usual cable functions such as ac power, intercom, setup trims, safety ground, recorder controls, tally lights, intercom party line, remote centering controls, program autio, sweep failure light and grounds for the various circuits.

Locking the camera cover in place frustrates knob twiddlers and leaves only minimal basic operating controls accessible to the camera operator. This is possible because of the camera's stability and special design features that keep setup and trims down to a once-a-day operation. The camera even has an accessory ac outlet so service techs can plug a soldering iron or trouble lamp directly into the camera, if needed. This outlet is on even when the camera is turned off.

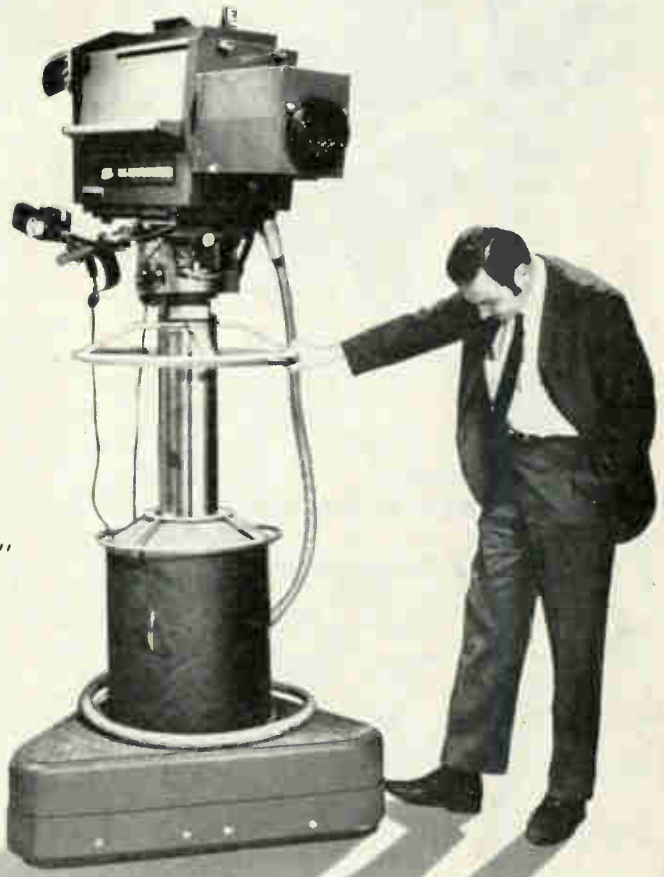
More Bells and Whistles

Newest version of the camera—the IVC-200—features a 9-inch viewfinder with a built-in extendable hood, a Varotal 10:1 zoom lens with local or remote servo-driven iris, 3-step gamma correction, built-in filter wheel, negative registration, R-G-B sequencer option for signal amplitude adjustments, and other refinements. This version of the camera is priced at $19,000 to $25,000, depending on options.

The camera's sensitivity, ease of operation and versatility (not to mention price) have made it an attractive package to CATV and CCTV operators. Now with its acceptance as a full-time partner in the broadcast studio, the camera is making color conversion possible for lots of low-budget operations. It may also be a major foot in the door for colorizing ETV and other highly specialized TV operations. A look at the price tag and a look at the camera's color output are enough to convince most skeptics. A little demo time operating it convinces the rest. The era of the budget color camera is at last at hand. **BM/E**

What if you had to buy your TV camera like you buy your car?

In both cases you've got quite a choice of makes, models and options. But a manufacturer of broadcast TV cameras gives you one more choice: the freedom to specify certain critical major components, the most critical of which is the lens system. You can specify and get immediate delivery of Rank Taylor Hobson Varotal V and XX series zoom lenses for use on Vidicon, Plumbicon and Image Orthicon format cameras. If you already own an RTH Varotal lens and want a newer model camera, good news. Keep your old friend, the Varotal. Rank Taylor Hobson now has a Lens-Pak which permits you to adapt your present RTH lens to fit almost any new camera. (It will work better too – the Lens-Pak has a "ride the rails" device that allows close-up focusing to less than one inch). We've also got the famous RTH zoom pre-set servo unit – the "shot box" with its 7-position, 11-speed fingertip control range. Tell us what camera you have in mind and the situations in which you'll use it. We'll send you detailed recommendations to help you select the right lens system. All it will cost you is a stamp – a small price for a choice that even Detroit won't give you. Write Albion Optical Co., Inc., 260 N. Rt.303, West Nyack, N.Y. 10994.



albion rank taylor hobson

Circle 47 on Reader Service Card

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

DISPLAY CLASSIFIED ADVERTISING: $22.50 per inch 1x; $22.00 per inch 3x; $21.00 per inch 6x; $20.00 per inch 12x. ALL OTHER CLASSIFIED ADVERTISING 25¢ per word; minimum $3.00. BLIND BOX NUMBER: No extra charge. Replies sent to address below will be forwarded to you. PAYABLE IN ADVANCE; send check with order. CLOSING DATE: 5th of 2nd month preceding issue date.

BM/E, Monterey and Pinola Avenues, Blue Ridge Summit, Pa. 17214 Phone 717/794-2191

BUSINESS OPPORTUNITIES

FRANCHISE DISTRIBUTORSHIPS FOR SEEBURG BACKGROUND MUSIC

We are expanding our distributor territories, and offer to those who qualify franchises for background music, with phone lines, FM Multiplex, or on-premise systems.

Complete details forwarded on request: Address:

Joseph F. Hards, Vice Pres.
SEEBURG MUSIC LIBRARY, INC.
1500 North Dayton Street
Chicago, Illinois 60622

WANTED TO BUY: Radio Station. Southwestern U.S.A. State LOCATION, PRICE, TERMS, POTENTIAL. All replies confidential to KHIL, Willcox, Ariz.

SALES REP WANTED

"Representatives wanted

to sell complete line of A.M. and/or F.M. Fixed Tune radios only to stations. Immediate delivery from New York stock."

Box 1268-3, c/o BM/E, Blue Ridge Summit, Pa. 17214

HELP WANTED

ENGINEERING OPPORTUNITY—Experienced engineers with 1st class FCC Phone license. Liberal company benefits. Construction of new facilities to start soon. Will consider new graduates. Contact G. A. Cerboskas, Chief Engineer, WKYT-TV, Lexington, Ky. 606-254-2727.

Engineering position available to work with PC-70's, VR-2000's and TK-27's in outstanding metropolitan VHF operation. First Class license required. Write Box 1268-15, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Announcer for 5KW full-time Pennsylvania adult music station with heavy accent on news and sports. No. 1 in medium market. Modern operation with top sound. No maintenance or selling. Good salary and fringe benefits. 215-696-3690.

First Class technician for east Pa. 5,000 watt full-time station. Well-established clean operation offers profit-sharing plan, other good benefits. Box 1268-5, c/o BM/E, Blue Ridge Summit, Pa. 17214.

#1 and #2 technicians wanted for 125-mile 20-channel CATV system. Construction beginning. Penna. Box 1268-4, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Announcer—1st phone morning or afternoon. Production ability—minimum maintenance. MOR 10 kw AM-FM simulcast. Top year around resort area—all sports—excellent schools. Send tape, resume to Station Manager, WJML—Petoskey, Mich. 49770.

HELP WANTED (cont'd)

WNOG in Naples, Florida. NBC affiliate needs first phone night man—no maintenance. Send information and realistic salary immediately to John L. Norman, Program Director, P.O. Box 1128, Naples, Florida 33940.

"The Navy got me." I recommend my sales job at KMMO, Marshall, Mo. Excellent facilities, congenial, helpful staff, good fringes. Contact Harold Douglas.

MOR first phone announcers. No maintenance. Permanent position. Apply WETT Radio, Ocean City, Maryland 21842.

POSITIONS WANTED

Inexperienced third class license holder requests experience on board as disc jockey or announcer—Will offer determination, success and loyalty. Location preferable in entire Massachusetts, Rhode Island, Southern New Hampshire, and parts of Connecticut and New York adjoining Massachusetts. Have available: all evenings, early mornings and weekends. Music forum—All types excluding jungle noises. Holder to enroll late spring, early summer for first ticket. Reply to Mel Christo, 66 Quinapoxet Lane, Worcester, Massachusetts.

ART DIRECTOR: Wants $7,956.00 per year salary based upon diversified knowledge and experience in all phases of art and photography for all media of advertising. Sales-minded. Will relocate, finance move and supply excellent reference. Box 1268-6, c/o BM/E, Blue Ridge Summit, Pa. 17214.

First phone man desires transmitter watch at hard rocker. No M-O-R, announcing, nor maintenance. Military completed. $130 start required. 412/521-6510. Box 1268-1, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Female—40—December grad of Broadcast school. Desire work in copywriting, commercials or production commercials. Relocate. 3rd. Box 1268-16, c/o BM/E, Blue Ridge Summit, Pa. 17214.

DJ/announcer, newscaster, salesman. Negro, experienced, versatile, creative. 3rd endorsed. Tight board, authoritative news any format. Mature. Box 1268-17, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Attn: Calif., Oregon, Washington, Nevada. Tight board, sales, news, third phone, broadcasting school. R. J. McLeran, 11 Locust Avenue, Larkspur, Calif. 94939 (415) 924-3583.

Mature announcer with 20 years experience seeks position with large market station only. Good references. Write Box 1268-7, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Young hip Negro announcer. Real swinger, will travel, broadcasting school graduate, third phone endorsement. 215/472-2741. Box 1268-2, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Beginner . . . Negro . . . disc jockey/announcer/control board operator/will relocate/third endorsed/tight board/dependable/available. Box 1268-8, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Negro announcer—dependable—experienced. Reliable—can work any type station. Third endorsed. Box 1268-9, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Engineer position desired—16 years communications experience—first phone—advanced class ham—for resume, Box 1268-10, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Black personality disc-jockey . . . program variety show and jazz. Best radio ratings in the country. Dependable, married. Resume, tape upon request. Box 1268-11, c/o BM/E, Blue Ridge Summit, Pa. 17214.

TV engineer, 1st phone, interested in transmitter operations, experience in GE and RCA UHF transmitters. Box 1268-12, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Negro dj, N.Y. trained. Best jazz in town. Strong on news. Good board. 3rd endorsed. Box 1268-13, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Aggressive sharp, family man, 25 years radio-TV background seeks management. Large or medium. Box 1268-14, c/o BM/E, Blue Ridge Summit, Pa. 17214.

EQUIPMENT FOR SALE

ANTENNA FOR SALE

1 RCA TFU-24BLS Antenna (Ch. 27) with ½ degree electrical beam tilt. Good condition (VSWR 1.1 to 1 or less). 28 sections RCA MI 19089 UHF Trans. line. 3⅛ inch—20 ft. sections.

Contact: R. J. Wickham, Dir. of Eng. WKOW-TV Madison, Wisconsin 53701

Immediately available: Mint condition 3 camera 1 VTR mobile unit. Ready to shoot with no additional equipment required. A-1 4½" cameras and studio quality viewfinder vidicons also immediately available. New waveform monitors at ⅓ original cost. Many other bargains in the finest used and surplus broadcast equipment. For details write, wire or phone ED RIES AND ASSOCIATES, 414 North Alfred Street, Los Angeles 90048—(213) 651-5080.

TRANSLATOR POWER now put your translator where antenna should be for best coverage not where power line happens to be . Use a TELAN thermoelectric generator. No moving parts, simple to operate, leave unattended 6-12 months. General Instrument Corp., Thermoelectric Division, Dept. BM, 65 Gouverneur St., Newark, N.J. 07104, 201-485-2100 ext. 481.

Scully tape recorders, finance and trade. Two Spotmasters Playback, and one record/playback, all three, $38.25 monthly. New equipment. QRK or Russco deluxe turntables, $10.80 monthly. Write for list. New cartridges shipped freight prepaid. Audiovox, Box 7067-55, Miami, Florida 33155.

Brand new remote amplifiers, 2 channel remote microphone amplifiers, 2½ inch VU, battery operated, 7 transistors $95.00 FOB Kokomo. GREDCO, INC. 1830 S. Webster, Kokomo, Ind. 46901. Area 317-883-5688.

Color video tape recorder/RCA TR-4 available Sept. 1st for $20,500. Unit has air bearing headwheel panel, line-lock. Mono and color ATC modules and accessory tool kit. Box 1268-18 c/o BM/E, Blue Ridge Summit, Pa. 17214.

For sale: Western Electric Model 405B 5 kw AM transmitter with reactors, tubes and manuals. Removed in working condition $2150. Contact: Chief Engineer or Manager, KBUC Radio, San Antonio, Texas 78220. Phone: 512-222-9191.

Schafer all Ampex 800-4 stereo system—the latest AG-440 and AG-445 decks. In use only 10 months. Price open. Dick Garvin, KSJO, San Jose, Calif. 408-251-8290.

100 ft. tower $200.00, 200 $800.00, 300 $1500.00, 400 $2400.00. Groundwire new 68¢ per lb. Bill Angle, 917/752-3040, Box 55, Greenville, N.C. 27834.

RCA TG-2A Sync Gen. with Dot/Bar, $800.00: RCA TG-1A sync gen. $200.00: RCA Monoscope $300.00. All just taken out of service. Pat Finnegan, WLBC-TV, Muncie, Ind.

Broadcast and recording equipment, new and used, bought-sold-traded. New items listed daily. Maze Corporation, Box 6636, Birmingham, Ala. 35210.

Whatever your equipment needs . . . check first with Broadcast Equipment and Supply Co., Box 3141, Bristol, Tennessee 37620.

Complete kit audio proof forms $3.50 postpaid. Specify AM/FM. Box 2605, Corpus Christi, Texas 78403.

6 element circular vertical and horizontal antenna. Price $2,400.00. Box 1268-19, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Towers, broadcast, microwave, CATV, TV, new and used. Phone 224-9922, Tower Maintenance, Inc., 2408 Old St. Rd., Tallahassee, Fla.

BARGAINS: CCTV Cameras, monitors, send for free list. Box 1268-20, c/o BM/E, Blue Ridge Summit, Pa. 17214.

Protect your records. Send for our free LP supply lists. Record Supplies, Hillburn, N.Y. 10931.

EQUIPMENT WANTED

Need used 250 watt AM transmitter. Send description price to WLEO—Playa—Ponce, P.R. 00731.

EQUIPMENT WANTED

WANTED: 4 Elements VEE F.M. Antenna at 89.3 Mc., to handle 5 KW., without defrosted, JAMPRO or ANDREW. Write to "SONOMUSICA," Box 347, Maracaibo, Venezuela

Want to Buy—complete classical music record library with filing system. Box 1268-21, c/o BM/E, Blue Ridge Summit, Pa. 17214.

GEL FM exciter working condition any channel. WKLS, Atlanta, Ga. 30309.

MISCELLANEOUS FOR SALE

Japanese Electronics. New products monthly! $1.00. Money-back guarantee. DEE 10639 BM Riverside, North Hollywood, Calif. 91602.

Professional Electronics Projects — $1 up. Catalog 25¢. PARKS, Box 25665-B, Seattle, Wash. 98115.

SIGNS, NAMEPLATES, LABELS, Decals, Badges, Trophies, Plaques. Seton Corp., Dept. BM/E, New Haven, Conn. 06505.

TECHNICAL SERVICES

VIDEO TAPE RECORDER AUDIO HEAD ASSEMBLY SERVICE

Precision relapping of all heads and supporting posts, includes cleaning and testing. AMPEX VTR audio assembly . . . $75.00 complete. Brand new shelf stock replacement heads of our manufacture available when relapping not advisable. LIPPS, Inc., 1630 Euclid St., Santa Monica, Calif. 90404 (213) EX 3-0449.

DON'T BE AN AUDIO DROPOUT in your market area. Let BROADCAST EQUIPMENT REBUILDERS take care of your tape cartridge rewinding needs. Call or write Quin Morrison for further information. Route 8, Box 718, Fayetteville, N.C. 28304. B-E-R . . . THE SPECIALISTS!

PROGRAM SERVICES

16mm CATV SOUND PROJECTORS (synchronized for TV) $650.00
American Diversfied Services
Box 975, Kingsport, Tennessee 37662
Phone area 615 239-9301

Background Music Service For FM Multiplex-Wire Line-CATV Systems
Magne-Tronics, Inc.
21 East 40th Street, New York, N.Y. 10016

Searching For Call Letters?
Flip through our computer printed directory of every possible call letter combination and find the one that gives extra spark to your station. Available for only $50 from Data Operations, Inc., 2464 Massachusetts Avenue, Cambridge, Massachusetts 02140. 617-868-0500.

"DEEJAY MANUAL" is a folio of Gags, Ideas, Breaks, Gimmix, Fun for the working deejay. Special $3.00 with this ad. Write for free "Broadcast Comedy" catalog. Show-Biz Comedy Service (Dept. E) 1735 E 26 St., Brooklyn, New York 11229.

PROGRAM SERVICES

35,000 professional comedy lines! Forty speakers' joke books plus current comedy, a topical humorous service period. Catalog free. Sample selection, $5. John Rain Associates, Inc., 232 Madison Avenue, New York City 10016.

DEEJAYS! 6000 classified gag lines for radio, $5.00! COMEDY CATALOG FREE! E. Orrin, Boyer Rd., Mariposa, Calif. 95338.

Add six voices to your station. D. J. PRODUCTIONS, P.O. Box 281, Auburn, Washington 98002 for complete details and sample.

Deejay lines by top comedy writers. 3 recent samples—$5.00. $25 yearly. Humor Originals. Box 86, East Meadow, N.Y. 11554.

INSTRUCTION

R.E.I.'s famous (5) week course for the First Class Radio Telephone License is the shortest, most effective course in the nation. Over 98% of R.E.I. graduates pass F.C.C. exams for 1st class license. Total tuition $350.00. Job placement free. Write for brochure Radio Engineering Incorporated Schools, 1336 Main Street, Sarasota, Florida 33577—or 3123 Gillham Road, Kansas City, Missouri 64109—or 809 Caroline Street, Fredericksburg, Virginia 22401—or 625 E. Colorado Street, Glendale, California 91205.

FCC License in six weeks from the nation's largest license school. Compare reputations and success rates before you invest. Professional announcing training on the nation's only fully school-operated commercial station used solely for training. School locations in Dallas, Atlanta, Chicago, New Orleans and Minneapolis. Write Elkins Institute, 2603 Inwood Road, Dallas, Texas 75235.

First phone in six to twelve weeks through tape recorded lessons at home. Sixteen years FCC license teaching experience. Proven results. Bob Johnson Broadcast License Training, 1060D Duncan, Manhattan Beach, Calif. 90266.

Learn Avionics (Aviation Electronics)—Jobs galore, G.I. approved; literature. Academy Avionics, Reno/Stead Airport, Reno, Nevada 89506.

CONSULTANTS

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Phone 202-223-1180
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USE BM/E's CLASSIFIED MARKETPLACE TO REACH OVER 21,000 BROADCASTERS!

Please run the ad attached in BM/E's CLASSIFIED MARKETPLACE in your next:

☐ 12 issues ☐ 6 issues
☐ 3 issues ☐ 1 issue

in a space of..... inches..... words under the Classification of:

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.....

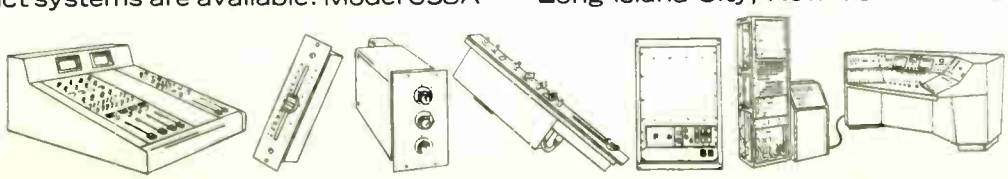
☐ Check enclosed

Name .....
Station or Co. .....
Address .....
City ..... State .....

BM/E Classified Advertising Department, Monterey Ave., Blue Ridge Summit, Pa. 17214. 717/794-2191.

THE FAIRCHILD REVERBERTRON

MODELS 658A, 658B. Fairchild reverberated sound is the sound of life; a real, natural, alive sound. Exclusive Fairchild systems offer a sound capability that supersedes all other artificial reverberation devices within equivalent price categories. Fairchild literally captures the superb quality of the world's finest acoustic chambers, without the expense of the chamber. Two compact systems are available. Model 658A utilizes 6 delay lines, each differently tuned, each carefully isolated. Its 28 pounds is completely portable; offers 3 basic reverberation periods and total unit flexibility. Model 658B, shown above in the lower corner, is only 3" wide, 5¼" high, 11" deep. It has fewer control features, yet embodies much of the Fairchild excellence. Contact your Fairchild Recording Distributor or write Fairchild for more data. **FAIRCHILD RECORDING EQUIPMENT CORPORATION.** Dept. BM/E 12, 10-40 45th Avenue, Long Island City, New York 11101.



DESKTOP MODULE CONSOLE / LUMITEN / REVERBERTRON 658B / INTEGRATED CONTROL MODULE / REVERBERTRON 658A / REMOTE AUDIO CONSOLE

BM/E ADVERTISERS' INDEX

*Also in Broadcast Equipment Buyers' Guide

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Manager, Advertising Sales

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San Francisco, California 94103
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Central Tokyo, Japan
Yoshi Yamamoto

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Another Times' first for the CATV industry: not just testing every reel of Alumifoam® coaxial cable that's shipped out of our plant, but testing to guarantee that every reel will meet db and frequency ratings unmatched by anyone else.

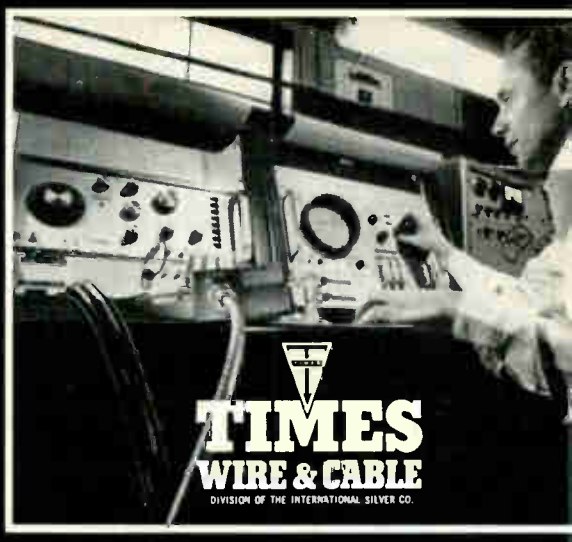
This testing is unique in the industry—because the equipment to accomplish it is unique. We literally designed and built it ourselves, from the ground up, to do the precise testing we wanted—so that we could guarantee every reel at 30 db to 240 megacycles. In fact, at a slight cost, we can use our equipment to test at 28 db to 300 megacycles, and guarantee that too!

It's this kind of extra performance that Times engineers constantly strive for—and it means that you get first-quality cable every time you order.

You get other advantages too. Alumifoam® is made in continuous seamless lengths up to ½ mile—which makes for fewer splices, fewer trouble spots, less maintenance and lower installation costs. Also there's no internal ridge to create a path for the longitudinal transmission of water or vapor—so it's moisture-proof.

Alumifoam's long life, based on tests and actual use, assures you of continuous quality performance for years. And that performance includes carrying color signals without degradation and the availability of many additional channels beyond the normal 12 (a good point to remember when you expand your operation.)

So now you can be sure of the cable in your Cable TV... sure of 30 db to 240 megacycles—even 28 db to 300 megacycles... because Times tests and guarantees every reel. Doesn't it make sense to get in touch with Times? Times Wire and Cable/a division of The International Silver Company/Wallingford/Conn. 06492. Phone (203) 269-3381.



Every reel of Alumifoam® is tested and guaranteed at 30 db to 240 megacycles

FROM THE EDITOR

Whither Audio?

By now, you'd think that so much is known about audio, its techniques so well perfected, that there wouldn't be much news of earth-shaking import to the broadcaster. Not so. As sophistication in recording techniques grows, so grows the broadcaster's needs for improved gear and operations. And all the while, the broadcaster must explore new ideas, new outlets, new program formats, new revenue sources—all hinging on audio developments.

As a forum for the audio industry and its burgeoning technology, the Audio Engineering Society's Annual Convention has become the world's crossroads. Here, gathered briefly under one roof, is a convocation of the people who count in professional audio, people from all corners of the globe. The annual AES Convention has grown enormously —much beyond the miniscule collection of manufacturers and engineers it once was.

Once the province of recording interests, the AES is becoming a focal point for broadcasters. To be sure, recording is still high on the list, for what broadcaster doesn't record? But new recording techniques are being turned around and used in TV production, especially those sophisticated multichannel consoles and recorders that help those spot commercials get the ever-elusive "just-right" sound track. Start with eight channels, mix down, remix a couple of times, try a few dubs—it all takes some pretty far-out audio gear—and broadcasters are at last waking up to the need for better station facilities.

With enough planning and critical cost-consciousness, almost any radio or TV station can start installing multichannel gear right now. It's not only good for commercials, it'll give the station professional recording quality for lots of diversified uses—all of them income-earners.

Don't throw out those cumbersome old mikes—there's always a place for them in a well-equipped recording studio. But do add new, versatile microphones, mixers and consoles, and don't be afraid to approach that 8- or 16-channel recorder; it won't bite. What it will do is help add professional quality to a sagging station product.

Yet sophisticated new equipment alone won't do the trick. There has to be someone to run these shiny new toys, and yesterday's audio engineer may not be up to the task of producing tomorrow's sound. A long, hard look at available operating personnel may be in order. One new man added to the staff may do the trick if he knows his stuff. Failing that, send your best man off to school to bring him up to the state of the art. Don't let progress pass your station by. As the Red Queen told Alice (in Lewis Carroll's *Through the Looking-Glass*), "It takes all the running you can do to keep in the same place. If you want to get somewhere else, you must run at least twice as fast as that!"

So start running.

Walter G. Salm
Managing Editor

TCA3 TRANSISTORIZED CAMERA AMPLIFIER

The dependable TCA3 has almost become standard equipment in all image orthicon cameras. It replaces the vacuum tube pre-amplifier and is designed so it may be quickly mounted within available space in the camera without permanently disabling the vacuum tube amplifier. This cool little amplifier, about the size of a package of cigarettes, can add years to the life of cameras. The TCA3 sells for $295.00 F.O.B. Nashville, Tennessee.

For complete information, write to:

INTERNATIONAL NUCLEAR CORPORATION

608 Norris Ave • Nashville, Tenn. 37204 • Ph.: (615) 254-3365

TC1 CLAMPING AMPLIFIER

The TC1 Clamping Amplifier employs tip clamping to remove low frequency signal deficiencies without disturbing burst and other chrominance information in or about back porch levels. The clamped stage utilizes a field effect transistor driven by a balanced bridge circuit. This advanced design technique produces highly effective and stable clamping. The TC1 Clamping Amplifier sells for $325.00 F.O.B. Nashville.

For complete information, write to:

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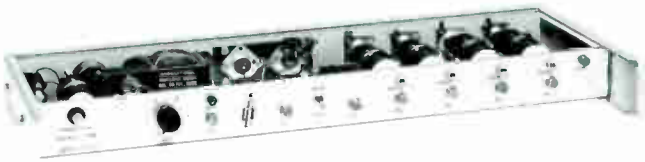
TDA2D VIDEO/PULSE DISTRIBUTION AMPLIFIER



The now-famous TDA2 Distribution Amplifier, in use at most television stations and networks, has a recently added feature. The "D" stands for Differential Input, which we added to the TDA2. And not only did we add a differential input, we subtracted $30.00 from the price. Instead of $325.00, we're selling the new improved TDA2D for $295.00 F.O.B. Nashville, Tennessee. The compact TDA2D fits neatly into 1¾ inches of panel space and produces virtually no heat.

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A COMPLETE REED STUDIO SWITCHING SYSTEM

We build them, in a few weeks, to your exact requirements. No limit on number of input and output buses. A single switching cross-bar can be operated from any number of studios, or master control, or VTR positions. Single re-entry, dual re-entry, keying buses, lap-dissolve buses, special effect buses, previews, spares, audio-follow-video, audio-not-follow-video, cut-bars, preset and transfer switching, and even computer-operated switching, are available for the asking.

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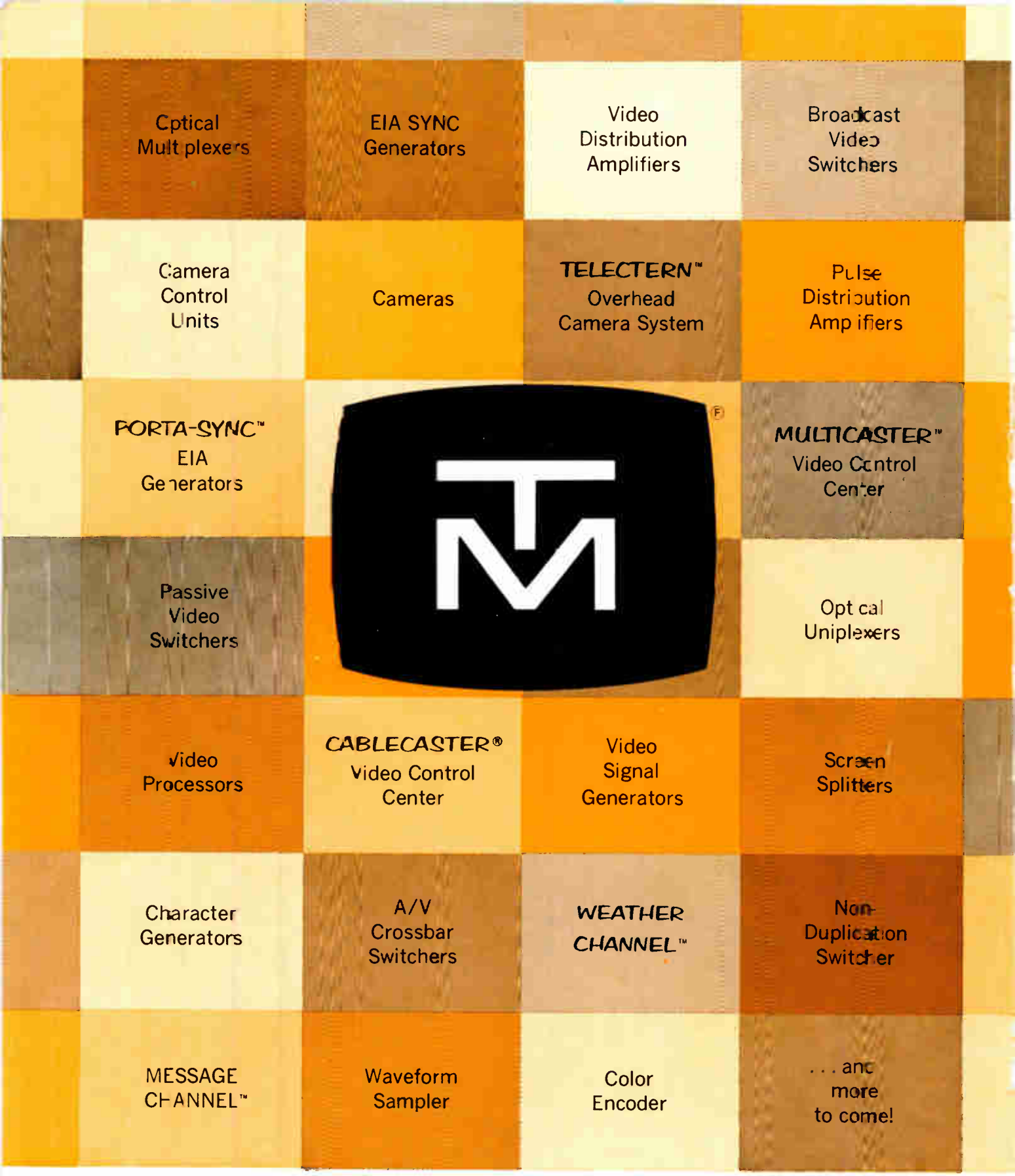

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