

BROADCAST **engineering**

the technical journal of the broadcast-communications industry



A HOWARD W. SAMS PUBLICATION

Pre-NAB Convention Review *page 18*

New Equipment Review
Logic In The Loop
Super Modulation Update

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How do you pick up sound without noise?

Pick up the new RE50 and the new RE85 quiet microphones.



Model RE50 omnidirectional dynamic \$128.50 list. Model RE85 lavalier dynamic \$142.50 list. Less normal trade discounts.

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

Small, light, and just barely larger than the smallest microphones of their type. Yet both use a unique double-wall construction that is more effective in reducing microphone noise than any other we have tested.



Let's look into the RE50 first. A cut-away shows that inside each RE50 nestles the familiar 635A, case and all. It's shock-mounted at top and bottom to the outer case. Even the connector is isolated from the actual microphone. And the problems

of mass and resonance have been worked out (with the aid of our computer) so that contact noises and cable rustling never reach the Acoustalloy* diaphragm.

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

But if noise can be a problem with hand-held and stand microphones, it is a plague to lavalier types. Clothing rustle, cord noise, and accidental contact with hard surfaces are common troubles. Ex-

cept with the new RE85. Again, we have created a microphone within a microphone. But we've gone even farther. A special low-noise grille, for instance. And even the hard, smooth paint finish was chosen to reduce small rubbing noises.

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

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

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high fidelity systems and speakers • tuners, amplifiers, receivers • public address loudspeakers
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WITHOUT DISTURBING
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OPTICAL ALIGNMENT



See "The Performer"
NAB Booth 324

BROADCAST engineering

The technical journal of the broadcast-communications industry

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ABOUT THE COVER

The cover this month kicks off our Pre-NAB convention coverage. Special attention has been given to products to be exhibited for the first time. See NAB preview, starting on page 18. Photo courtesy of Ampex.

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EDITORIAL

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Robert E. Hertel, Publisher

INTERTEC PUBLISHING CORP.
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MODEL 938 QUAD SPLIT GENERATOR

SPORTS SPECIAL

A



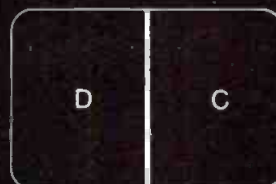
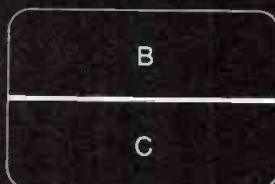
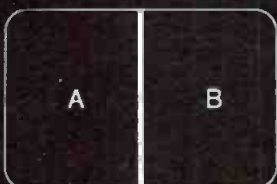
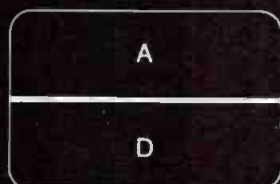
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D



C



Model 938 is a complete special effects system. It permits up to four video signals to be displayed simultaneously. The separation of the four quadrants can be emphasized by the use of a variable width border which can be adjusted to any level from black to white. In addition, borders can be colored by use of a color background generator.

Complete remote control of the 938 is provided. The horizontal and vertical separation lines can be placed anywhere in the raster or, if desired, wiped completely off the screen to leave two signals separated either horizontally or vertically (see illustration).

The 938 system consists of two plug in modules, plus power supply and mounting frame. A remote control panel is supplied as standard equipment. GVG Model 909 Color Background Generator (optional) is suggested for those users requiring colorized borders.

\$1,525

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Circle Number 5 on Reader Reply Card

DIRECT CURRENT FROM D. C.

MARCH, 1972

by Howard T. Head

Direct Current From D.C.

With the NAB issue of BROADCAST ENGINEERING, it's time once again for our Pompous Predictions, where we try to forecast FCC and other Government actions for the coming year. Our batting average for the past year turns out to have been pretty good, although several of the items are still waiting for Commission action.

The Commission is feeling the pinch of a personnel cut and an increased workload, much of the latter in non-broadcast and non-engineering areas. An increasing amount of the Commission's time is being devoted to complaints involving the Fairness Doctrine, a quagmire of the Commission's own making, and this year's political campaigns and elections are certain to bring about a sharp rise of fairness complaints. Yet there will be a few dedicated Commission engineers "tending the store", and so once again we bring you our . . .

1972 Pompous Predictions

Satellite-to-Home Broadcasting: Plans will be completed for experimental satellite-to-home television broadcasting of educational programs to the Rocky Mountain area. Actual broadcasting will begin with the launching of the ATS-F satellite in the Spring of 1973. The transmissions will be broadband FM in the 2.5 GHz region, and will require high-gain receiving antennas and converters for distribution to school and home viewers.

Emergency Warning and Broadcast System: The Emergency Broadcast System (EBS) will be overhauled. The Office of Civil Defense (OCD) will proceed with the implementation of its Decision Information Distribution System (DIDS) employing high-power LF and MF transmitters. The Office of Telecommunications Policy (OTP) will press for a separation of the warning function from the broadcast function, and will oppose any requirement for mandatory inclusion of warning circuits in home entertainment receivers.

New Television Field Strength Curves and Contours: The Commission will adopt its proposed revised curves of field strength vs. distance and contour field strength definitions for the VHF and UHF television bands. This will require drawing new contour maps for all television broadcast stations. A principal effect of the new contours will be on the newly adopted CATV regulations, which define many rights and duties of cable systems in terms of the City Grade, Grade A and Grade B contours. There will be a period of utter confusion following the adoption of the new curves.

THE TV DEMODULATOR

WITH THE
Proof of Performance Certificate



AMF TV Demodulator

HS 2064
Front End Receiver
For Off-Air and Remote

Reference Standard

A *precision* TV demodulator serves as a reference standard for the evaluation of the performance of a TV x'mitter. It is the key for all measurements of frequency response, group delay, differential phase and gain, noise, etc. of the transmitter. The tolerances of the demodulator must therefore be considerably tighter than the FCC transmitter specs.

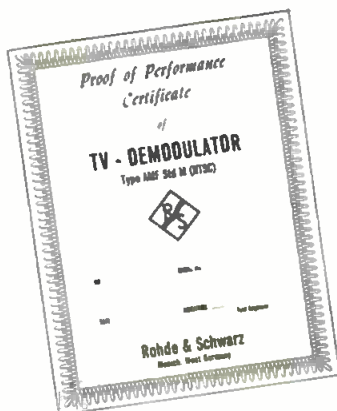
Operation in Strong RF Fields

The demodulator must be designed specifically for operation in strong r.f. fields. Good shielding and a high level r.f. input ($1 V_{rms}$) with little attenuation, are therefore mandatory. For the same reason, the front end receiver HS 2064 which is to be used for remote reception has been designed as a separate unit. The demodulator must also have tolerances considerably tighter than those of the x'mitter for its group delay and amplitude responses within the video band.

Certification

The Proof of Performance Certificate delivered with each AMF assures you that the demodulator has been checked thoroughly to be truly a standard. This six page document contains all the calibration data which gives the instrument its full value.

Quality Does Not Come Cheap
More than \$100,000 worth of test equipment and many hours of work by highly trained specialists are required to prepare these individual certificates and represent a substantial part of the cost of the AMF.



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Circle Number 6 on Reader Reply Card

See us at NAB Booth 241 West Hall.

New Broadcast and Broadcast Auxiliary Rules: A Committee including representatives from NAB, the Federal Communications Bar Association (FCBA), and the Association of Federal Communications Consulting Engineers (AFCCE) will begin work on a general revision of the Commission's broadcast rules (Part 73). Commission observers will participate in the project and will have the wholehearted backing of FCC Chairman Burch. The Chairman is hopeful that this work can be completed in less than a year's time, but this may be somewhat optimistic considering the magnitude of the task.

AM Modulation Levels: The Commission will act, perhaps prior to the NAB Convention, to reimpose a maximum limit on positive modulation for AM broadcast stations. This limit will be 125%, but watch it—the new rules will provide that no positive peak may exceed this level—which will require that "frequently-recurring peaks" be held to a lower value.

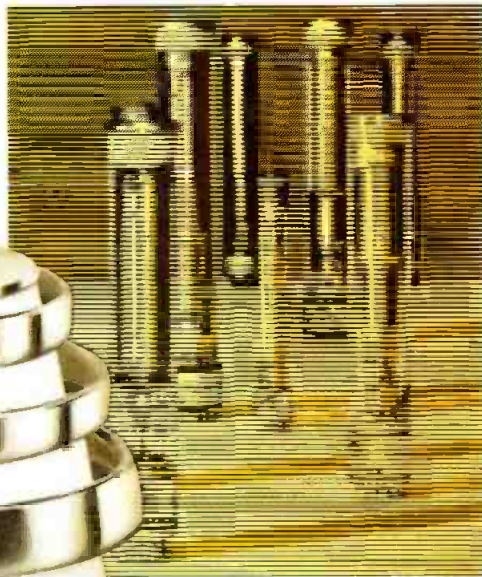
Four-Channel Stereo: An Electronic Industries Association (EIA) Committee will be formed to study possible standardization of a four-channel stereo system for broadcast stations. The Commission will not participate actively, but will supply observers as was done with the National Stereo Radio Committee (NSRC), which standardized the present FM stereo multiplex system. Progress will be slow, because much of the physiological and psychological basis for the four-channel effect is just now beginning to be understood.

Television Remote Control Test Signals: The Commission will stick to its guns and require that any television station operating its transmitter by remote control employ the special VITS insertion signal required by the new remote control rules (See Dec., 1971 BE). However, NAB will request an extension of time past the present April 1, 1972 deadline, which will be granted for a period of 90 days.

Color Reference Signal: EIA will adopt a Recommended Practice for the use of the vertical interval reference (VIR) color signal developed and tested by its Broadcast Television Systems Committee (See Jan., 1971 BE). A formal amendment to the Commission's rules will be proposed to permit the use of the VIR signal, but action by the Commission within the coming year is unlikely.

AM Freeze:





We reverse past predictions and now forecast that the "freeze" on new AM station construction will not be lifted in the near future. The reason for this is not technical—agreement has been reached on new AM rules and the necessary documents are ready—but the fact that the Commission would be obliged to divert several engineers from other duties in order to process expected applications. As noted above, this comes at a time when the Commission is feeling a tight personnel pinch.



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Plumbicon* TV camera tube
that revolutionized
color broadcasting
all over the world...*



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8812 	6.25	8.75
8813 	12.5	17.5
8915 	17.5	25.0

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March, 1972

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They feature "K" grid material for long and stable life; mesh filaments and grids for high power gain, efficiency and mechanical strength and rugged coaxial metal-ceramic construction that lends itself readily to cavity operation.

Optimally matched cavities for each type are available for both low- and high-band service and for both video and sound transmission.

Amperex precision design and manufacture of the tube and matching cavity is your best assurance of reliable, trouble-free performance. When you think of TV broadcast equipment ... think of it from the Plumbicon tubes in your cameras through the power tubes in your transmitter.

For additional information on the complete line of Amperex cavity-matched VHF-TV power tetrodes, write: Amperex Electronic Corporation, Product Manager, Power Tubes, Hicksville, New York 11802.

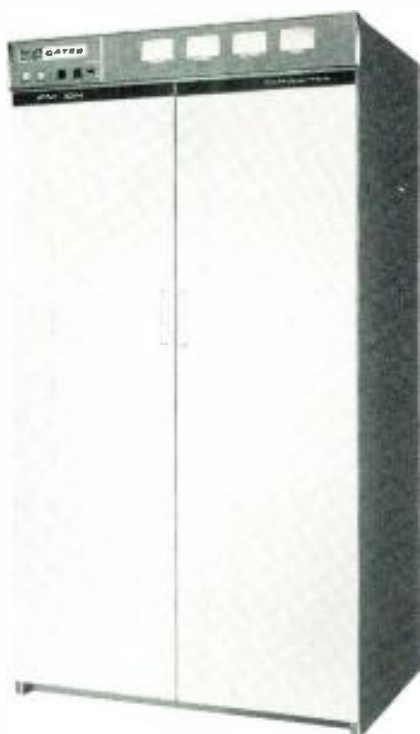
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LETTERS TO THE EDITOR

Freq. Monitors

Dear Editor:

In the course of the years of our repairing and rehabilitating FM and AM frequency monitors, it has come to our attention that there is one area of station maintenance that is often overlooked by the station engineer.

This is the maintenance of the thermostats and relays in the frequency monitors.

Relays should have their contacts burnished at least once every three months, and where the contacts are oriented so that dust and dirt may remain on them instead of falling through, this should be done more often.

Mercury thermostats are subject to failure in that the internal contacts may become corroded or dirty, or the mercury may become contaminated, and result in poor or no contact. We have met with cases where the internal contact was entirely burned away, resulting in thermal runaway that almost destroyed the instrument. Mercury thermostats that have been in service for ten years or more, should be replaced, even if they seem to be operating properly. A small investment in a replacement part is a little thing compared with a complete rebuilding of the oven and associated parts.

Howard S. Knaack
Radio Aids
Lake Bluff, Ill.

Station Needs Facts

Dear Editor:

KILE in Galveston, Texas, will be 50 years old in 1972. In commemoration of this anniversary, we are attempting to chronicle the past history of this pioneer broadcasting station on Galveston Island.

To accomplish this, we are interested in corresponding with anyone who owned or worked at this station prior to 1960. It was formerly KLUF and was most cer-

tainly operated under at least one other set of call letters during its existence.

Dick Fletcher, CE
Galveston, Tex.

Solid State Rectifiers

Dear Editor:

In reference to a recent article in BE concerning the use of solid state rectifiers, I recently converted our Collins 5 kW transmitter. To replace the required four 866A's, two 872's, and six 575A's would cost around \$175.00 whereas the changeover to all silicon stacks cost about \$130.00.

Since there is no filament voltage required when using silicon rectifiers, all the filament transformers supplying filament voltage to the mercury vapor rectifier tubes were disconnected by removing the fuse in the circuit. The B+ lead was removed from the center-tap of the transformers and connected to the correct pin of the silicon stack. I figured that the power used to heat just the filaments was around 600 Watts an hour, so here's a saving alone in your power bill in just a month!

Now there is no need to warm up the transmitter for 15-30 minutes on a cold morning! By the way, I didn't construct these stacks myself... I ordered them from a company up north. Now my problem is... what am I going to do with eight filament transformers not in use?

John Buckalew, CE
WUFE Baxley, Ga.

Recycling Problem

We have a Raytheon RA-1000 transmitter that has, what seems to be, a built-in characteristic. All engineers counseled seem to have no answer for why this unit recycles for apparently no reason and in no set pattern. For days it may not go off the air, then it may cycle twenty times in one day. Any ideas or suggestions would be appreciated.

Hugh M. McBeath
Owner-Manager
KJBC
Midland, Tex.

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April 11—Ten/70 Mono Playback

April 12—TT-22 Turntable Preamp

Come to Booth 307, Continental Room, during NAB and register daily for the big Spotmaster giveaway. It's a great opportunity to win our top line tape cartridge equipment . . . a value of more than \$3,200! Only NAB members are eligible.

Then see the entire 1972 Spotmaster line, including our new "Mini-Giant" multiple cartridge players that let you mix and match 3, 5, 6, 9, 10 and 15 decks in one expandable package.

Single cartridge machines on display will range from our low-cost 400 series (starting at just \$440) and classic 500C series . . . to the incomparable Ten/70. See them all—mono, stereo, delayed programming, compact and rack-mount models.

SEE YOU AT NAB!

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The Spotmaster/Revox A77 Mark III-B, a new reel-to-reel stereo tape deck with broadcast quality performance and dependability, all the features you want . . . and a budget-pleasing price!

EARLY BIRD SPECIAL



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BROADCAST ELECTRONICS, INC.

A Filmways Company

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Introducing a new cast



from the TCG-1425A Character Generator

To the station manager:

The TCG-1425A is TeleMation's cost-effective answer to your titling problems. It lets you get more mileage out of fewer people. And, with its colorized and edged characters, it puts you miles ahead of your competition. Your promos get more mileage, too, because the 1425A automatically synchronizes itself to the video source—lets you run promos and credits over remote or network feeds without gen-locking.

Worried about how to edge out the competition with your election coverage? Let the 1425A do it for you with its random access, 50,000-character disc memory—backed up by the limitless capacity of our upcoming audio cassette storage device. If you wish, we can even interface with large computers.

We give you more features, more sophistication, more flexibility and more attractive characters than you can get with our chief competitor's equipment—at a

saving of more than \$5000.

Beef up your image—buy a TCG-1425A.

To the production manager:

The TCG-1425A gives you a perfect program of production values. Two accessory storage systems ensure maximum versatility. The TDM-1425 random access disc memory, for example, offers you an unmatched 2000-line storage capability, 1/60 second access time and the ability to spit out a full-page display in just 1/4 second. More than 142 full "pages" of information can be stored with line-by-line random access. A cassette memory system for archival storage, soon to be available, will let you put statistical information, such as election returns or sports data, on audio cassette for replay through the disc whenever desired. Keyboard control buttons are color coded and grouped for easy operation by untrained personnel.

With its built-in video switcher and automatic color synchronization to the selected source, a single TCG-1425A can

serve both operations and production departments, producing eye-appealing matted, colorized and edged letters to spice up your taped commercials and on-air presentations. Horizontal crawl, vertical wipe, vertical roll and flash are all standard features with the TCG-1425A.

You get outstanding editability, too—with display editing functions such as copy-up/copy-down, hop-left/hop-right, snake-up/snake-down, automatic page and line centering and open-line/close-line (for erasing mistakes without resetting full lines). All this plus a handy extra line for composition preview. And a handsome keyboard that will either mount in a console or stand on its own.

Beef up your productions—buy a TCG-1425A.

To the chief engineer:

Our new TCG-1425A character generator and its many options have been engineered as a system. You get complete system integrity and single-source re-

of characters



sponsibility. Built into the TCG-1425A is a solid-state switcher which permits selection between two video sources. The source selected is routed through the matting amplifier while the other source is bypassed through an equivalent delay circuit. One of the sources even has a fail-safe metallic-contact bypass.

Options include edging, colorizing, 1000- or 2000-line random access disc memory, and an operator's control panel for on-air presentation of stored data. The all-around edging is accomplished electronically. Synchronization is automatic and instantaneous when operator switches between video sources. The subcarrier regenerator and burst logic let you colorize over either color or monochrome sources, with hue, saturation and lumi-

nance all operator-controlled. TeleMation-designed-and-built, the disc memory can be random-accessed line-by-line either from the keyboard or the operator control panel. It uses flying heads for wear-free, clog-free, trouble-free operation. Beef up your picture—buy a TCG-1425A.

To the news director:

What could be more convenient than a keyboard right in the news room! You can compose copy, correct it, edit it, delete it, transpose it, update it, store it and even air it. And you can use the 1425A's vertical-roll mode as an electronic prompter. This keyboard calls your edited copy out of the disc memory and presents it in highly

legible form. (Our easy writer is an easy reader, too.)

Beef up your ratings—buy a TCG-1425A.



For information or demonstration, write or call today.

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FAA Hits Commission on Hijack Monitoring

The Commission has been notified by the Federal Aviation Administration in connection with recent aircraft hijackings that some broadcasters and other Federal Communications Commission licensees have been monitoring Federal Aviation Administration air-to-ground communications and divulging their content to the public. In some cases they have broadcast live or taped reproduction of such conversations.

The Federal Aviation Administration has not authorized such activities and has reported that the widespread public dissemination of these radio transmissions could seriously hinder law enforcement activities during an actual aircraft hijacking and therefore jeopardize the lives of passengers and crew. Moreover, such radio transmissions serve to alert potential hijackers.

The Commission recognizes that there is a strong public interest in the free gathering and dissemination of news and does not wish to discourage broadcast stations or other news media in their proper efforts to serve such public interest. However, it must also be recognized that there is a strong public interest in public safety, and that the divulgence of public safety communications in news bulletins or other use of such intercepted communications is contrary to law unless authorized.

Section 605 of the Communications Act, with limited and specified exceptions, prohibits any person, not authorized by the sender, from intercepting and divulging or using radio communications of this character. This prohibition is applicable to the practice of monitoring Federal Aviation Administration communications for the purpose of obtaining information as to events worthy of on-the-spot news coverage, to making other beneficial use of such interceptions, and to the divulgence of the content of transmissions either verbatim or in news bulletins.

Cable Advisory Group Created

The Commission has created a Cable Television Technical Advisory Committee to deal with problems of technical standards. Chairman Burch will head the Committee, and Mr. Sol Schildhouse, Chief of the Commission's Cable Television Bureau, will be its Vice-Chairman.

The Commission expects that the Advisory Committee will attempt to formulate and propose technical standards for carriage of cable originated programs, return (two-way) communication, and various miscellaneous cable services as they develop. In related effort, the Commission expects shortly to request comments on such matters as limitations on permissible cross-modulation, ghosting, measurement techniques, and carriage of aural broadcast signals (31 FCC 2d 134).

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neered for stereo channel calibration in record studios, as well as extremely critical listening. The 500 AL Series features design modifications which make it ideally suited for the rough handling encountered in heavy on-the-air use. In fact, among the nation's disc jockeys it has become known as the "industry workhorse."

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Sports Blackout

FCC Cable Proposals

Amendment of Part 76 of the rules (proposed cable television rules) to implement, for cable systems, television sports blackout provisions of Public Law 87-331 has been proposed by the FCC (RM 1836). In a separate action, the Commission also proposed an amendment to restrict importation of non-local radio signals by cable systems (RM 1782).

The proposed sports rule states that when a professional baseball, basketball, football, or hockey team is playing at home, no cable system within the predicted Grade B contour of a station located within the home city of a team shall, without consent of the home team and the league, carry the television broadcast of a professional game of the same sport if the event is not available on a TV station located within 35 miles of the cable system's community, or has an audience in the county or community of the system meeting the significant viewing standard of the new rules.

Public Law 87-331 provides an exemption from the antitrust laws for professional football, basketball, baseball and hockey so that "packaged" or "pooled" TV rights may be sold by the League for games of the member clubs (Section one); provides for television blackout of games in the home territory of a team when it is playing at home (Section two); and ensures that professional football teams will not play, or cause their games to be televised into areas where collegiate football is being played on Friday nights or Saturdays.

The Commission said that the legislative history of Public Law 87-331 indicates that Section two was included for the purpose of maintaining TV blackouts when the home team was playing at home, and the proposed rule will accomplish that intention in regard to cable television carriage of sports events.

The Commission said that while it believes that the Grade B contour of TV stations located in the home city of the team in question represents the area in which cable systems must comply with the blackout, it wanted comments on whether it should parallel its signal carriage rules by establishing a fixed mileage of 35 miles. Because different leagues recognize varying distances for "home" territories, the Commission asked for comments on whether cable systems not located within the Grade B contours of stations in a team's home city, but within their "home territory" (where a TV station might be subject to a blackout) should fall within the proposed rule and whether a fixed mileage zone would be preferable to the proposal for Grade B contours. It also requested comments on whether there should be a different criteria for carriage of home games as against the games of some other team, and comments as to the appropriateness of adopting rules for other types of sports events.

Radio Markets

The Commission said that in order to control the fragmentation of local radio markets brought about by the carriage of nonlocal radio stations, it was seeking comment on the definition of the term "local signal" as applied to radio stations; the possibility of "grandfathering" radio signals presently imported by cable systems; the appropriateness of a leapfrog policy; and the possibility of devising importation policies premised either on the size of the market or on the type of signals imported, as is now done with TV signals.

The Commission pointed out that the "Consensus Agreement" it had included as Appendix D to its **Cable Television Report and Order** (adopted this same day) suggests a rule so that "When a CATV system carries a signal from an AM or

FM radio station licensed to a community beyond a 35 mile radius of the system, it must, on request carry the signals of all local AM or FM stations respectively." The Commission said that the suggested rule should provide an appropriate focus for those commenting, "with one addition — that whenever a local signal is carried, all such signals of the same type must be carried."

The Commission said that until radio rulemaking is completed, it would not process applications for certificates which propose to bring distant radio signals (one licensed to a community more than 75 miles away from the cable community) into cable communities having licensed radio stations with populations of less than 50,000 or unless all radio stations of the same type (AM or FM) licensed to the cable community are also carried.

Industrial Television Convention Ready

The 1972 National Conference of the National Industrial Television Association will be held in Chicago, April 12 through 14, 1972, immediately following the National Association of Broadcasters Convention.

Plans call for the opening of the registration desk on April 12, with the balance of the day available for visits to the equipment exhibits of the National Association of Broadcasters. 'Mini-exhibits' are also planned for those manufacturers who do not participate in NAB, but who handle lines of equipment of interest to the industrial user.

A reception is planned for the evening of April 12. The balance of the program on April 13 and 14, will be devoted to special presentations on the use of videotape in industrial and business applications, and on developing the solutions to typical industrial television problems in workshop formats. Some of the problem areas to be dealt with include: "Selling Management the TV Communications Concept"; "The Present and Future of TV Program Distribution"; "Program Evaluation and Cost-Effectiveness"; and "Establishing Economical Production Facilities".

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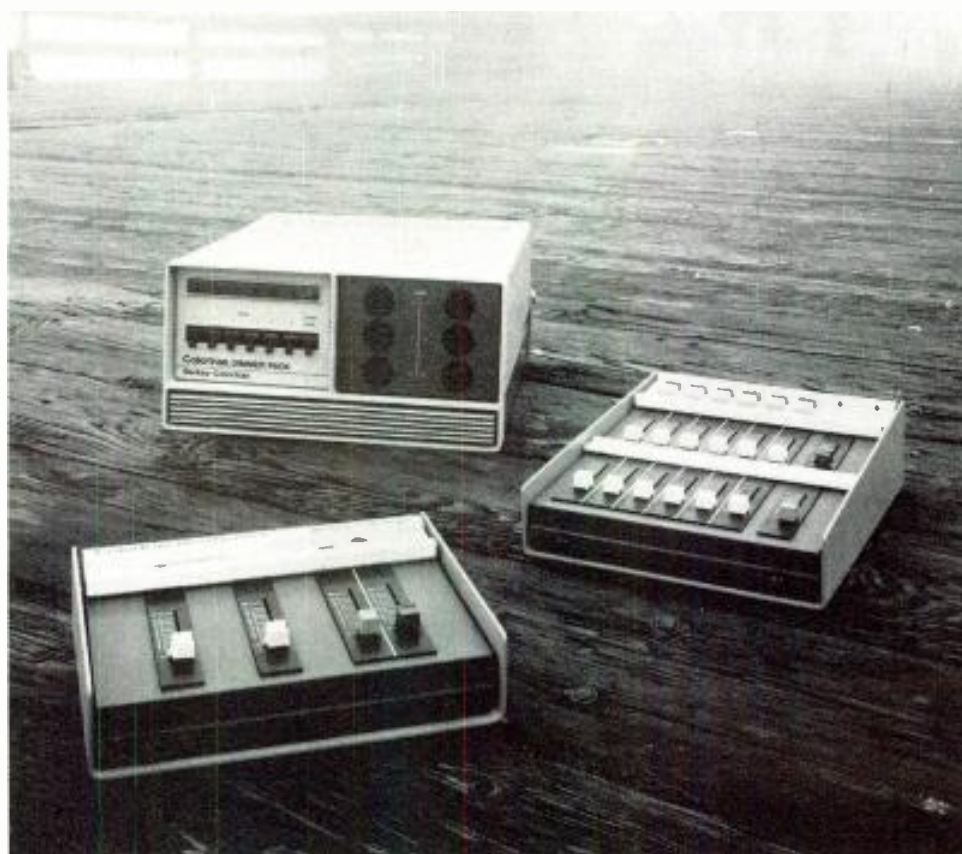
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NAEB's Harley: "Stop Second-Guessing Management"

NAEB President William G. Harley, in remarks delivered January 23, called on the federal government to stop "second-guessing" management personnel decisions in educational/public broadcasting.

Such actions are "time-consuming and impractical," Harley said, "and further than that, they are inappropriate. These are questions which should be posed, argued, debated, and resolved in a professional setting. No one makes decisions which are uniformly acceptable in any field, the Congress, the courts and the executive branch included.

"Public broadcasting is aware—if not adequately financed to implement it—of the need for a range of opinion to be expressed on any controversial issue. Even without a regulatory requirement for fairness, the serious ethical journalist really has no other professional role but to bring clarity where confusion exists and to reveal diversity of viewpoints where one might have thought there were only one or two.

"That is the objective which must be pursued and it should not be obscured by the government's anxiety over particular personnel decisions and what they cost—in plain English, government interference.

Accountability

"Enter next the question of accountability. How can the government be accountable to the taxpayers if it maintains a hands-off policy in the operation of public broadcasting?

"The answer of the Carnegie Commission, adopted by the government, was something new under the sun—the Corporation for Public Broadcasting—a private, independent corporation which was historically the first kind of mechanism ever established in which federal funds would be funneled into a sensitive area so closely allied to the First Amendment. The only part of the Carnegie plan the Congress has not implemented is the insulation from annual appropriations by means of an excise tax. This may turn out to be a fatal deficiency.

"It is the CPB's obligation to expend its funds in such a way that public support of its behavior from most of the eligible recipients will serve as testimony to an inquiring Congress that its appropriations are being spent wisely. We have not really put this procedure to the test, for it has been assumed that unanimity is the mother of consent, and without it that government authorities will render public broadcasting hopelessly at civil war and unworthy of support. What a mistake!

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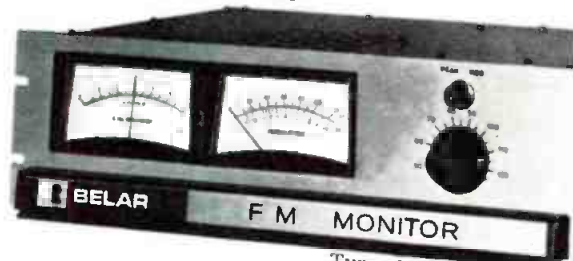
"It is easy to think of public broadcasting, like other institutions in our society, being affected by outside forces. But wait a minute: Is it public broadcasting if there are outside forces? It should be a

(Continued on page 110)

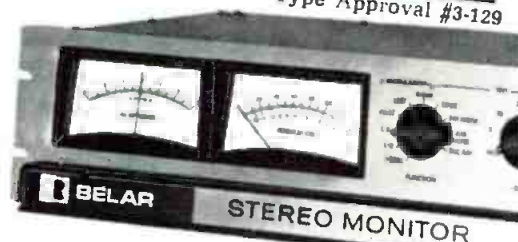
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Circle Number 15 on Reader Reply Card

NAB CONVENTION PREVIEW

NAB digs in for a better showing in 1972. National convention will be watched closely by all sides of broadcast-communications industry.



When the National Association of Broadcasters gather in Chicago next month (April 9-12) for their national convention, there will be several major issues on the line. And unless the membership and its boards can come up with a better batting average when they leave, broadcasting will remain on the firing line for 1972.

Much will depend upon the attendance at the convention—both by broadcasters and manufacturers. Broadcasters must become committed to a stronger course of action, or all the clawing and scratching from the outside may serve to reshape broadcasting into something none of us really want.

On the other hand, manufacturers must be prepared to meet the real needs of broadcasters. And none of this will be easy. Visual Electronics came out of its Chapter 11 in January and is well on the way to recovery. Ampex, a leader in several lines, took a big loss in its consumer line. They'll be redoubling their efforts to serve broadcasters.

So the convention must be a strong showing, because all those forces involved in the broadcast-communications industry will be

looking at the strengths and weaknesses of the entire chain.

The Engineering Conference schedule in this section is only what was available at press time. Please check your NAB schedule of events booklet after registration.

The National Association of Broadcasters has elected twelve prominent broadcasters to its 28-member Radio Board of Directors.

All will serve for a two-year term beginning April 12, the closing day of NAB's golden anniversary convention in Chicago.

Those elected by mail balloting are: Philip Spencer, president and general manager, WCSS, Amsterdam, N.Y. (District 2), Robert R. Hilker, president and general manager, WCGC, Belmont, N.C. (District 4), J. Kenneth Marston, executive vice president and general manager, WDXI, Jackson, Tenn. (District 6), George A. Foulkes, president and general manager, WAAC, Terre Haute, Ind. (District 8), Robert E. Thomas, vice president and general manager,

WJAG AM-FM, Norfolk, Neb. (District 10), V. Kay Melia, treasurer and general manager, KLOE, Goodland, Kan. (District 12), Sidney King, general manager, KVOC, Casper, Wyo. (District 14), Dan McKinnon, president, KSON/KSEA, San Diego, Calif. (District 16), Harold R. Krelstein, president, WMPS AM-FM, Memphis, Tenn. (At large representing Class "A" market radio stations), Thad M. Sandstrom, vice president, WIBW AM-FM, Topeka, Kans. (Class "B" at large), Tom Harrell, president and general manager, WSTP/WRDX, Salisbury, N.C. (Class "C" at large), Clint Formby, president, KPAN AM-FM, Hereford, Tex. (Class "D" at large).

Thirteen directors in even numbered districts and the four at-large categories were elected for two-year terms last year. There also are three network representatives on the Board.

Results of the mail balloting in this year's election were certified by a three-member committee appointed by NAB President Vincent T. Wasilewski. Committee members are Mitchell Miller, WFAX,



NAB convention will get underway April 9 in the Conrad Hilton Hotel, Chicago.

Falls Church, Va., chairman; Donald E. Macfarlane, WTOP, Washington, D.C., and Arch McDonald, WRC, Washington.

Engineering Award TO WCCO Engineer

John M. Sherman, director of engineering, WCCO, Minneapolis, Minn., has been chosen by the NAB to receive its annual Engineering Award. Among his other accomplishments, Sherman helped originate the North American portion of the first live intercontinental television exchange via Telstar.

NAB's top engineering honor will be presented at the engineering luncheon on Tuesday, April 11, during the Broadcast Engineering Conference, held in conjunction with NAB's 50th annual convention in Chicago.

His interest in broadcasting goes back to 1921 when he became a licensed amateur radio operator. Following graduation from Carnegie Tech, he joined the Federal Communications Commission's district office in St. Paul as engineer-in-charge.

In 1936, after serving in the FCC

post for seven years, he was named director of engineering at WTCN (which later became WCCO). Sherman has served as consulting engineer for more than a dozen radio stations and four television stations. He also has been a consultant for the construction of stations in Mexico, Holland and Hawaii.

Members of the Conference Committee which selected Sherman are: Ralph F. Batt, vice president and manager of engineering, WGN Continental Broadcasting Co., Chicago, Ill.; Ernest L. Adams, vice president for engineering, Cox Broadcasting Corporation, Atlanta, Ga.; Eugene A. Chase, chief engineer, WKJG Radio and Television, Ft. Wayne, Ind.; William B. Honeycutt, director of engineering, KDFW-TV, Dallas, Tex.; Andrew M. Jackson, director of engineering, LIN Broadcasting Corp., Louisville, Ky.; Leslie S. Learned, vice president for engineering, MBS, New York, N.Y.; James D. Parker, staff consultant, telecommunications, CBS Television Network, New York, N.Y.; Royce LaVerne Pointer, director, broadcast engineering, ABC, New York, N.Y.; Russell B. Pope, direc-

tor of engineering, Golden Empire Broadcasting Co., Chico, Calif.; William H. Trevarthen, vice president, operations and engineering, NBC, New York, N.Y.

Board Moves Could Strengthen NAB

The Board of Directors of the NAB took several actions recently in its continuing effort to strengthen the Association to enable it to deal more effectively with the problems facing the radio-TV industry.

The combined Radio and Television Boards have recommended that the government relations department be strengthened, and it authorized the NAB's Executive Committee to use the Association's financial reserves as needed.

It also voted to drop the separate offices of vice presidents for radio and television and recommended that their functions be consolidated into the station services department.

In another action, the Board directed Board Chairman Richard W. Chapin and NAB President Wasilewski to appoint immediately an Ad Hoc committee to make "an in-depth study of the future direction the NAB should take."

The Board of Directors of the National Association of Broadcasters has approved this schedule for NAB's 1972 and 1973 series of one-day Fall Conferences:

October 16.....	Hartford, Conn.
October 18.....	Chicago, Ill.
October 23.....	New Orleans, La.
October 25.....	Atlanta, Ga.
October 30.....	Denver, Colo.
November 1.....	San Francisco, Calif.

The 1972 Fall Conference schedule, previously approved, follows:

October 31.....	Denver, Colo.
November 2.....	Las Vegas, Nev.
November 9.....	Boston, Mass.
November 14.....	San Antonio, Tex.
November 16.....	St. Louis, Mo.
November 21.....	Atlanta, Ga.

The Radio Board, in an earlier action, established within the NAB a separate Radio Information office to sell and tell radio's story.

The Joint Board scheduled a special half-day meeting during the NAB's annual convention in Chicago, April 9-12. Newly-elected members who take office after the Convention will be invited to attend as observers.

Wasilewski, who received a unanimous vote of confidence by the Joint Board at its earlier meeting Tuesday, will negotiate a new contract with a special Board committee appointed by Chairman Chapin.

Its members, in addition to Mr. Chapin, president of Stuart Enterprises, Lincoln, Neb., are: Andrew M. Ockershausen, assistant general manager, Evening Star Broadcasting Co., Washington, the Radio Board Chairman; A. Louis Read, president and general manager, WDSU-TV, New Orleans, La., TV Board Chairman; Harold P. Krelstein, president, Plough Broadcasting Co., Memphis, Tenn., a Radio Board member, and Leslie G. Arries, Jr., vice president and general manager, WBEN-TV, Buffalo, N.Y., of the Television Board.

The Board approved a \$3.5 million budget for NAB operations during the year starting April 1, a figure that anticipates a small deficit.

It also directed the Executive Committee to examine and to implement, if possible, recommendations by TV Board member Dale G. Moore, president of KGVO-TV, Missoula, Mont., concerning tighter accounting procedures, executive committee responsibilities and areas of authority, and more complete reporting to the Board.

In other actions, the Joint Board:

- Applauded interest shown in Congress in assuring that sporting events now shown free on television will not be diverted to any form of pay television. The NAB staff was instructed to support any legislation which would protect the public from the siphoning of sports and other events now presented free by television broadcasters.

- Approved plans for an Engineering Directional Antenna Seminar in Cleveland next October and another Engineering/Management Development Seminar at Purdue University in February 1973.

- Authorized a Management Development Seminar at Harvard University this July and a Sales Management Seminar there during 1973.

- Directed the Executive Committee to investigate with the Radio and Television News Directors Association the possibility of holding a seminar on journalism, preferably in the Midwest.

- Established two new categories of associate members—one for regional radio and TV sales representatives; the other for production consultants.

- Broadened another associate member category to include telephone companies and firms involved in satellite communications.

Burch Looking For FCC Radio Office

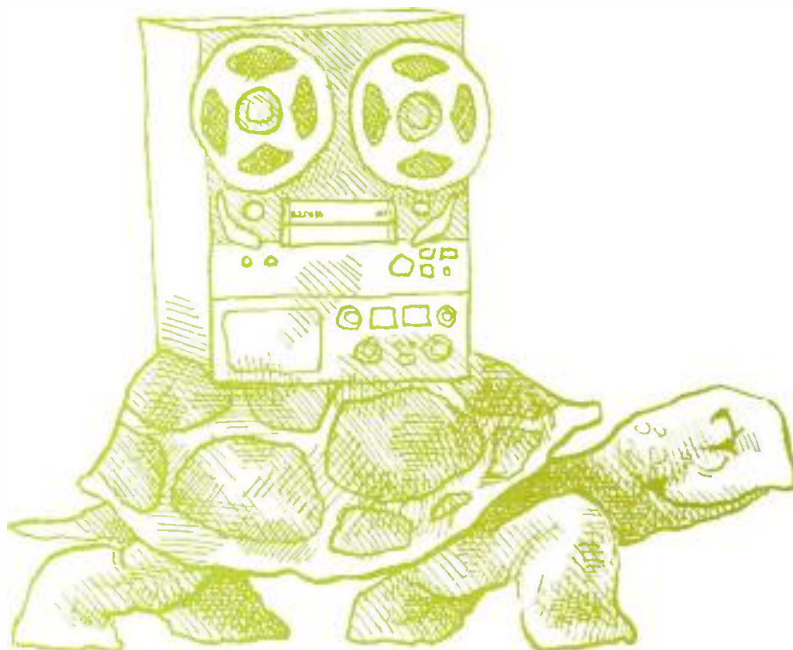
Dean Burch of the FCC has assured broadcasters that he is seeking to implement a suggestion that a separate office be established within the FCC to handle problems unique to radio.

His assurance was contained in a letter read to the Radio Board of Directors of the National Association of Broadcasters by Richard W. Chapin, NAB's Joint Board Chairman who made the suggestion several months ago.

Burch said he believes Chapin's "basic objectives" can be achieved by a joint NAB-FCC effort and that he has instructed the Commission's executive director to explore with NAB President Vincent T. Wasilewski the feasibility of establishing a working group to follow up with recommendations to the FCC.

He said the NAB-FCC committee could "identify problems which are unique" to radio and provide the FCC staff with information concerning rule-making proceedings and "any appropriate recommendations for simplifying existing requirements."

"The rather acute financial problems which many smaller broadcasters are experiencing today clearly require attention by the Commission," the FCC chairman said. "I am personally concerned



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John Sherman, NAB engineering award winner for 1972.

over the many informational and procedural problems facing radio broadcasters to which you referred."

NAB Engineering Group To Develop System To Aid Deaf TV Viewers

The Engineering Advisory Committee of the National Association of Broadcasters has appointed a special subcommittee to develop the engineering requirements necessary for a television captioning/subtitling system for viewers with impaired hearing.

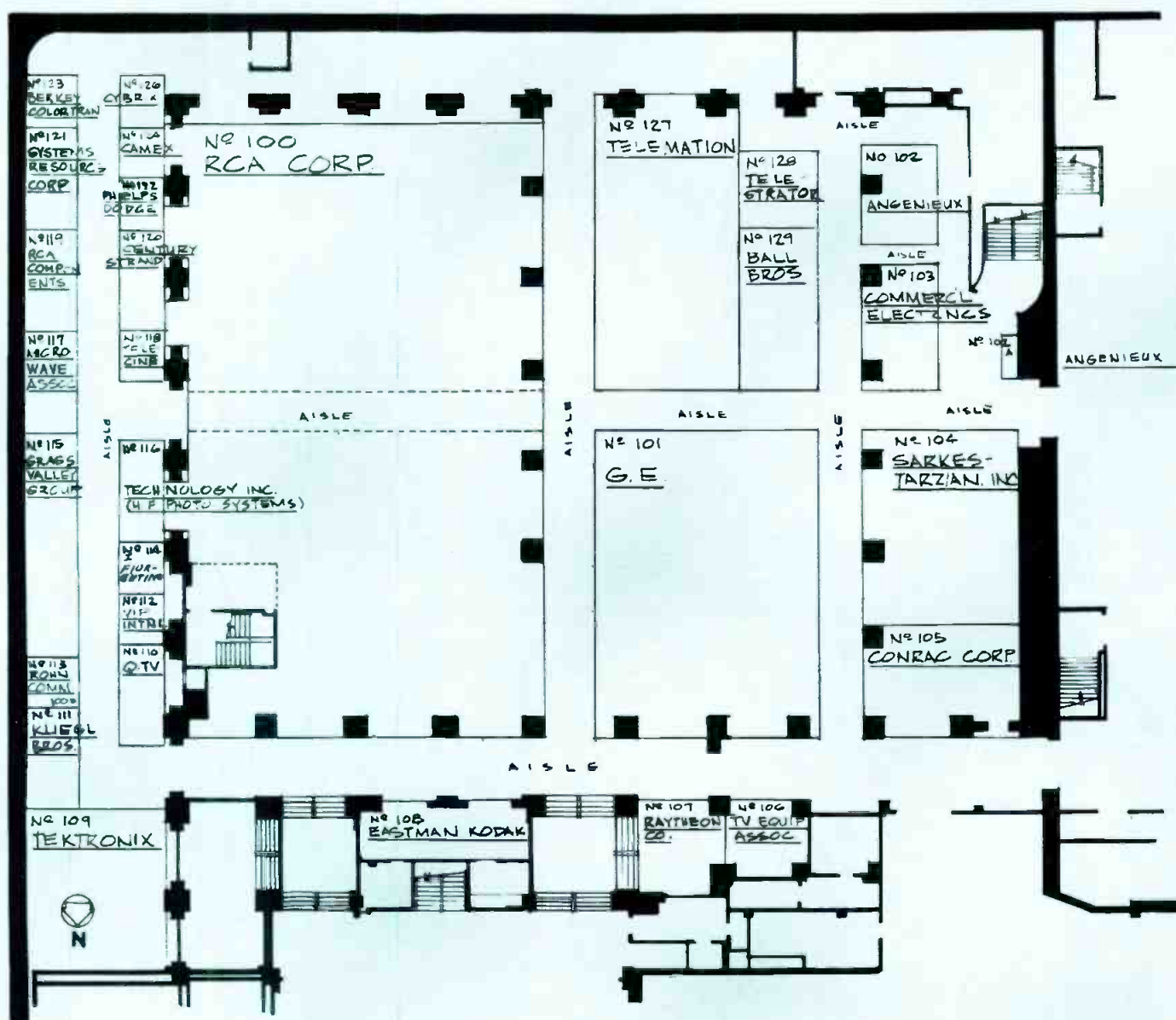
Julius Barnathan, American Broadcasting Co. vice president in charge of broadcast operations and

engineering, was appointed chairman of the subcommittee.

Acting Advisory Chairman Albert H. Chismark, director of engineering, Meredith Corporation Broadcast Division, said Barnathan will be assisted by representatives of the three TV networks (ABC, CBS and NBC) and the Public Broadcasting System and by a representative group of engineers from independent and network affiliated stations.

The Advisory Committee was told that a captioning/subtitling system has been developed which would enable viewers with impaired hearing to use a decoding device so they can "see" what is

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being said on such specially-prepared programs as newscasts and weather reports.

Barnathan said the system would use "TV Line One"—the top line of a TV picture—to transmit time, frequency, and captions and subtitles.

Through use of the decoder, information transmitted would ap-

pear across the bottom of the home screen, either as a "crawl" or as a brief caption that would stay on only long enough to be read.

Barnathan said the decoder would be reasonably priced so it could be generally available to the public.

Reverend Billy Graham has been chosen to receive the Distinguished Service Award of the NAB, the radio-TV industry's highest honor.

The presentation will be made by NAB President Vincent T. Wasilewski during the opening General Assembly at NAB's Golden Anniversary convention.

The award, established in 1953, is presented to individuals who make a "significant and lasting contribution to the American system of broadcasting by virtue of singular achievement or continuing service for or in behalf of the industry."

Past recipients include former President Herbert Hoover, comedian Bob Hope and industry leaders.

Mr. Graham's selection was made by NAB's Convention Committee during a recent meeting held in Marco Island, Fla., in conjunction with the four-day winter meeting of NAB's Board of Directors.



Vincent Wasilewski (left) and Neville Miller. NAB president will need a strong program to calm association waters. Miller is a past president of the NAB.

Engineering Sessions

Monday, April 10

10:30 AM—Joint Session with Management for Opening of Convention.

12:30 PM—Engineering Conference Luncheon; Williford Room, Conrad Hilton Hotel.

Presiding: Ernest L. Adams, Vice President for Engineering, Cox Broadcasting Company, Atlanta, Ga.

Monday Afternoon

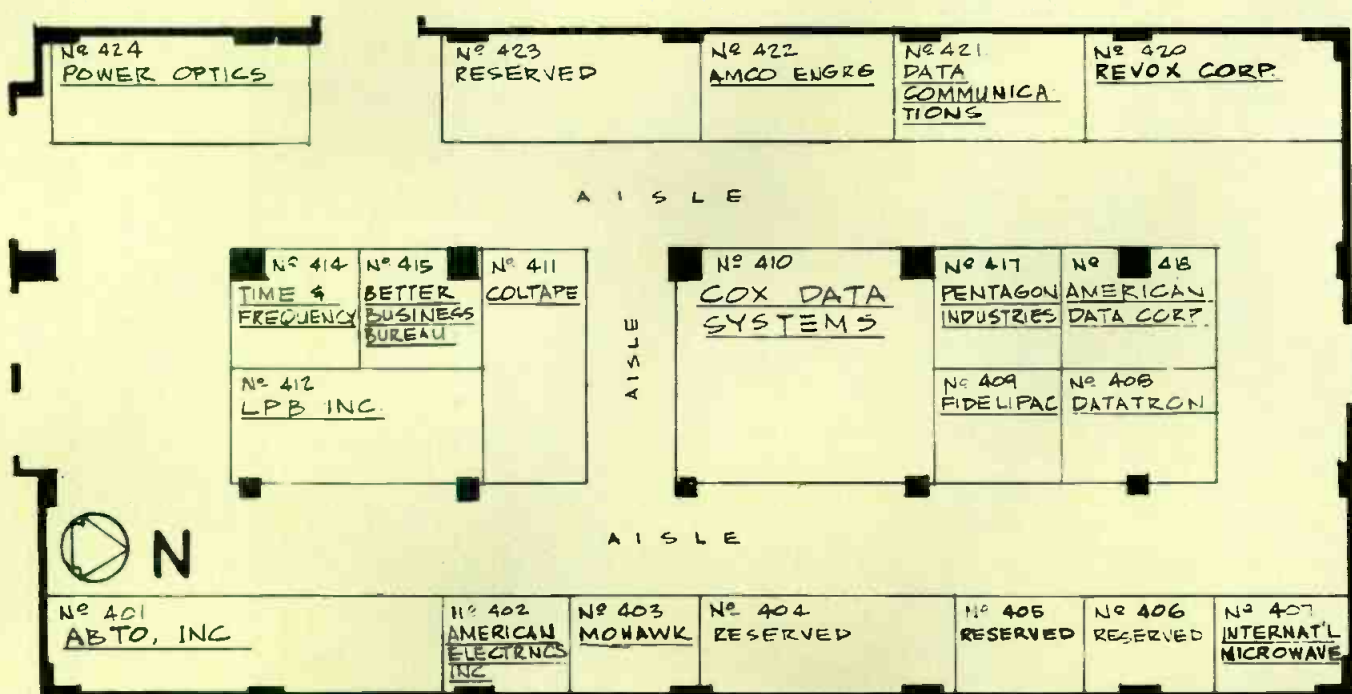
Pick Congress Hotel

Presiding: William B. Honeycutt, Director of Engineering, KDFW-TV, Dallas, Texas. Coordinator: Russell B. Pope, Director of Engineering, Golden Empire Broadcasting Company, Chico, California.

2:30-2:40 PM—Opening of Engineering Conference—Vincent T. Wasilewski, President, NAB.

2:40-3:00 PM—Report of Engineering Advisory Committee Activities; The Role of the Engineer in our Future Scheme of Broadcasting—Benjamin Wolfe, Chairman, NAB Engineering Advisory Committee.

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offers a rare combination of production flexibility with maximum automation. A digital computer is teamed with a dynamic CRT display giving a graphic representation of all related segments, edit points and transitions. Production directors need no longer be burdened by the technical problems associated with editing, as all checks, searching, synchronization and inter-related calculations are handled by the computer, allowing full artistic freedom.

The PEC-102 provides frame accuracy control of cueing, synchronization, editing and production effects automatically and is fully compatible with SMPTE recommended practice for time codes. Operates on 25HZ color or monochrome; 29.94HZ color and 30HZ monochrome.

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Circle Number 18 on Reader Reply Card



FCC Chairman Dean Burch lends support to commercial radio.

3:00-3:10 PM—EBS Review—John M. Torbet, FCC Executive Director.

3:10-3:25 PM—Status of Pending FCC Dockets—James D. Parker, CBS TV Network, New York, N.Y.

3:30-5:00 PM—FCC/Industry Technical Panel—Moderator: Albert H. Chismark, Broadcasting Division/Meredith Corporation, Syracuse, N.Y.

Tuesday, April 11 —RADIO—

Presiding: Andrew M. Jackson, Director of Engineering, LIN Broadcasting Company, Louisville, Ky.

Coordinator: Leslie S. Learned, Vice President for Engineering, Mutual Broadcasting Company, New York, N.Y.

9:00-9:25 AM—Modernizing Technical Facilities as WSAU, Wausau—Robert A. Jones, Consulting Engineer, La Grange, Ill.

9:30-10:25 AM—Quadraphonic Sound (Panel)—Moderator: Edward H. Herlihy, Kaiser Broadcasting Co.

10:30-10:55 AM—The Pulse Duration Modulator—Hilmer Swanson, Gates Radio Company, Quincy, Ill.

11:00-11:25 AM—Design Features of the Automated WINS Transmitter Plant—Bruce H. Ratts, WINS Radio, New York, N.Y.

11:30 AM-12 N—Parasitic Radiators—John Battison—Carl E. Smith, Consulting Radio Engineers, Cleveland, Ohio.

Tuesday, April 11 —TELEVISION—

Presiding: William H. Trevarthen, Vice President for Engineering and Operations, NBC, New York, N.Y.

Coordinator: Eugene A. Chase, Chief Engineer, WKJG Radio and Television, Ft. Wayne, Indiana.

9:00-9:25 AM—Kodak Videofilm Express—Eastman Kodak Company, Rochester, N.Y.

9:30-9:55 AM—Translators, the Broadcaster's Obligation—Vincent E. Clayton, Bonneville International Corp., Salt Lake City, Utah.

10:00-10:25 AM—New Technique for Differential Gain and Phase Calibration of Broadcast Demodulators—Telemet, Amityville, N.Y.

10:30-10:55 AM—Cinematte I—Sarkes Tarzian, Inc., Bloomington, Ind.

11:00-11:25 AM—Circular Polarization for Television Signals—Lewis D. Wetzel, Shively Laboratories, Inc., Raymond, Me.

11:30-12:00 N—A Broadcaster's Experience with Video Cartridge Tape Recorders—Francis Jacob, WWL, New Orleans, La.

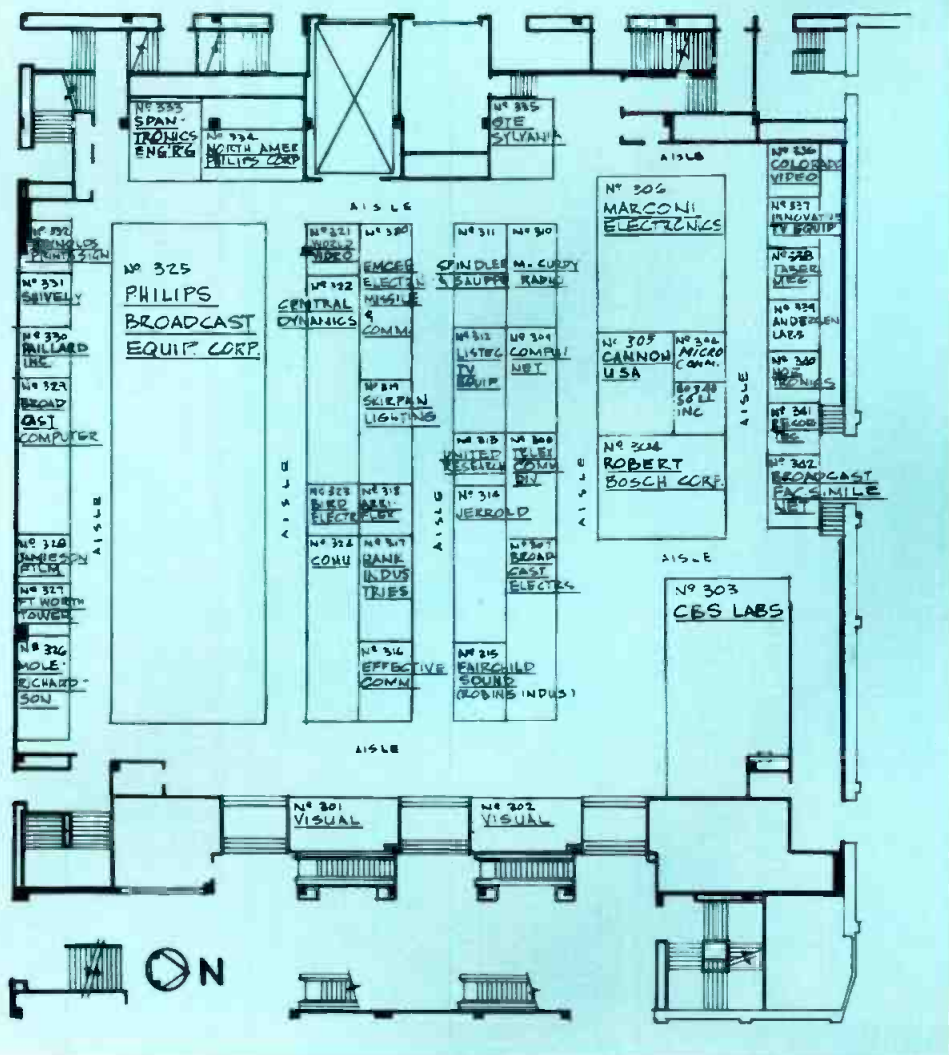
12:30 PM—Engineering Conference Luncheon; Williford Room, Conrad Hilton Hotel.

Presiding: Ralph F. Batt, Vice President & Manager of Engineering, WGN Continental Broadcasting Company, Chicago, Ill.

Presentation of 1972 Engineering Award: George W. Bartlett

Acceptance of Award: John M. Sherman, Director of Engineering, Station WCCO, Minneapolis, Minn.

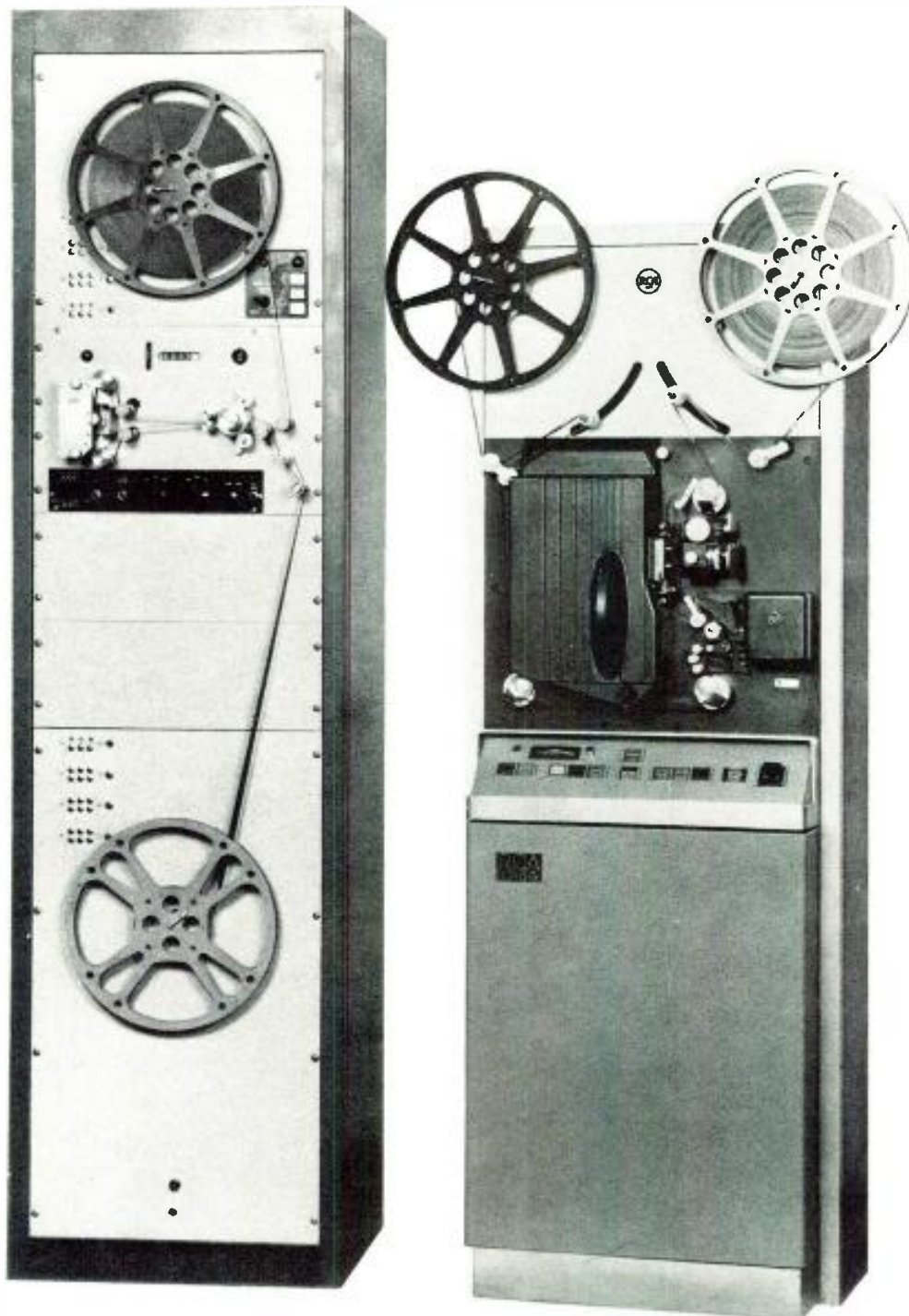
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Circle Number 19 on Reader Reply Card



Ralph F. Batt, chairman of the 26th NAB Broadcast Engineering Conference. Batt is VP and manager of engineering for WGN Continental Broadcasting Co.

Tuesday Afternoon

No sessions scheduled to permit delegates to visit exhibits and hospitality quarters.

Wednesday, April 12

Presiding: Royce LaVerne Pointer, Director, Broadcast Engineering, ABC, New York, N.Y.

Coordinator: James D. Parker, Staff Consultant, Telecommunications, CBS Television Network, New York, N.Y.

9:00-9:25 AM—The Next Step in Automation—T. Jordan, General Electric Company, Syracuse, N.Y.

9:30-9:55 AM—Influence of RF Output Systems on TV Transmitter Picture

Quality—Thomas M. Gluyas, RCA, Camden.

10:00-10:25 AM—High Power UHF Transmission Utilizing Freon Gassed Transmission Lines—Edward H. Herlihy, Kaiser Broadcasting Company.

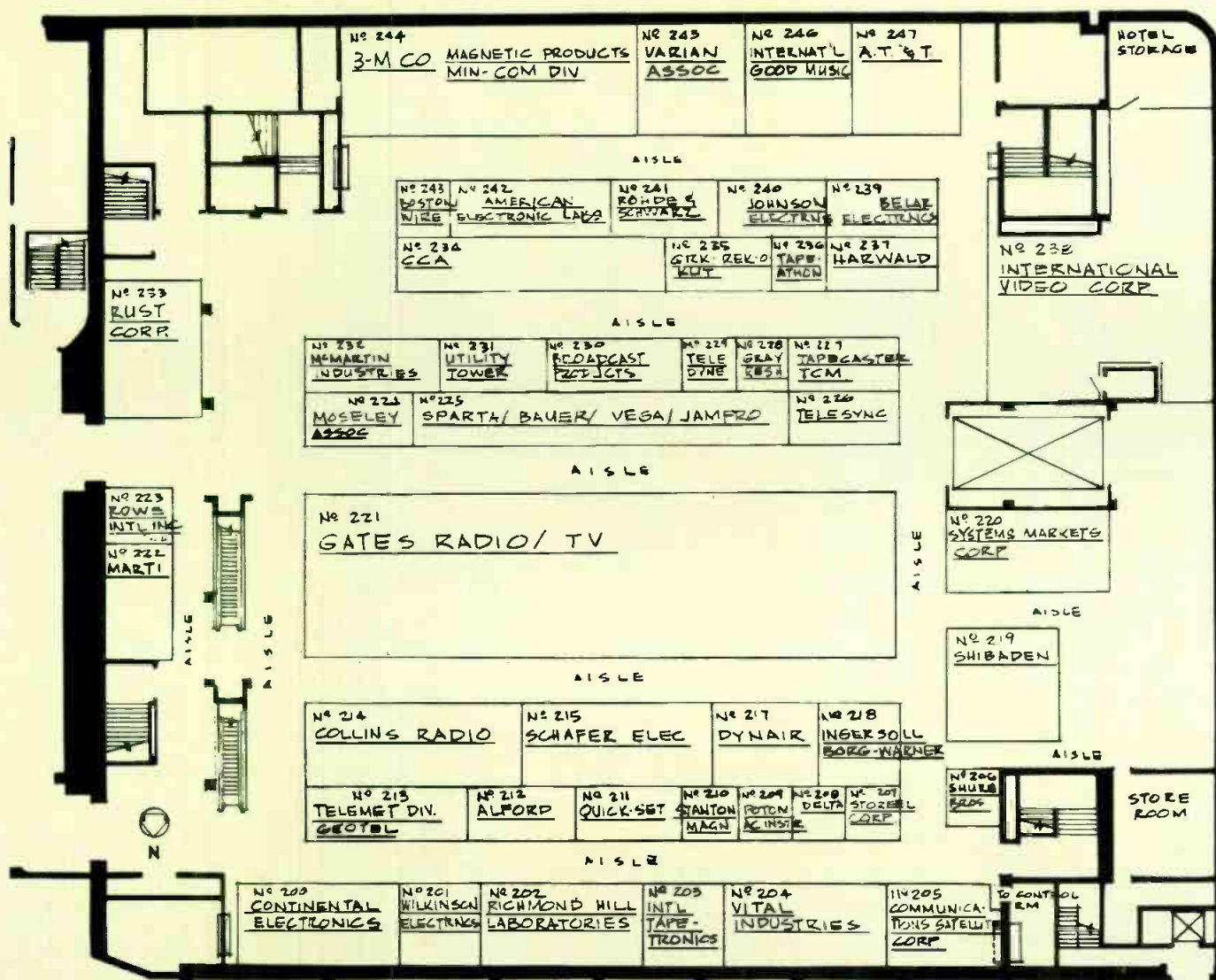
10:30-10:55 AM—Noise Reduction in Quartz Halogen Lamps—R. P. Bonazoli and R. Hebert, GTE Sylvania Inc., Danvers, Mass.

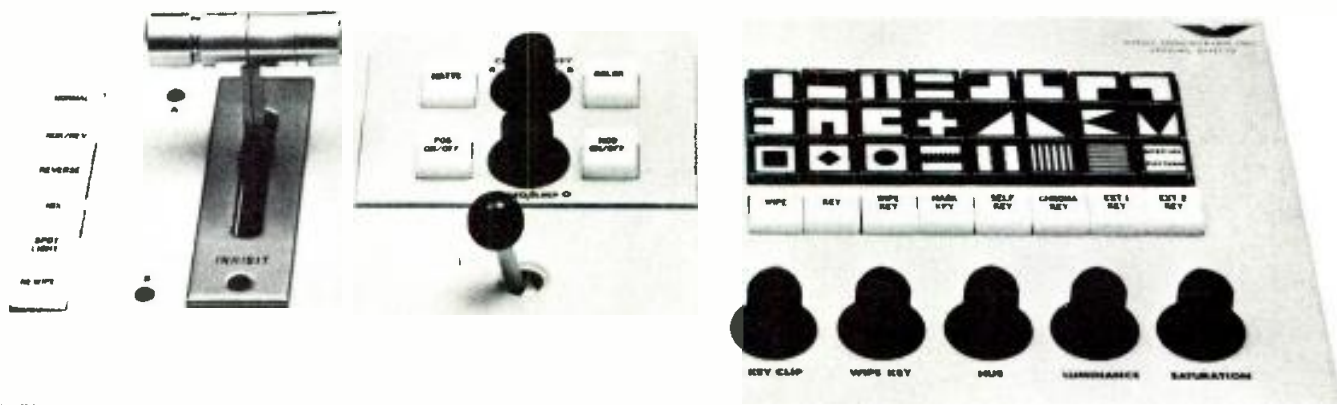
11:00-11:25 AM—A Picture Source Sync Generator—Robert D. Post, NBC.

11:30 AM-12 N—Recognition and Correction of Waveform Errors in TV Transmission—Frederic C. Everett, Consulting Engineer, Ft. Lauderdale, Fla.

12:30 PM—Joint Management and Engineering Luncheon. ▲

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Takes 1 3/4" rack space, weighs 8 1/2 lbs.
IM distortion less than 0.05% from
1/10w to 30w at 8 Ω
S/N 106dB below 30w output
\$229 rack mount

D150



universal

Delivers 75w RMS/channel at 8 Ω
IM distortion less than 0.05% from
0.01w to 75w at 8 Ω
S/N 110dB below 75w output
Takes 5 1/4" rack space, weighs 20 lbs.
\$429 rack mount

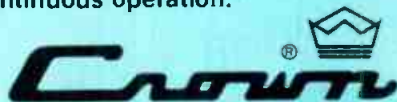
DC300



power

Delivers 150w RMS/channel at 8 Ω
IM distortion less than 0.05% from
0.01w - 150w at 8 Ω
S/N 110dB below 150w output
Lab Standard performance and
reliability
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Circle Number 42 on Reader Reply Card

New Product Review

An NAB Convention Preview

The equipment exhibits will be as interesting as ever this year, with a greater interest paid by the competitors. That is, they'll be looking to see who made it to the convention and how much space they've taken on the floor.

And there should be more than a passing interest in what Ampex and Collins are up to as well as Visual. Ampex has been hit by losses in their consumer division, but their professional divisions should do well this year. They probably will show their top-of-the-line video products.

Meanwhile, Visual Electronics has weathered the storm. They pulled out of their Chapter 11 in January and are off to a good start for 1972.

You'll notice that we have used

Reader Service numbers with each of the new products listed in this special section. Those of you who don't make it to the convention will still have a good idea of what was shown, and you can get more information by using the Reader Service card. We're running this special section also for those who will attend, because we think you should know what to look for in advance.

Because of our publishing deadlines and because some manufacturers do not tip their hand before the convention, this section is comprehensive, but not complete. We will continue our coverage of what's new for '72 in the April and May issues of BE. May also will include a roundup of convention business and technical sessions.

New Digital TV

Remote Control System

During the 1972 NAB Convention, Moseley Associates, Inc., Goleta, California, will be introducing its "D" series of equipment for remote broadcast transmitter operation.

The new series of equipment is fully integrated and employs BCD digital techniques. Independent systems provide remote control and telemetry, automatic parameter logging, status indications, individual full-time parameter display panels, and independent control system for the ultimate in remote transmitter operation.

The DCS-1 Digital Control System can provide in excess of 192 control functions and 96 telemetry positions. Telemetry is displayed as a full four-digit indication, with each position having a pre-programmed memory bank giving a real-word channel identification. Access time to any channel for an average system is less than 0.25 second from time of selection.

Parity and double-message reception requirements coupled with true-tally return/readout guarantee selection of the desired channel.

The DLS-1 provides automatic parameter logging in blocks of 20 parameters with programmable selection of time sequence and channel deletion. Status indication can be obtained in blocks of 32 individual channels with the DSI-1. The "D" series will be displayed by Moseley Associates in Booth 224, West Hall, during the NAB Convention.

Circle Number 150 on Reader Reply Card

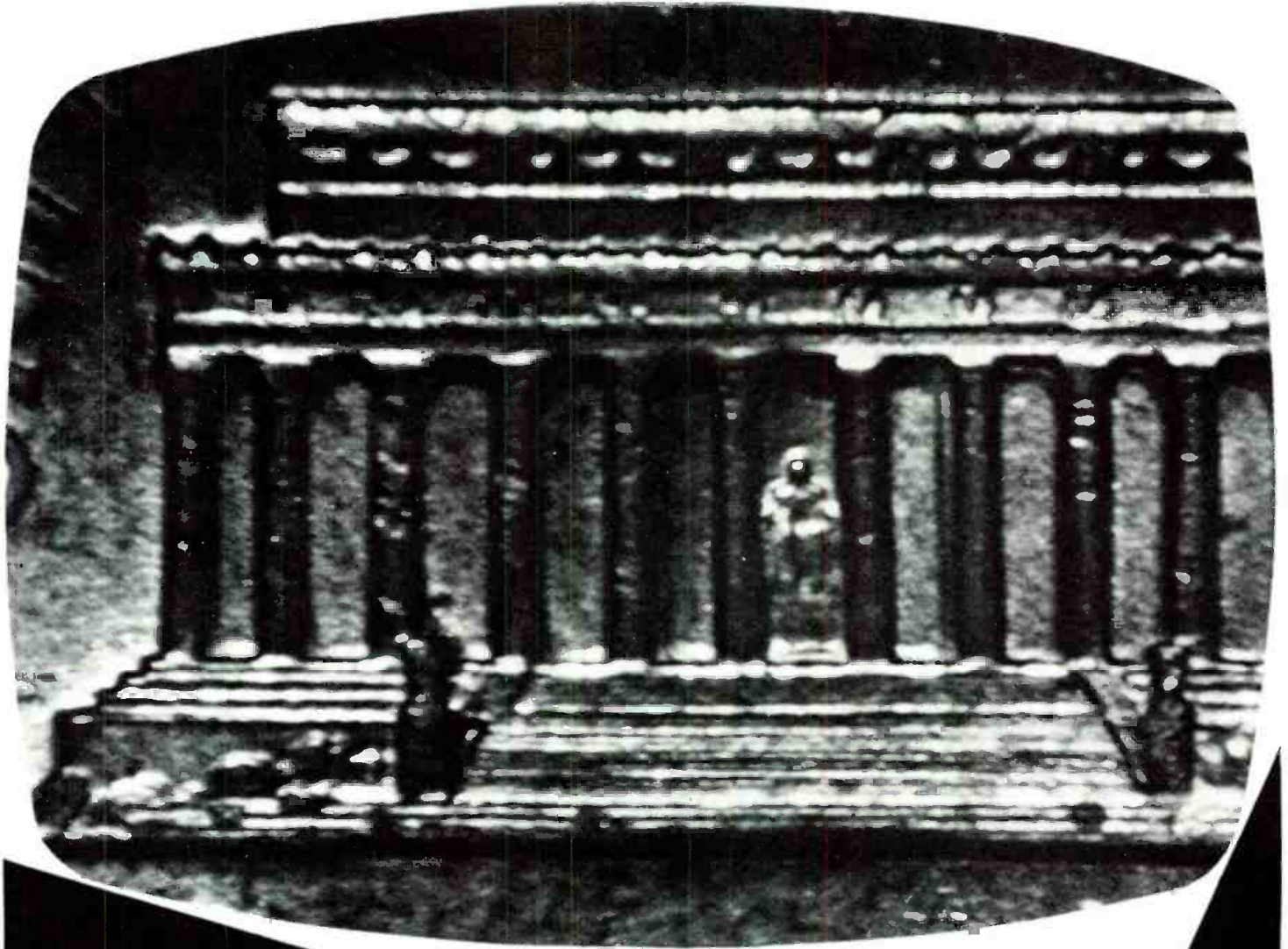
Caption Generator

Datavision, Inc. has a new Model D-2400 Character Generator, an entirely self-contained, portable device designed for broadcast use.

According to Datavision, the D-2400 is the only television character generator now available which allows simultaneous presentation of two different page displays, making it possible to use a title on-air, while preparing, changing, or pre-

(Continued on page 32)

DID YOU KNOW THAT LINCOLN IS ON THE BACK OF A PENNY?



IT TAKES A 37.5 TO ONE RANGE
TO GO FROM THIS
TO THE ABOVE CLOSE-UP

WITH THE **angénieux** 15 TO ONE IT IS POSSIBLE TO GO FROM 675-18mm IN ONE SECOND.
THERE ARE FOUR 15 TO ONE RANGES WITH AUTOMATIC IRIS COMPENSATION.

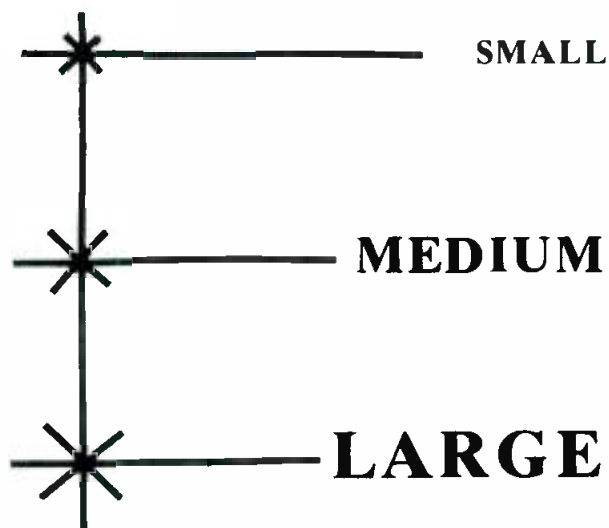
Imagine yourself observing a threaded needle actually being used to suture an incision... or a puck slammed across a hockey rink. You can get right in on it... and out... for those dramatic split-second shots.

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NAB BOOTH 418

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viewing a different title on the preview output. The D-2400 is light enough (approximately 17 pounds) to be portable, and can be used with remote van equipment, as well as in the studio. It can also be used at the transmitter for emergency stand-by information.

The D-2400 provides these standard features: large characters, 32 scan lines high; four-page, two-channel display capability; one row horizontal crawl; cursor editing; 16 characters each in 8 rows of display, per page; and external storage using standard audio recording techniques.

In broadcast use this means that up to 32 one-row titles may be stored for retrieval and display one at a time in the lower one-third of the picture area, single multi-row titles may be displayed anywhere in the picture area, or four separate announcements may be composed quickly for horizontal crawl display at the bottom of the picture.

Circle Number 151 on Reader Reply Card

Lightning Elimination

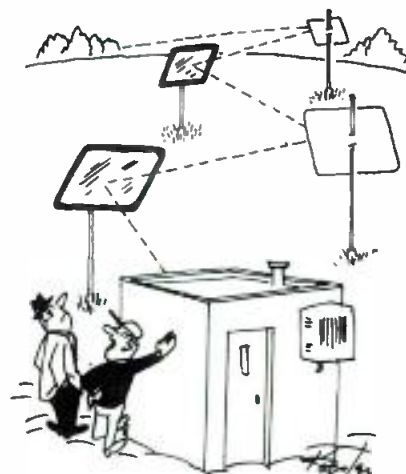
Lightning Elimination Associates will display and be on hand to explain a unique concept in lightning elimination.

The LEA dissipation array has been developed after a number of years of experiments. The company claims that their array will eliminate lightning from within the area the array protects.

The protection system works on a combination of two mechanisms: cloud charge control and electrical isolation of the protected area.

Circle Number 152 on Reader Reply Card

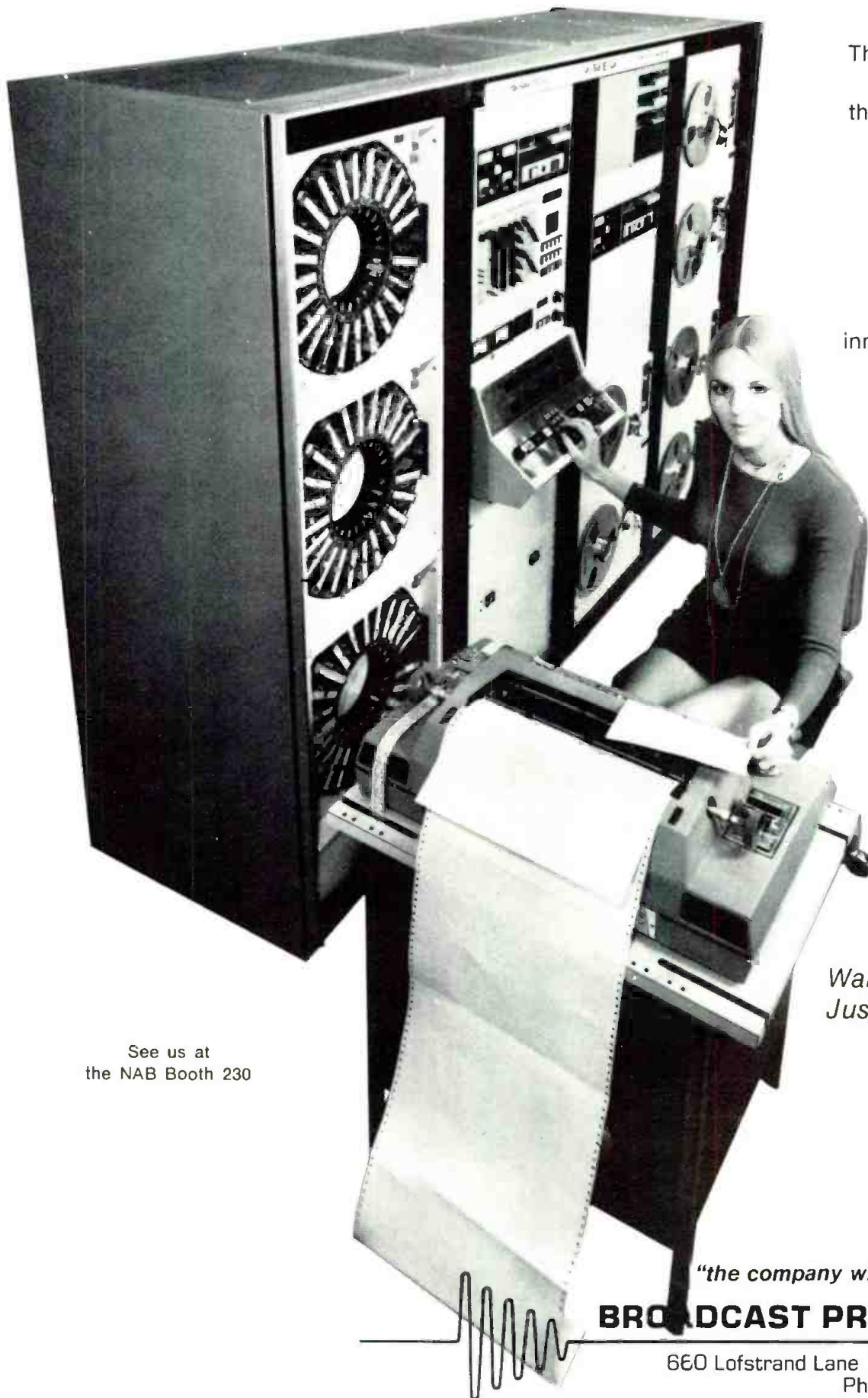
(Continued on page 34)



*"THE LAW REQUIRES REMOTE TRANSMITTERS
MUST BE VISIBLE TO THE OPERATORS."*

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The new AR-2000 series
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the ultimate . . . the most
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But then—
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Circle Number 23 on Reader Reply Card

New Products

(Continued from page 32)

Dimmer Pack System

Berkey Colortran, a division of Berkey Photo, announces a new compact modular portable dimmer pack system. Six 2400 Watt fully filtered solid state dimmer modules in a compact portable housing weighing only 60 pounds.

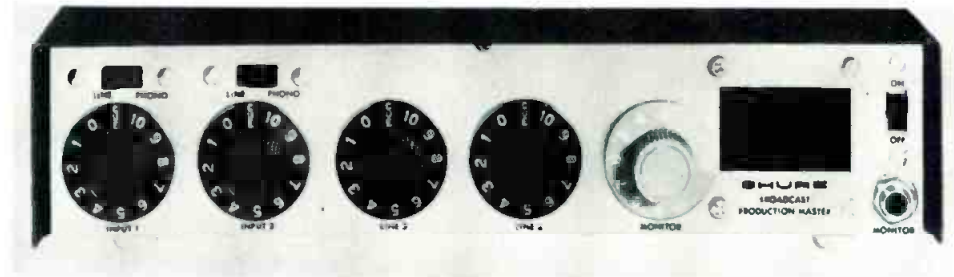
The two-scene Control Pack unit can remotely operate the dimmers and can be expanded up to 120 dimmers. A Master Pack provides proportional cross-fading, pile-on mastering of the presets, as well as an independent master and grand master. Colortran Dimmer Pack systems are available for use at 120 or 240 Volt.

The Colortran Dimmer Pack system has been designed to be reliable, rugged, portable, and expandable for use in theatres, schools, auditoriums, churches, meeting rooms, nightclubs, television studios, or any situation requiring lighting control.

Circle Number 153 on Reader Reply Card

Production Console

Shure Brothers Inc. will introduce the M675 Broadcast Production Master, designed for use with the Shure M67 Series of Microphone Mixers to provide a complete, small size, professional quality—but inexpensive—broadcast console.



The M675 augments the four M67 microphone inputs with four line inputs (two switchable to R1AA), cuing and monitoring facilities, and self-contained battery supply to power both the M675 and M67.

The M67/M675 combination, with its cuing and monitoring facilities, is designed for use in recording applications as a complete audio production console for both studio and remote assignments. It also

can be used as a complete CATV audio console and as a stand-by console in any broadcasting operation. When combined with the Shure M63 Audio Master, the M675 can be used for tape duplication and equalization assignments.

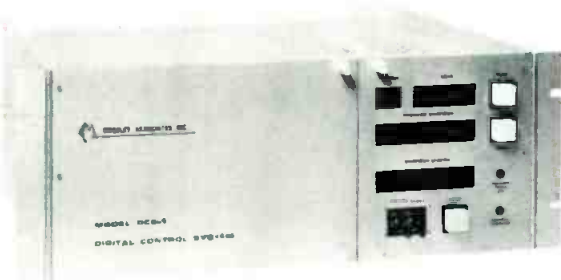
The unit's four monitoring facilities

include an internal speaker built into the front panel, a speaker output jack in the rear panel, a front panel headphone jack that automatically mutes the internal speaker or speaker output when used, and a rear panel headphone jack which enables the engineer or announcer to monitor only program material.

Circle Number 154 on Reader Reply Card

(Continued on page 36)

ALL DIGITAL REMOTE CONTROL



A NEW CONCEPT IN TV~FM~AM REMOTE OPERATION

CONTROL~LOGGING~STATUS

We proudly introduce the "D" series Remote Control System. This all digital system provides remote control and metering, automatic transmitter logging, status indications, and more! Visit us during the NAB Convention, Booth 224, West Hall. Also on display: Aural STL, conventional remote control, all solid-state remote pickup and related items.

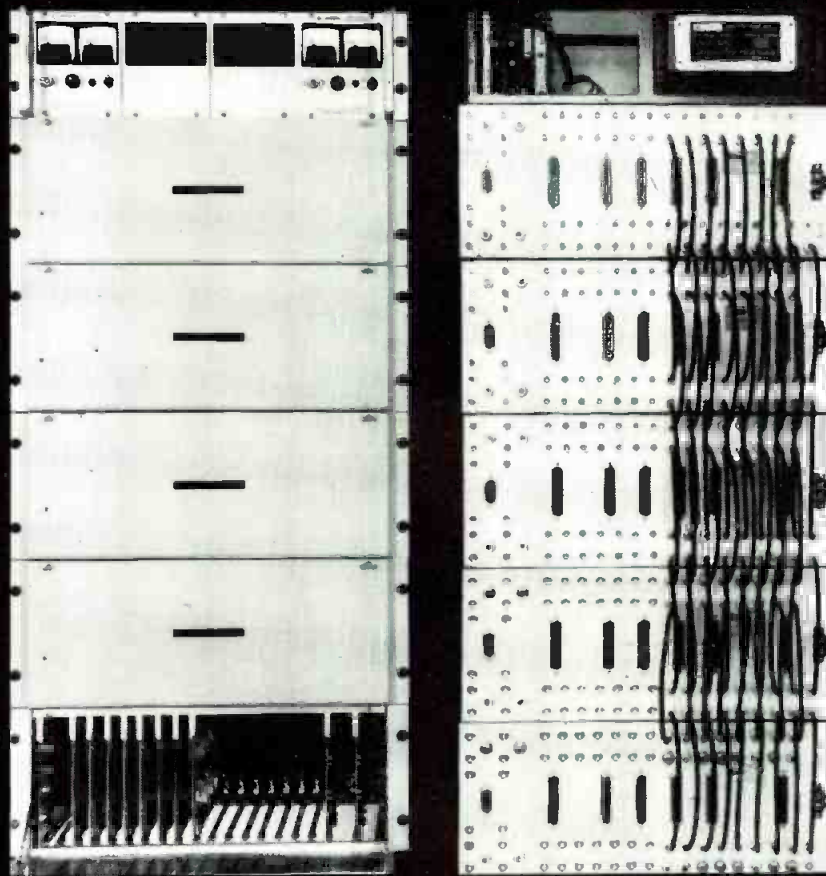


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All of professional quality, precision made of finest materials. All doing "double duty" with torque amplifier handle that slips over color-coded midget tools for longer reach, greater driving power. Each easily identifiable on the bench or in the service kit thru Xcelite's exclusive, optically clear, plastic "show case" that closes securely with positive snap-lock.

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PS130
3 slot tip, 2 Phillips
screwdrivers, 5 nutdrivers

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3 slot tip, 3 Phillips screwdrivers

PLUS PS88, PS120, PS7, PS89, PS44
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In Canada contact Charles W. Poynton, Ltd.

Circle Number 26 on Reader Reply Card

(Continued from page 34)

Viewfinder Cameras

Cohu Electronics, Inc., will show their new 2830 series viewfinder camera which can be provided with Plumbicon, silicon-diode array, integral, or separate mesh vidicons.

Sync can be internal, either random or 2:1 interlace, or external composite video or sync. This camera has a viewfinder switchable to camera or program video and an amplified intercom system with program audio capability.

Linear phase, delay line aperture correction and the keyed-clamp controlled black level assure clear, stable pictures. Remote controls are available.

Cohu also will show their 1500 series broadcast three tube camera. Triple action automatics—sensitivity, white level and black level—permit hands-off operation.

Circle Number 155 on Reader Reply Card

1100 Line CCTV Camera

A new ultra high resolution TV camera capable of producing 1100 line horizontal resolution has been announced by GBC Closed Circuit TV Corp.

It is expected to be used in applications where photographic reproduction of small detail is desired, such as data transmission and industrial process control.

Unusually versatile, the CTC-8000 is available in any of eight scanning rates from 525 to 1023 lines. Horizontal resolution is 1100 TV lines at the center and 900 lines at the corners. Video bandwidth is 30 MHz. Vertical resolution is up to 715 lines at the 1023 line scanning rate.



"I GOT TIRED OF BEING NOTICED ONLY WHEN
WE HAD AN EQUIPMENT FAILURE, THAT'S WHY."

The image tube is an 8507 vidicon. A plumbicon version is also available.



A two piece unit, the CTC-8000 comprises a 5.9 x 3.9 x 11.8" camera and a camera control unit connected by a 33' cable.

The camera control unit controls include: electrical focus, beam, target, gain, pedestal, horizontal scan, reverse-normal, video, negative-positive, vertical scan, reverse-normal, intercom, private-common, pulse, internal-external, pulse, 75 Ohm-high, sync, on-off, and power, on-off.

Automatic controls include: ASC (automatic sensitivity control), AGC (automatic gain control), and ASU (automatic set-up control).

Circle Number 156 on Reader Reply Card

Pinpoint Aerosol

The Cobra™, a flexible extension device for the precise application of many Miller-Stephenson Chemical Company aerosol cleansers is now available.

The Cobra™ Extension Nozzle permits application of the cleaning spray to minute, localized areas of pc boards, instrument circuits, EDP and magnetic recording heads, miniature contacts, and, in fact, to any difficult-to-service points.

The regular valve is removed from the Miller-Stephenson aerosol can and the Cobra™ extension unit pushed firmly into place. A wire hook is engaged under the rim of the can top to permit spraying, and released in order to relieve pressure during storage.

Circle Number 157 on Reader Reply Card

(Continued on page 86)



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Century Series

by **SPARTA...**

...which makes other tape cartridge equipment obsolete.

A decade ago the industry enjoyed a new **SPARTA** idea in tape cartridge handling, not matched in newness until today's *Century Series*.^{*} Its original and exclusive features maintain **SPARTA** leadership in everything for your every broadcast need. *Century Series* is for you now! Make sure your station isn't left behind;

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**The Model 206 "viscous damped"
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Probably the most widely used Transcription Arm in the Industry. Rugged and Dependable.



**Models 808A and 810A
Broadcast Equalizers**

A truly professional passive equalizer series. The 808A for stereo input mono output. The 810A, stereo in and out.

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Series L — Studio Furniture

Update your studio with this new look. Single or double bay turntable cabinets and console mounting board offer complete versatility. Ask about custom installations.



Almost "One-Stop" shopping . . . that's Gray's product line-up for the quality seeking Station Engineer. From the 206 viscous damped tone arm series through the exciting new professional turntable, the Gray line of broadcast instruments provides the quality and depend-

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6400 Series — Turntable Preamplifiers

"0" dBm output levels from a self-powered, integrated circuit design for Mono or Stereo. Independent level controls for each channel. 3 selectable equalization curves. Write now for complete specifications.



THE 6400 TURNTABLE PREAMP SERIES

0 dBm into 600 ohms —
0 dBm into 600 ohms —
GRAY HAS GONE ACTIVE!

Headroom to plus 15 — Self powered —
4 3/4 x 6 x 2 inches small — Stereo or mono
— You'll find it hard to get more professional quality turntable output anywhere.



The Model 2570 Antenna Heater Control System

Provides fully automated control of FM, TV and other types of electrically operated Broadcast and Communications antenna Heating Systems.

ability every performance conscious engineer requires to keep his station on top.

We'd like you to be fully aware of Gray's products, their flexibility, their advantages. Drop us a card for complete specifications on all.



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More than that, we can engineer and install the whole system, including things we don't make. (Like cable, antennas and such.)

When we're through you can start communicating.

Whatever way is best for you.



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FDM cable carrier



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Whatever it may be.

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1105 County Road, San Carlos, CA 94070

GTE LENKURT

Circle Number 29 on Reader Reply Card

Logic in the loop

By Pat Finnegan*

An update on the control loop, its functions, its logic, and troubleshooting tips.

There have been drastic changes in FM Exciters over the past few years. With the conversion to solid state, many new techniques have been applied to solve old problems.

Many methods have been used to produce FM modulation, but with the growing use of Stereo, the Reactance Tube Modulator has had a great increase in popularity. While the basic modulator concept is the same, solid state components now perform the functions. One of the basic weaknesses of this modulator is its lack of stability. Even though the new solid state models are more stable, it still requires an outside crystal reference and control circuit. This article will investigate the control loop.

For comparison, consider the old tube style modulator and control circuit. The modulated oscillator is multiplied up to carrier frequency and amplified to 10 Watts at the output stage. A sample of this modulated carrier is fed to a mixer stage. A separate crystal oscillator is multiplied up to a similar frequency and also fed to the mixer. The output of this mixer produces an IF frequency of perhaps 150 kHz, which is applied to a discriminator type circuit whose center is tuned

to the 150 kHz.

The output of the discriminator is filtered to remove any audio, so that only a DC voltage which changes in magnitude and direction as the carrier drifts off the center frequency. This DC voltage is applied to a reactance tube across the master oscillator, and the carrier frequency is pulled back to its correct operating frequency.

New Style Modulators

Techniques will differ among manufacturers, but typical of the modern day solid state FM Exciters is the CCA Electronics Corp. Model FM 10-DS. A reactance modulator is used in this exciter. Aside from solid state techniques, the RF stages, reference oscillator and mixer are essentially similar to the old principles, the IF output frequency produced is 250 kHz. At this point, the old and new principles part company.

Enter Logic

The IF signal is amplified and sent through a limiter, which produces square waves from the sine waves, but still contains the frequency and modulation characteristics of the IF signal. The 250 kHz square waves are applied to a

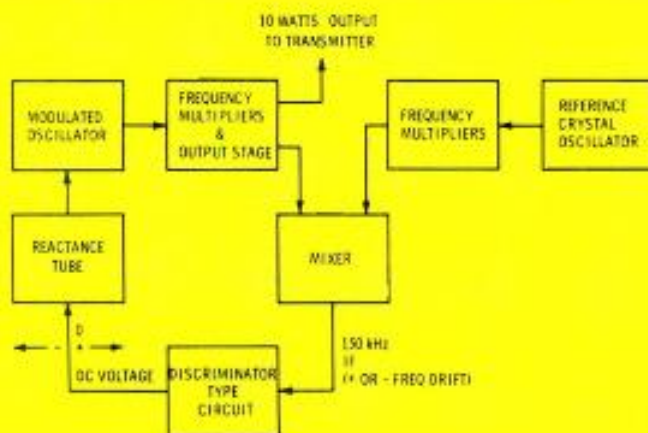
MDTL, integrated logic circuit. This first circuit is a pulse triggered binary which acts as a frequency divider, so that the output frequency is 125 kHz. These output square waves pulses are new pulses created by the binary, and they are constant in amplitude and width, with a repetition frequency of 125 kHz.

The output of the binary is now applied to another integrated logic circuit, a monostable multivibrator. The output of this one-shot is a series of positive going pulses, but the width of each pulse is one fourth of the input pulse. The amplitude and width of the pulses remain constant, and vary only in frequency with the input frequency. The amplitude level is somewhat low (0.8 V p-p) so they must be amplified and then converted to a DC voltage equivalent only to the input frequency. This is accomplished in a combination amplifier-filter which also removes any audio that may remain.

The filter is in series with the power supply voltage, so the recovered DC voltage reacts with the supply voltage. A potentiometer in this voltage divider couples this DC voltage combination to another integrated circuit. The circuit in this case is an Operational Amplifier which amplifies the DC voltage changes caused by frequency drift.

The output of the Op-Amp is diode clamped to hold voltage excursions within plus or minus 4 Volts. The clamped DC voltage is applied to the anodes of a pair of voltage variable capacitor diodes (these take the place of the old reactance tube). The diodes act as a capacitive reactance across the modulated oscillator, so any change in voltage will change the reactance and thus the frequency of the oscillator. The potentiometer which sets the operation of the Op-Amp is also used as the AFC frequency control adjustment.

Fig. 1 Old style reactance tube modulator exciter and control loop.



The oscillator and amplifier can be adjusted so that when the carrier is on frequency, the voltage will be zero. As the main carrier drifts, the IF frequency will also drift in the same direction. The frequency of the pulses at the converter will also change, so that for a higher frequency of the IF, the output voltage of the converter will be higher and this is applied to the reactance diodes which change the frequency back to where it belongs. Since the width and amplitudes of the pulses into the converter remain constant, a higher frequency will mean more pulses in a given time period and thus the average DC voltage will be higher. Conversely, if the frequency is lower, there will be fewer pulses and the average recovered DC voltage will be lower. The filter also removes any modulation components that may remain.

Maintenance

Even though the new exciters are very reliable, they are not immune to component failure. In troubleshooting, a voltmeter, ohmmeter, and scope are necessary.

Carrier frequency: Should the monitor indicate the carrier is far off frequency, a few quick checks should be made before adjusting the transmitter frequency. Any number of things can be at fault—including the frequency monitor itself. In such problems, the monitor is more often at fault than the transmitter itself.

Most exciters have metering built into them. For an off frequency indication of the monitor, check the AFC meter position. In normal operation, the AFC reading should be very near zero on either the plus or minus side. If this meter is showing a very high reading, either the oscillator is far off frequency and the AFC is trying to pull it back by delivering a high control voltage, or

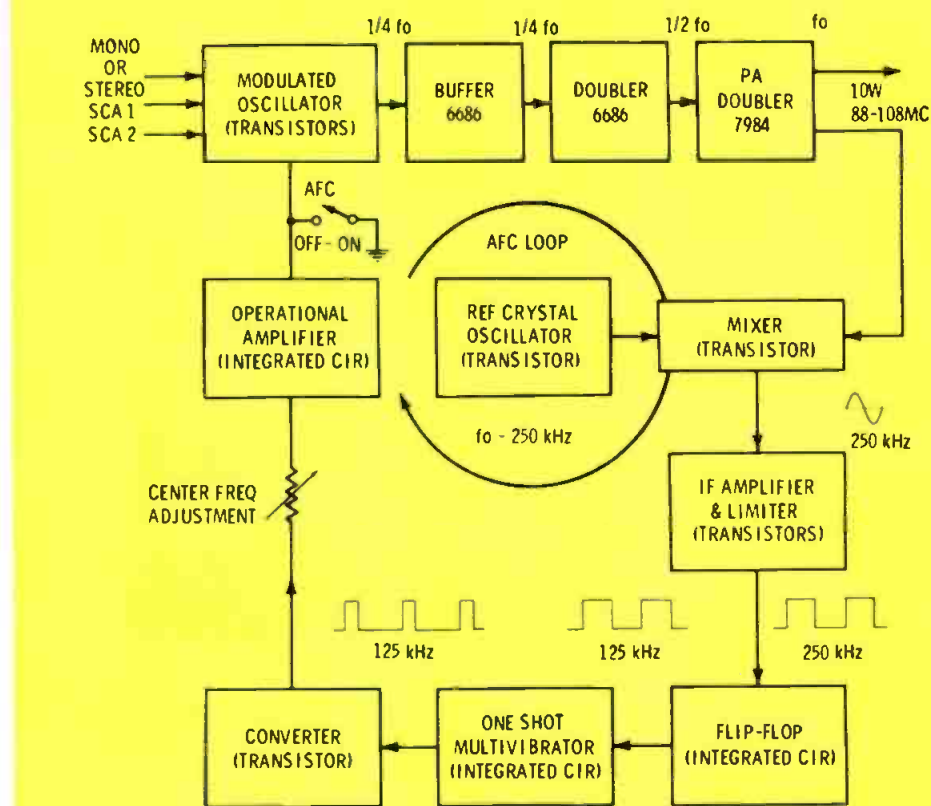


Fig. 2 New style reactance modulator exciter using a logic control circuit. This is a block diagram of the CCA Electronics FM-10DS.

the control circuit is defective, applying a high voltage and forcing the oscillator off frequency. Switch the AFC control off. If the loop is at fault, the carrier will return to somewhere within normal limits.

Assume for this example, the monitor is OK and telling the truth, switching the AFC off and the monitor now indicates frequency somewhere within tolerance. The station can operate this way until sign off if the oscillator will stay reasonably stable, and most of them will. But it will be necessary to keep an eye on it and when it begins to drift towards the edge of tolerance, the oscillator can be adjusted in small amounts to bring it back.

The adjustments must be made gently and in very small amounts, since this is changing the voltage on the reactance diode and a very small change here means many cycles change in the carrier. Unless something has happened to the oven, this will stay reasonably stable. If very unstable, check the fuse on the oven. Many of the stages including both oscillators and the crystal are all in an oven. This does much to enhance stability.

Troubleshooting in the loop: If you can operate as mentioned, the problem is definitely in the control loop. It is best to wait until sign off so you can open the oven to get at the circuits. At the same time, no modulation will allow for a steadier scope pattern.

The first problem will be the mechanics of getting the oven out and open. There will be some type bracket to support the unit after this is done. At the same time, there will be many screws to take out before both top and bottom are exposed. This will take time and the oven will cool off, which is another good reason to wait until sign off if possible.

Once all is opened, attached to the bracket and turned back on, use the scope to signal trace, starting at the mixer output. If there is no 250 kHz IF, the mixer or the crystal chain is at fault. If there is 250 kHz, proceed along the loop with the scope. Compare the pulse frequency, width, and amplitudes through the loop. These values should be shown on the print. Be careful when checking around the IC's with the probe

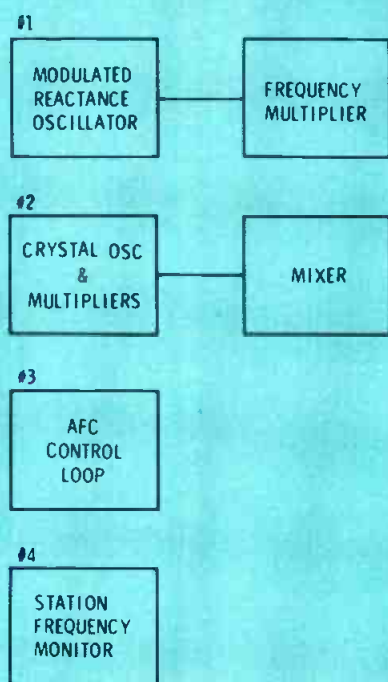


Fig. 3 An off-frequency indication of the station frequency meter will be caused by one of these main divisions (aside from a blown fuse in the oven).

so as not to short pins together. Accidentally shorting the supply voltage to a wrong pin can blow the IC.

The scope will quickly isolate the stage where the signal is failing. On the IC's, it will be a go-no-go situation. The pulse will go in but not come out when it is not working, or they may be coming out in some sporadic manner. Check the supply voltages to the IC and especially check any external resistor and capacitor components associated with the IC. Any cooked resistor must be replaced before turning the unit back on. If a resistor is burned, the IC undoubtedly is shot, as something has failed inside to cause the resistor to draw too much current. Replace the IC and defective components.

Supply voltage should be checked again, and the pulses checked after components have been replaced. They will or should be OK now, so

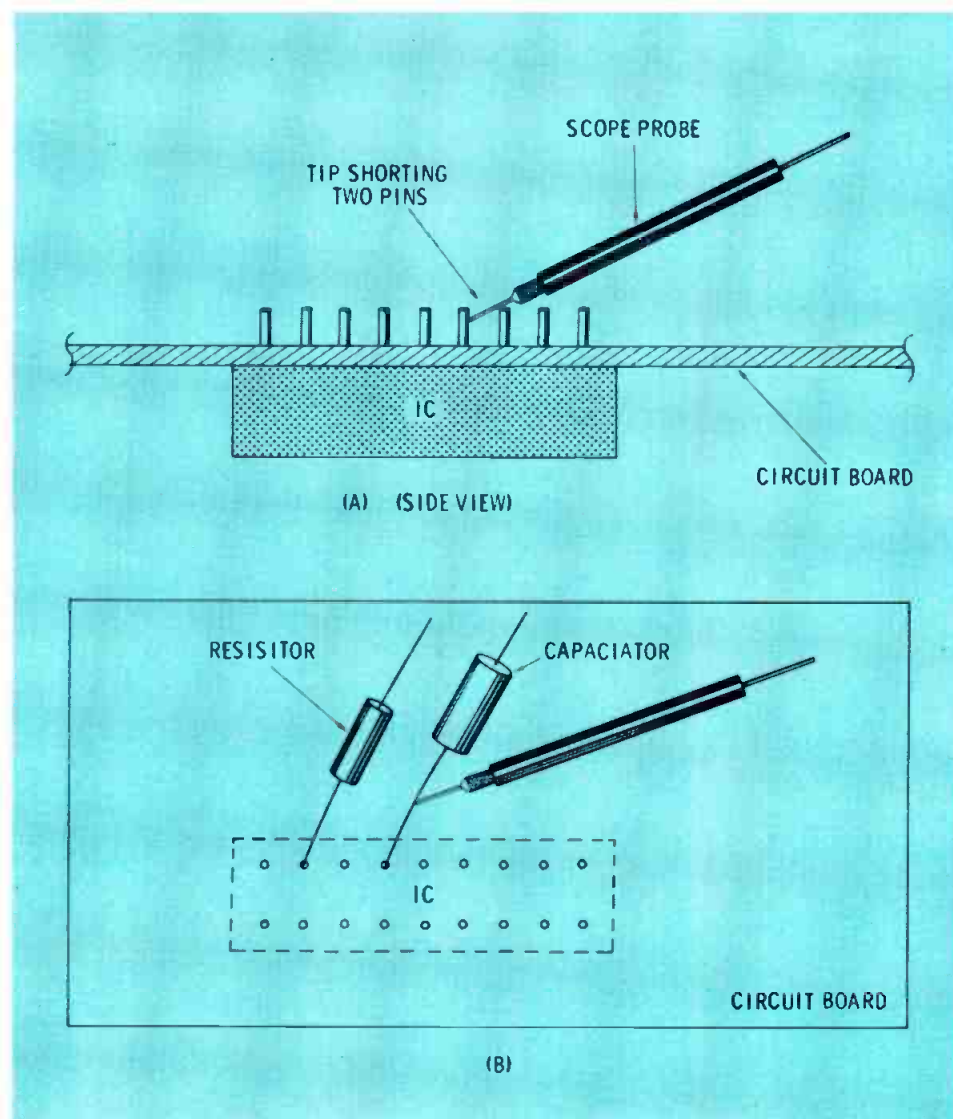


Fig. 4 Take care when putting the scope probe on the pins of the IC. They are so close together that it is easy to short out two pins. It's a lot safer to use the method shown in 4(B).

the oven can be restored and replaced inside the exciter. It will take some time for the oven to stabilize, but it should be possible to keep the frequency within tolerance by the AFC control now. The logic type control loop has a much greater capture and control over the frequency of the master oscillator than the old tube models, so that even if the oscillator is several hundred cycles off center, it can pull it back onto frequency.

Spare Parts

Mention should be made about spare parts. A full set of replacement IC's and transistors should be kept on hand. Don't expect to run down to the local parts house and pick up the IC's and transistors you need. It also is not advisable to attempt using any of the "general" type transistors many of these places carry, unless it is an emergency situ-

ation. Such general replacements may be unreliable or not work at all in your circuits. A complete spare set of transistors and IC's is not too expensive and should be bought from the transmitter manufacturer. You will get the correct brands as well as types that will work in those circuits.

When replacing the solid state components in the exciter, use a small iron, and one that has no AC currents on the tip. This is most important if the transistor is a MOS type FET. These are very delicate out of the circuit and a person's body static can destroy them.

The new exciters use not only solid state components but also new technology and do a better job. Troubleshooting requires a different approach, but common sense cause-effect reasoning and a scope for signal tracing will get the transmitter back into operation in a very short time. ▲

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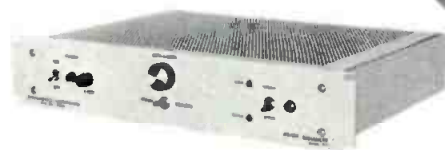
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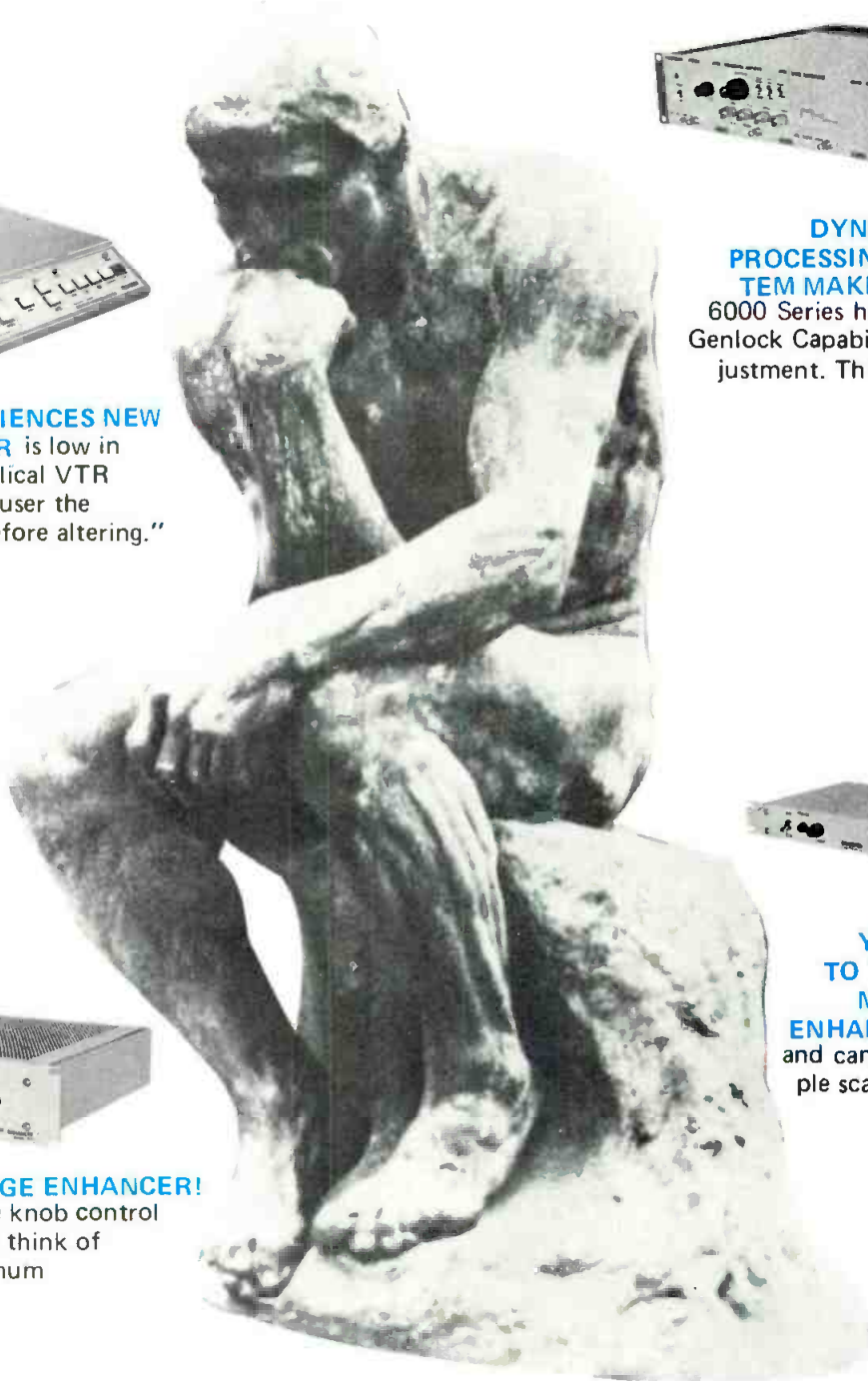
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An Investigation of *SUPER MODULATION*

A Continental Electronics design engineer heats up Docket 18867 with the results of his tests on transmitters and draws some interesting conclusions.

*By Joseph B. Sainton**
*Principal Engineer, Continental
Electronics, Dallas, Texas.

■ One of the most controversial issues to invade the normally placid area of AM Broadcasting in recent years is the matter of supermodulation. The unrestricted positive peak has been the subject of debate, pro and con, since an FCC Notice of Proposed Rule Making that would limit positive overmodulation was brought forth almost two years ago.

The pros would appear to outweigh the cons because of the prevailing belief that the loudest sound will dominate the market. The fervent defender of supermodulation will claim that a transmitter will modulate 135 percent positive without a noticeable increase in distortion. Another will tell you that positive overmodulation causes no noticeable adjacent channel interference. Although the distortion and splatter aren't noticeable to the ear that doesn't want to hear them, it is a cold, hard fact that the prime requisite of a non-symmetrical waveform is an abundance of these supposedly non-existent distortion products.

An examination of AM transmitter requirements, along with some measured data, will reveal some critical deficiencies and show that unrestricted non-symmetrical modulation of present day transmitters will not only cause severe waveform distortion, but will also result in negative overmodulation and excessive occupied bandwidth. The proper application of supermodula-

tion requires a new breed of transmitter and an amendment of Section 73.40 (Transmitter Design) of the FCC Rules.

Constructing A Non-Symmetrical Waveform

The basic ingredient of a non-symmetrical wave is a second harmonic component which bears a definite phase relationship with the fundamental. If a sine wave is clipped square on one peak, the predominant distortion components will be the second, third and fourth harmonics in diminishing amplitudes.

We can generate a non-symmetrical wave by clipping one peak, by mixing a sine wave with its second harmonic or by passing a sine wave through a non-linear device such as a vacuum tube or transistor amplifier. Figure 1 shows a sine wave with a superimposed second harmonic component and the resultant non-symmetrical wave. The second harmonic amplitude is 10 percent of the fundamental and the distorted result has 10 percent harmonic distortion.

The second harmonic component is in phase with the fundamental on the positive peak and adds 10 Volts to the peak amplitude. On the negative peak it is out of phase and subtracts 10 Volts. The positive peak of the resultant wave is then 110 Volts above the zero axis (or axis of symmetry) and the negative peak is 90 Volts below the axis. When this wave is transmitted through an AC coupled system (capacitors, transformers, etc.) the axis will shift upwards about 2 percent, because

the area above the axis will equalize with the area below the axis. If a sinusoidal peak voltage of 100 Volts will modulate the transmitter 100 percent positive and negative, then the distorted wave will modulate 92 percent negative and 108 percent positive. If the distorted wave were to be DC coupled to the modulated stage in the transmitter, the original axis could be maintained and the peaks would be 90 percent negative and 110 percent positive. From this we see that a sine wave containing 10 percent second harmonic will have a difference of $108 - 92 = 16$ percent in the positive and negative peaks. If we increased the level of this distorted wave to modulate the transmitter 100 percent negative, the positive peak would go to 116 percent.

If the superimposed second harmonic wave in Figure 1A were to be shifted 180° relative to the position shown, the resultant wave would be inverted, with the flattened peak on top. It is important to note that if it is shifted 90° because of limited frequency response, the resultant wave becomes sawtooth shaped, and the positive and negative peaks become symmetrical. The importance of this will be shown later.

The waveform of Figure 1B can be generated easily by mixing the outputs of two audio oscillators and observing the resultant waveform on an oscilloscope. The frequencies must be exactly 2:1 and as the frequency of one oscillator is adjusted within a cycle or so of the other, the observed waveform will gyrate from flattened positive to sawtooth

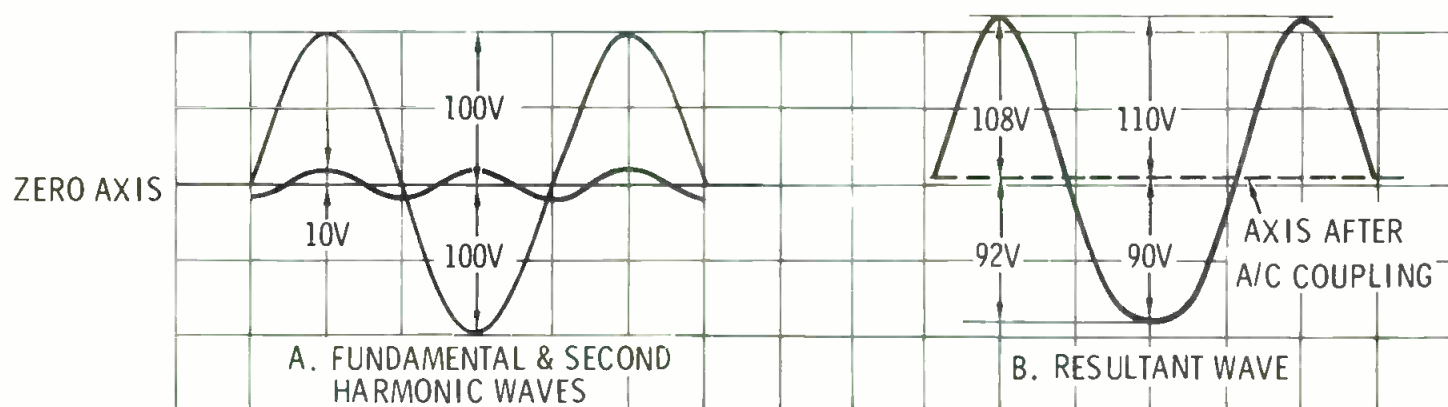


Fig. 1 Sine wave with superimposed second harmonic component and the resultant non-symmetrical wave.

to flattened negative as the phase relationships vary. The levels can easily be set by using the low frequency to calibrate the distortion meter full scale, nulling it down to its lowest value and applying the second harmonic tone to full scale the 10 percent range on the distortion meter.

If we increase the second harmonic component from 10 percent to 15 percent, the peak dissymmetry increases from 16 percent to about 22 percent, which would modulate a transmitter 122 percent positive and 100 percent negative. If we decrease it to 7.5 percent, the peaks will be 112 percent positive and 100 percent negative.

Figure 2 shows a method of generating a non-symmetrical wave by utilizing the non-linear transfer characteristic of a vacuum tube or other non-linear device. The curve shown will result in about the same waveform as was obtained with the two oscillators, that is, it will consist almost completely of fundamental and second harmonic.

It is interesting to note that if the output waveform of Figure 2 were to be DC coupled to the plate or grid of the modulated RF Amplifier of the transmitter, the solid line axis would represent carrier level and if the 60 Volts below the axis would modulate 100 percent negative, then the 140 Volts above it would modulate 233 percent positive! The hooker is that the average carrier level would shift up to the

dotted AC coupled axis and we would have 53 percent positive carrier shift ($92V/60V \times 100 = 153$ percent carrier). The harmonic distortion would be about 10 percent because the peak dissymmetry is $108 - 92 = 16$ percent.

If we utilized a linear transfer curve and moved the operating point up and down the curve consistent with the input modulating voltage, we could produce the same results but with distortion less than 1 percent. This could truly be called supermodulation. However, for a 5

kW carrier, the peak power capability of the transmitter would have to be $3.33^2 \times 5000 = 55,500$ Watts or the equivalent of a 13,875 Watt transmitter modulated 100 percent.

Generating The Clipped Wave

If we use a device with a linear transfer curve and move the operating point down toward cut-off and over drive it as shown in Figure 3, we obtain the clipped, non-symmetrical wave. The same waveform could be produced by using a biased

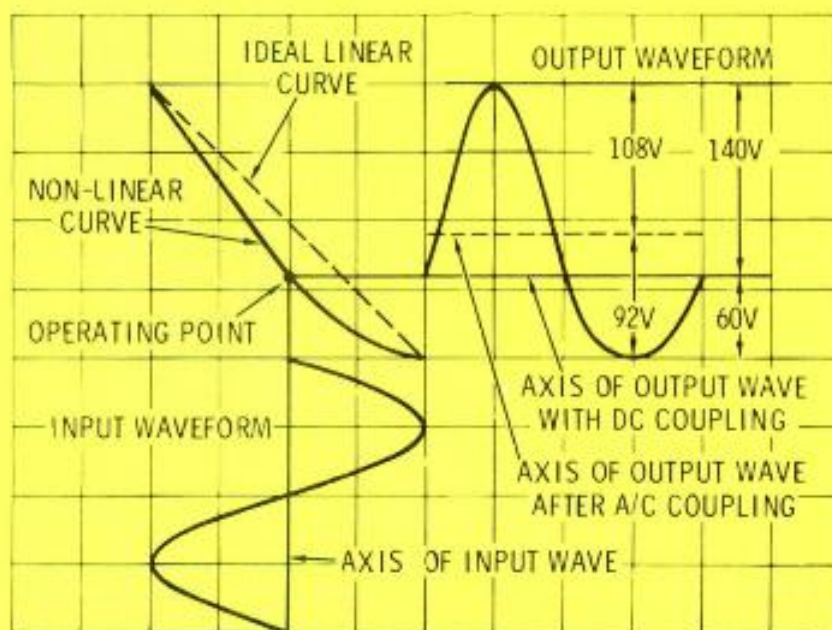


Fig. 2

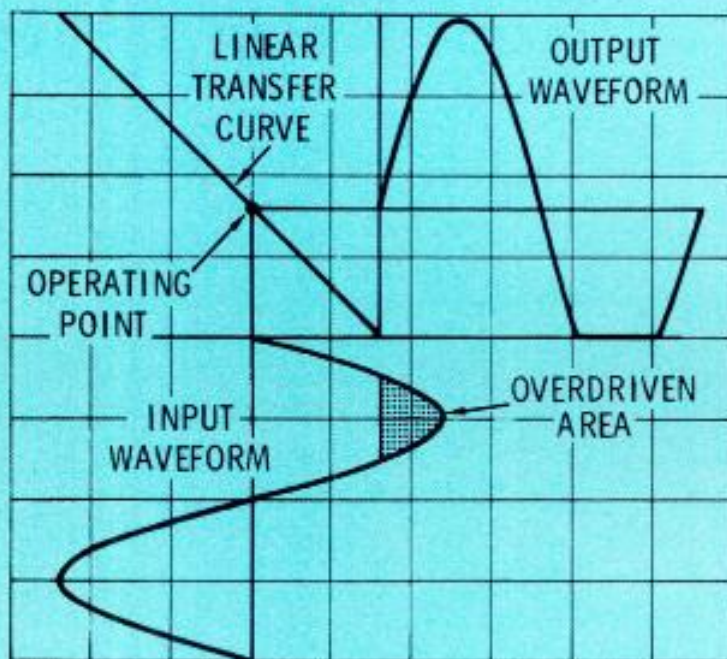


Fig. 3

diode to clip the peak.

This waveform has two rather important features which distinguish it from the wave of Figure 1B. First, because the negative peak is squared off, there is very little upward shift in the axis of symmetry. This is because the squared portion below the axis has a greater area than the rounded portion below the axis of Figure 1B. This feature will permit the clipped wave to be transmitted through AC coupled amplifiers with the negative peak fixed at 95 percent modulation almost regardless of the positive peak amplitude. This is possible only as long as the clipped portion has no tilt (also called ramp).

Second, the effective value of the harmonic components which make up the clipped wave is lower than the wave containing only pure second harmonic. However, the **peak** value of the harmonic components during the clipping interval is two or three times the effective value. Since the distortion meter can only average out all the trash that's left after the fundamental is nulled out, the clipped wave having 16

percent peak dissymmetry will measure less total harmonic distortion than a wave having the same peak dissymmetry but made up mostly of second harmonic.

If you were to superimpose the output of the distortion meter (the trash that the meter sees) upon the distorted waveform being measured, you would see what is shown in Figure 4.

Either of the two waveforms will modulate the transmitter 116 percent positive and 100 percent negative, but while the total harmonic distortion of 4B will measure 10 percent, the distortion of 4A will measure only about 6 percent. The high amplitude spike that occurs during the clipping interval of 4A causes a harsh rasping sound in a loudspeaker and occupies much more frequency spectrum than 4B. In fact, a visual inspection of the spectrum verifies that the clipped wave will occupy almost as much space even at 95 percent negative modulation as would be occupied by a similar clipped wave generated by negative overmodulation of the transmitter.

At this point, two questions come to mind. First, if 116 percent positive modulation will generate 6 percent total harmonic distortion, what happens at 120 percent or 125 percent. Second, if a limit is placed on positive peaks, how do we accommodate naturally asymmetrical waveshapes?

The first question is answered by a simple process of distortion measurement, the results of which are described subsequently. There is no simple, matter-of-fact answer to the problem posed in the second question. We all recognize that certain musical instruments and speech waveforms are non-symmetrical, and we phase our microphones and program line so that the highest amplitude peak will modulate the transmitter in the positive direction.

If we want these waveforms to modulate 100 percent negative, then the transmitter must have the head room to accommodate the high positive peak. The trouble is, we don't know exactly how non-symmetrical these waveforms are, so if we want a clean, undistorted sound, we reduce the modulation so that the positive peak isn't clipped.

Most any transmitter manufactured today will accommodate positive peaks of 115-120 percent because the transmitter designer must be assured that his product will modulate 100 percent under such adverse conditions as low line voltage, out-of-tolerance components, old tubes, etc. The station engineer who wants a clean signal with good dynamic range will use this built-in tolerance to reproduce naturally non-symmetrical waves. On the other hand, if loudness is the objective, he will purposely distort symmetrical waveforms beyond a reasonable or even tolerable limit.

Measuring The Clipped Wave

In order to obtain quantitative data on clipped waves, the output of a low distortion (0.1 percent) audio oscillator was fed to a biased diode clipping circuit. The clipped

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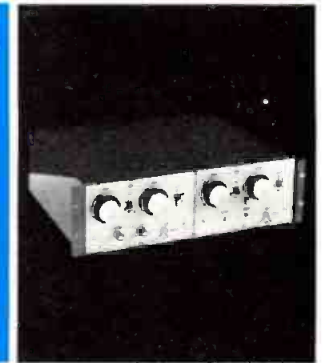
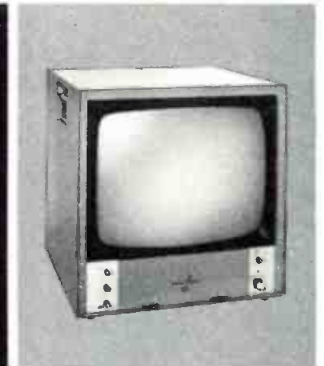
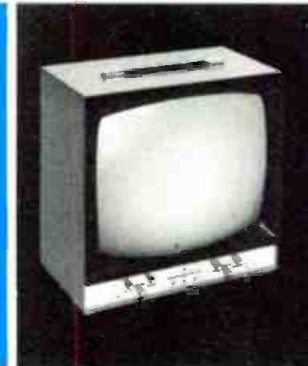
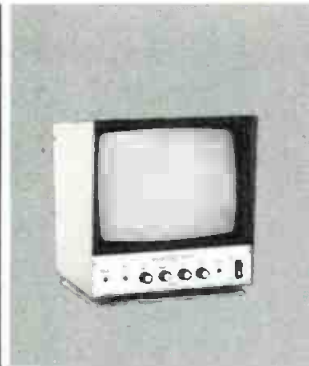
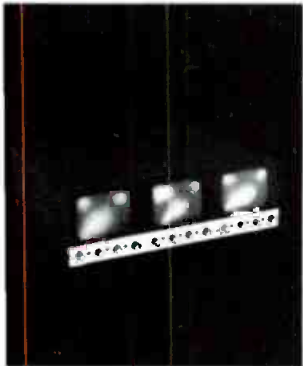
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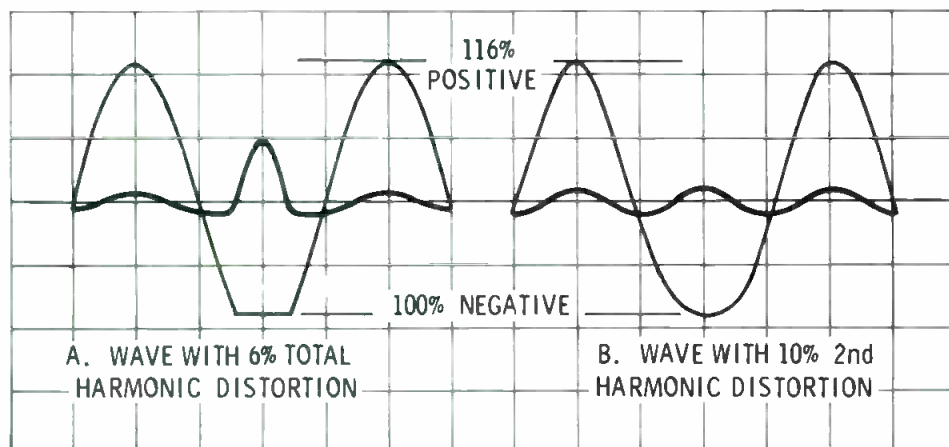


Fig. 4

signal was used to modulate a Continental Electronics Type 315F, .5 kW broadcast transmitter. The transmitter distortion (less than 1 percent) and noise level (better than -60 dB) is low enough so that it doesn't add appreciably to the measured distortion of the clipped wave.

The 315F, a Doherty Amplifier, was adjusted for zero carrier shift at 100 percent symmetrical modulation and the peak amplifier plate tank was loaded to provide 130 percent positive peak capability. Under these conditions, the peak envelope power output is $2.3^2 \times 5000 = 26,500$ Watts or the equivalent of a 6,625 Watt transmitter modulated 100 percent.

The other test equipment included a General Radio Type 1931-A Modulation monitor and a General Radio Type 1932-A Distortion Meter. A Hewlett-Packard Type 8552A Spectrum Analyzer was used to observe occupied bandwidth.

The Percentage Modulation Meter on the G-R Monitor only measures 110 percent full scale, so, in order to accurately measure positive peaks up to 130 percent, the carrier level control was adjusted to indicate 80 rather than 100 on the carrier level meter. With this setting, 100 percent modulation will deflect the Modulation Percentage Meter to 80, 50 percent will deflect it to 40, etc. Every small scale division will indi-

cate 2.5 percent rather than 2 percent modulation, and the full scale reading of 110 will occur at 137.5 percent modulation because the full scale deflection has been increased to $100/80 \times 110 = 137.5$ percent. A Tektronix Oscilloscope with 8 centimeters of scaled vertical deflection was used to check the modulation monitor accuracy.

The system was adjusted so that negative peak clipping began at 95 percent modulation using a 1000 cycle tone. To verify that no 3rd harmonic distortion products were generated in the transmitter due to positive peak compression, the system was checked by observing a trapezoidal oscilloscope display of the modulation percentage. The diagonal sides of the trapezoid remained absolutely linear up to 130 percent modulation.

Figure 5 is a table of the measured peak dissymmetry, total harmonic distortion and the level of the 2nd harmonic of the modulating frequency in dB below the unmodulated carrier level at tone input levels up to 4 dB above clipping level. Negative and positive peaks have been normalized to a 100 percent reference.

At input levels which are 2.5 dB or greater above the clipping threshold or where the peak dissymmetry exceeds 20 percent, the distortion is more than 7.5 percent and the 2nd harmonic level for modulating frequencies above 7500 cycles exceeds

Input—(dB Above Clipping Level)	Peaks Neg.-Pos.
0	95 - 95
0.5	95.5-100
1.0	96 -104
1.5	96.5-108
2.0	97 -112
2.5	97.5-117.5
3.0	98 -122.5
3.5	98.5-126
4.0	99 -129

Fig. 5

the -25 dB limit for emissions appearing between 15 kHz and 30 kHz from the carrier frequency.

If negative peak clipping is accomplished by negative over-modulation of the transmitter instead of with the clipping diode, the distortion figures are the same for given peak dissymmetries and the peaks are, of course, 5 percent higher. The occupied bandwidth is only slightly less when clipping is generated ahead of the transmitter. This is due to the limited frequency response of the audio amplifiers in the transmitter. It might be suggested that occupied bandwidth can be reduced by using a filter between the clipping circuit and the input to the transmitter that will sharply attenuate anything past about 10,000 cycles. The suggestion is valid and will in fact reduce splatter at some modulating frequencies, but to assume that such a filter will pass a high frequency clipped wave is sheer fantasy.

Frequency Considerations

At mid-range audio frequencies, from about 200 to 3000 cycles, a sine wave with a clipped peak can be transmitted through a typical AC coupled audio amplifier with the output waveform bearing a fairly good resemblance to the input signal. At extreme high and low frequencies, however, the output wave will not even faintly resemble the input. Limited frequency response

Harmonic Distortion	2nd Harmonic Level (dB)
0.4%	-43
1.2%	-42
2.5%	-40
4.2%	-33
5.8%	-27
7.6%	-24
9.5%	-23
12.0%	-21
15.0%	-19

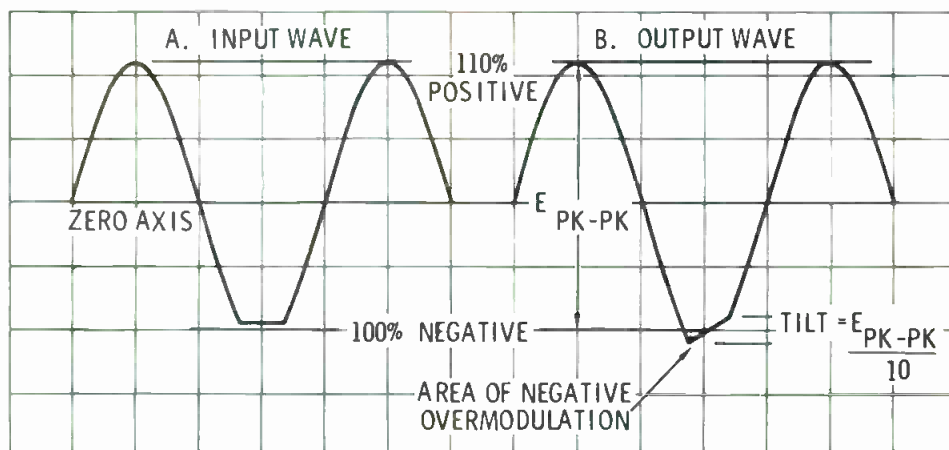


Fig. 6

is the reason for this.

Suppose that the high frequency response of the audio amplifier chain is purposely degraded to reduce side band splatter by inserting a filter into the system. The filter has zero attenuation out to 10 kHz but rolls off 20 dB at 15 kHz. System gain is adjusted to provide 16 percent peak dissymmetry by clipping (95 percent negative and 111 percent positive peak) when driven by a 1000 cycle tone. Now if we change the test tone frequency to 7500 cycles, we find that the transmitter is severely overmodulated on the negative peak. This is because the filter has reduced the required 10 percent second harmonic amplitude to 1 percent and has almost completely removed the higher order harmonics. With only 1 percent second harmonic, the non-symmetrical input wave comes out symmetrical and the transmitter will be modulated 100 percent negative by the time the positive peak reaches 102 percent. In effect, the filter has not only nullified the action of the negative peak clipper but has also increased the sideband splatter in the process.

The problem could be resolved either by reducing the response ahead of the clipper enough to assure that high frequencies are never driven to the clipping threshold or by limiting peak-to-peak excursions by symmetrical clipping followed by an appropriate filter, as in the case of trapezoidal modulation.

Either solution represents a considerable departure from AM Broadcast standards.

The low frequency response of a typical AM transmitter will be essentially flat down to 50 cycles and down about 1 dB at 30 cycles. This is a perfectly acceptable specification for sine wave transmission, but falls far short of what is required for low frequency square waves or the faithful reproduction of clipped sine waves. The ideal amplifier for these low frequency waveforms would be DC coupled. In AC coupled amplifiers, the low frequency deficiency will cause the clipped peaks to tilt or droop (also called ramp). When the tilt exceeds 10 percent, the clipped input signal of Figure 6A will become symmetrical as shown in 6B and will cause negative overmodulation of the transmitter. The frequency at which tilt exceeds 10 percent will usually be in the vicinity of 100 cycles.

Here again, the problem could be resolved by reducing the low frequency response ahead of the clipper or by using symmetrical clipping. However, the low frequency trapezoidal waveshape would still come out of present day transmitters with excessive tilt.

Conclusions

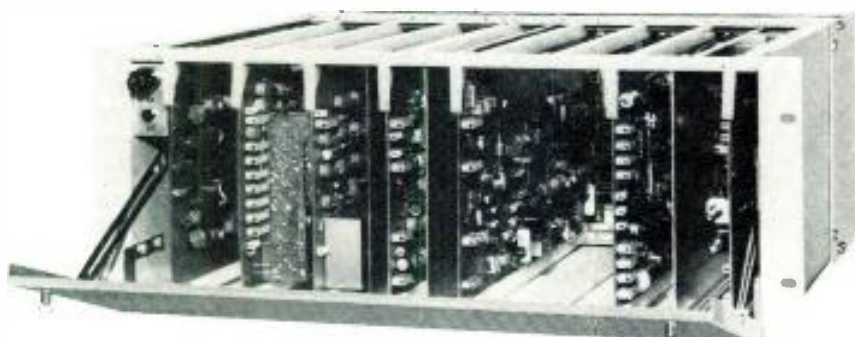
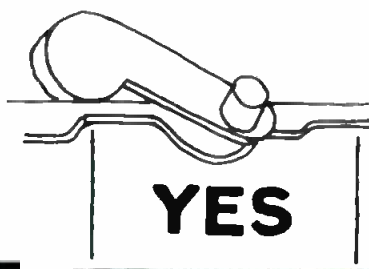
In summary, a properly adjusted transmitter capable of linear output up to about 115 percent positive modulation will remain within FCC specifications at that modulation

level with occasional negative overmodulation due to low frequency signals. If the transmitter is capable of 115 percent but is non-linear above 100 percent, distortion and spurious emissions will rise sharply. Approval of anything in excess of 115 percent should be accompanied by a new set of transmitter performance standards which would place tolerances on peak power output, low frequency tilt, high frequency overshoot, frequency response, distortion and occupied bandwidth. If distortion is to remain below what was once considered a respectable 3 percent, then the carrier would have to be clamped near 95 percent negative with a corresponding positive carrier shift.

On the other hand, if broadcasters feel that a continuously strident blast of sound is necessary to overcome the increase in man-made electrical noise levels, then the simplest alternative is to press for FCC approval of trapezoidal modulation which has been used for a number of years by USIA short-wave stations to put louder signals into distant overseas reception areas.

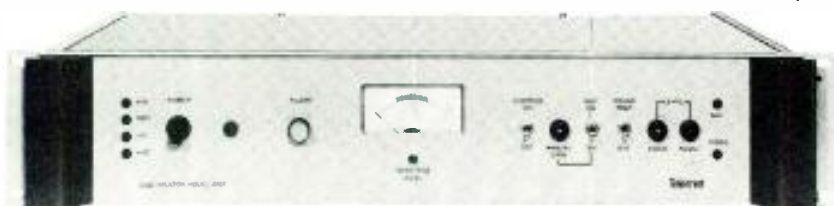
As described earlier, this system utilizes symmetrical clipping and is capable of sounding considerably louder than the non-symmetrical supermodulated carrier. It should be pointed out, however, that the USIA transmitters were designed to very definite specifications with regard to trapezoidal modulation capability. ▲

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REDESIGNING For Operator Convenience

By Fred Chapman / WMCF, Stuart, Florida.

■ In September, 1969, WMCF-FM obtained its financial divorce from its AM affiliate. The studios were moved, temporarily, to a cottage at the AM station transmitter site to enable use of the existing tower for the FM antenna, pending construction of a new studio-transmitter installation and a new, taller, tower.

The site chosen for the new plant is 4.75 miles north of Stuart on busy US-1, the main highway down Florida's coastline. This would enable WMCF to be seen by the large number of local motorists who travel between Stuart and nearby Fort Pierce. The former site, on the St. Lucie river, while picturesque, was not visible to anyone who was not already aware of the station location. After all, the name-of-the-game with a new or newly indepen-

dent station is to let people know you exist!

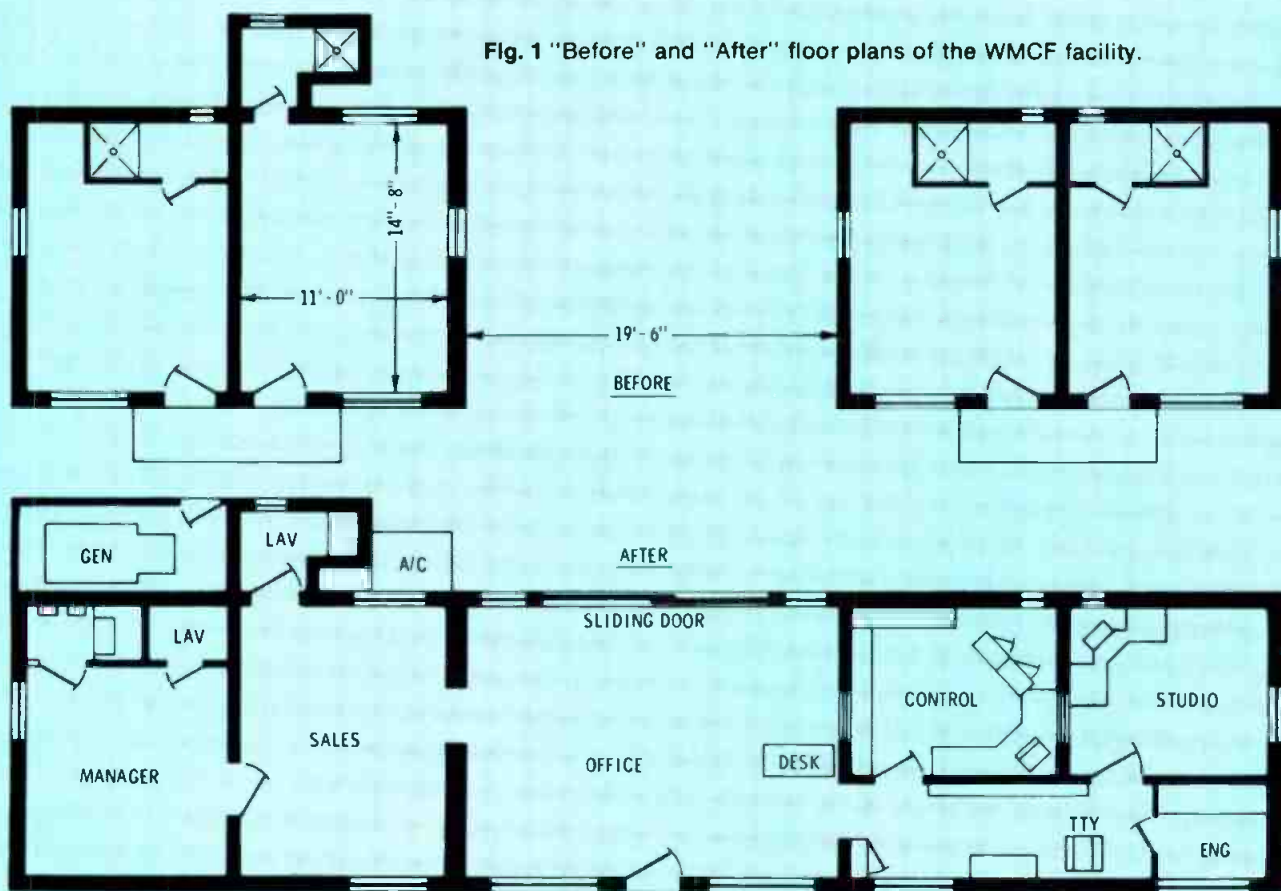
The location selected was occupied by a long defunct motel. After a study of the available buildings, we decided to use two of the dual motel unit buildings for WMCF. Figure 1 shows the 'before and after' floor plans of the selected structures. All members of the staff took pencil and paper and came up with their own versions of what the station installation should look like. The lower drawing shows the final result.

There is a problem in fitting a radio station into an existing building, especially one where the partitions are eight-inch block concrete. The first, logical, step was to join the two old buildings with a large, window-walled reception room. All of the existing motel room door

openings were walled up. The location for the big diesel generator, a much needed item in coastal hurricane country, and the heating-cooling plant fell in with the logical point for the AC service to enter the building. The main disconnect, transfer switch, circuit breaker panel and the generator control board were hidden in a closet made from the shower and 'suitcase' alcove in the motel unit. A door was cut through the concrete connecting wall and another was formed by enlarging the old side window opening. The window which backs up to the central heating-cooling plant is used as a set of recessed shelves for commercial cart storage.

The shower stall in the 'L' shaped bathroom off the sales office has shelves for office supplies. Most of

Fig. 1 "Before" and "After" floor plans of the WMCF facility.



Editor's Note: The WMCF-FM facility may not be the most glamorous looking broadcast setup, but there are several approaches to typical problems that warrant consideration.

Most of the facility problems small market broadcasters face come from the fact that the building was not originally designed to house a broadcast station. WMCF overcame many obstacles and developed an efficient and functional station.

the inside walls were refinished with wood paneling and/or acoustic tile, and all ceilings were converted to acoustic tiles.

From the Working End

The design of the 'working' end of the station took a good bit of time and thought. We are automated during part of the daytime

hours Monday through Friday and most of the afternoon and evening on Saturday and Sunday. Since the logical operator for the automation is the stations 'Girl Friday,' and since the weekend operators are more likely to spend time in the office area than buried in the control room while the automation grinds away, it was mandatory that the automation system be both visible and accessible from the front office. Therefore, it was located in a single 84" rack in the hallway. This called for a hallway wide enough for the rack plus a normal 'people passage.' We set the width at five-feet. This added some bonuses: It provided space for the AP teleprinter close to the control room and studio. It gave room for an editing table, racks for automation tapes, and a 6 x 5 foot (air conditioned) office-workshop for me.

The workbench-desk is a standard 30 inch height. I prefer to sit in a comfortable chair while I work rather than perch on a stool or stand up.

The decision as to which of the 11 x 9 foot rooms was to become the control room and which the studio was dictated by two factors: First, the office girl/operator must be able to see the transmitter meters and monitoring equipment. This is the Gospel, according to the FCC. This means the rack containing this equipment must face the office window at an angle not much over 45 degrees. Let's be honest. With some installations, you don't really see the meters, just the side of the meter housings. We carry MBS news on the half-hour only and, in order to tag it with up-to-the-second local weather conditions, we need quick access to the main control position. To save steps, to provide good meter viewing from the office and to allow the operator to zip into the control room at the last minute without having to scoot around control desk extensions, we located the control room and the desk as shown in Figure 1.

Looking at the photographs, you will see some examples of my design

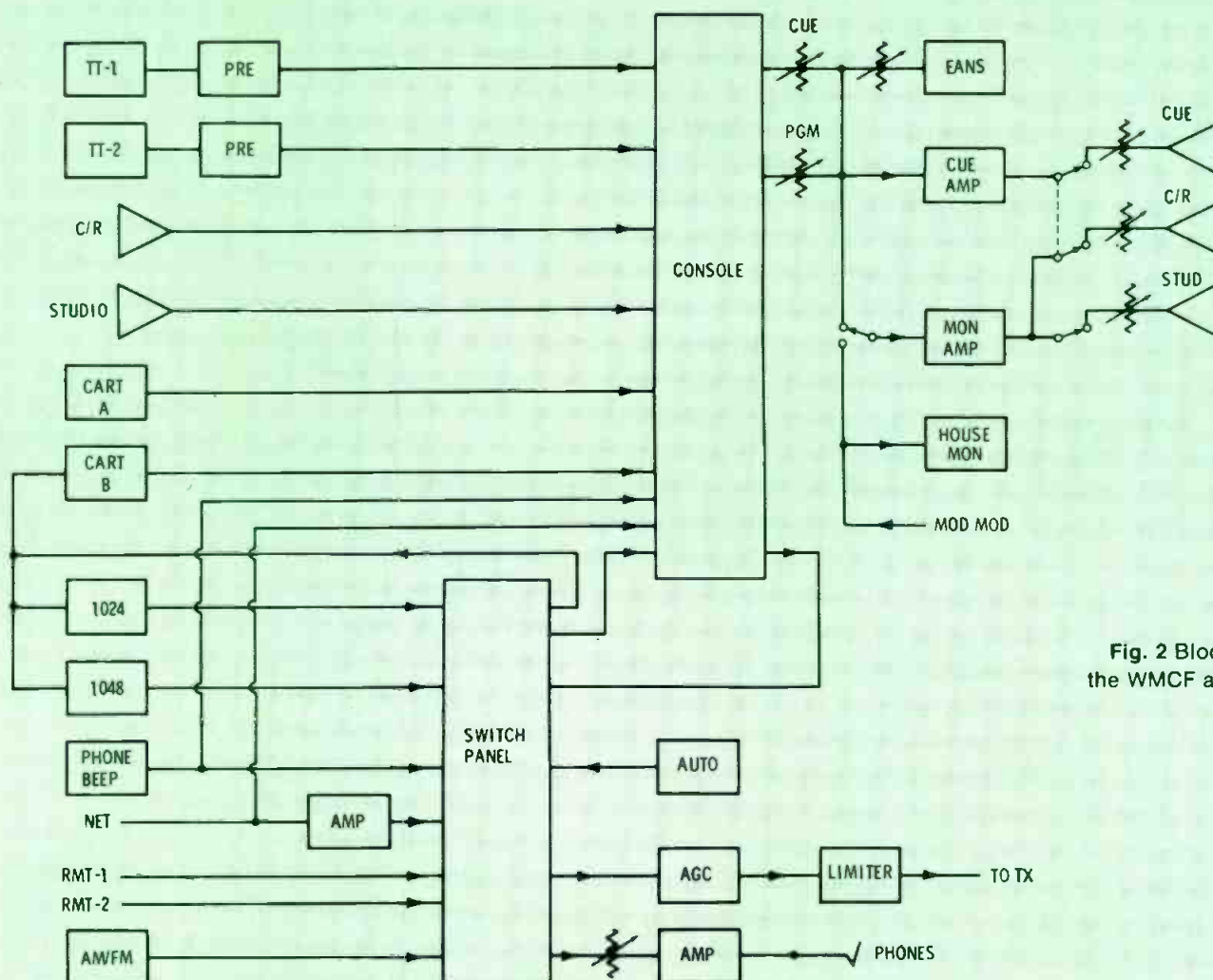


Fig. 2 Block diagram of the WMCF audio system.



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Circle Number 33 on Reader Reply Card

Fig. 3 View of the main office. Window over desk allows office girl to view racks. Automation system is at right, with AP wire machine down the hall.



photos were taken, note the wires on either side of the existing instrument.)

There should be enough space in front of the console to lay copy, news items, etc. Many announcers, myself included, prefer to read copy from this position rather than use a copy rack.

The program log should have a space of its own which allows it to be read while talking. (Ever have to fill between a short break spot and the net?) It also keeps you from missing 'write-in' spots which seem to get dropped in the dog-gondest places.

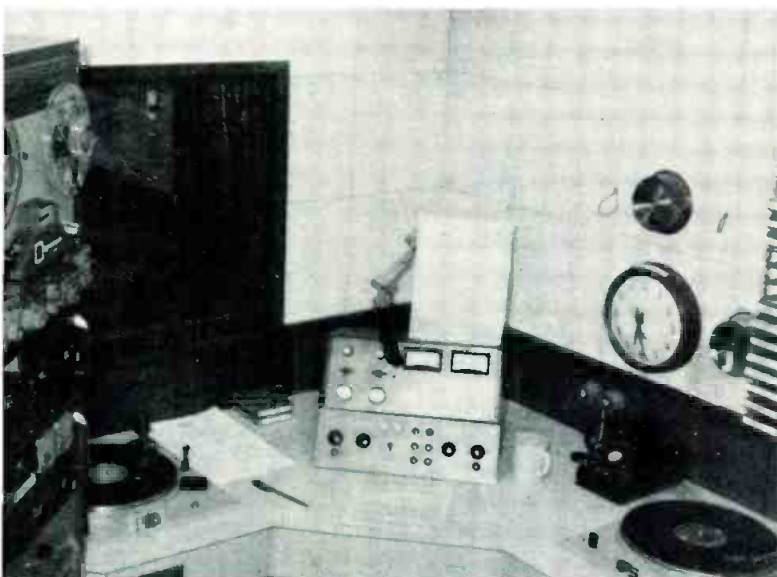
I prefer a turntable on each side, set as far forward as possible, permitting a glance while talking. I have a coordination confusion which scrambles the relationship of console pots and two tables on the same side. I have talked to announcers who have this same problem. I have never found one, however, who dislikes one on each side. These requirements are best met by a corner location for the control desk. It gives you a wall for instruments and another for the studio window without turning your head. This window and the one between the control room and office have triple 1/4" glass panes set in felt gaskets.

On the control desk skirt at the operators left hand is a small panel with the phone jack and the L-pad and the control room speaker gain control. The studio has its speaker control on the wall beside the door. There also is a small speaker in the hall over the AP machine which mutes with the studio speaker. This allows monitoring while editing news and at the same time it prevents feedback into the studio mike should the studio door be opened while the mike is live.

Our records are all in the control room since we do two live DJ shows per day. There is a two-bay-high rack under the control room-office window and a five-bay-high, four-wide rack on the back wall.

All controls, meters, etc. which are not mounted on the console desk are in the two short racks mounted at an angle that is excellent for front office viewing, does not cramp the operator, takes up a minimum of control room space and still allows working room behind the racks. You will note from the photo that

Fig. 4 Overall view of the control room. Note location of clock and weather instruments. Also, racks at left are so close to the DJ's position that he seldom needs to leave the controls.



philosophy. This is based on some 16 years as an announcer-operator-engineer. I stress this, because, too often, stations are designed by engineers who have never had to pull a fast paced board-air-shift and who refuse to consult the people who have. These stations may have beautifully laced wiring harnesses and look great to other engineers, but they are tough for the announcer-operator who winds up working in them. Moral: If you are designing a station and you do not have 'on-air-operating' time yourself, talk to people who do. Show them your ideas and get opinions. This is especially important when you must design around non-professionals (such as office and sales people). I used my wife as a 'test pilot' for many of the designs.

Human Engineering

At the risk of sounding like a pompous expert, I offer a few truths

which I hold to be self evident:

All controls which may need to be operated while the announcer is talking **must** be in front of him. This includes such, often forgotten things, as headphone selectors, recording selectors, remote input selectors, etc. How many times have **you** forgotten to switch a selector to the proper tape unit until you were already introducing the tape. The switching unit directly below the console takes care of this problem.

All instruments which may have to be viewed or read by the announcer while talking **must** be within easy view, preferably at eye level. This business of hanging clocks seven feet in the air where you look at them obliquely is futile. You will note the clock and weather instruments to the right of the operator... at eye level. We have a barometer, remote temp gauge, wind direction and speed indicators. (Two of these were not mounted when the

the rack closest to the desk contains the two reel-to-reel machines, two cart machines and the EAN control unit (see **BE** June, 1971 issue). The other rack holds all transmitter control and monitoring equipment, limiter, AGC amp and the two monitor amplifiers, one feeding the studio and control room and the other the office speakers.

The current EAN receiver sits on top of the rack. The AM-FM receiver normally used for this job was 'down' at the time of the photo. The AM-FM unit has an extra feed to the console for off-air broadcasts or recording. Again, all controls and metering are accessible to the operator without getting out of his chair.

WMCF Audio System

The block diagram, Figure 2, shows the audio electrical connections of the system. You will note that most everything runs into and out of the console switcher panel. A common recording buss feeds the reel-to-reel and cart machines. A line amplifier is used to raise the

-20 dBm network level to the same level as the output of the console and the automation system, -6dBm. This allows console bypassing while on net. The headphone amplifier and gain control allows an operator to adjust phone level to his own taste.

We have found two remote lines to be adequate. The Telco terminations are on the wall in the engineers room. If we ever need more remote inputs, I will just put a rotary selector switch on one of the lines to the control room.

A production setup for recording tape cartridges for our automation unit is located in the studio. This is just a simple mixer feeding the table mounted cart machine. Again, the turntable setup is the same as in the control room to keep things uniform for the operators.

Since we work with some operators to whom expressions like 'impedance' or the many abbreviations used in electronics would be foreign. We avoid these as much as possible. It is for the same reason that I do not use patch panels. There is no

more confusing item than a black panel full of holes and little abbreviated labels.

We have retained the tiny 12" x 18", former bathroom windows in both the control room and the studio. They detract nothing from the noise reduction, allow the operators to check the tower lights visually and can be opened for ventilation if the air conditioner ever conks out. We have also retained the large window in the studio wall. This faces the control room window and allows the announcer to avoid giving a 'fair and warmer' forecast while we are having a cloudburst outside. Our transmitter is located in a 10 x 14 foot concrete block building at the base of our tower. This keeps the transmission line losses (and cost) down and also provides protection should fire ever hit our studios. A mike, tape deck and remote amplifier would put us back on the air. The transmitter building has its own air conditioner, room for a couple of speech racks and a good bit of workbench and storage space. ▲



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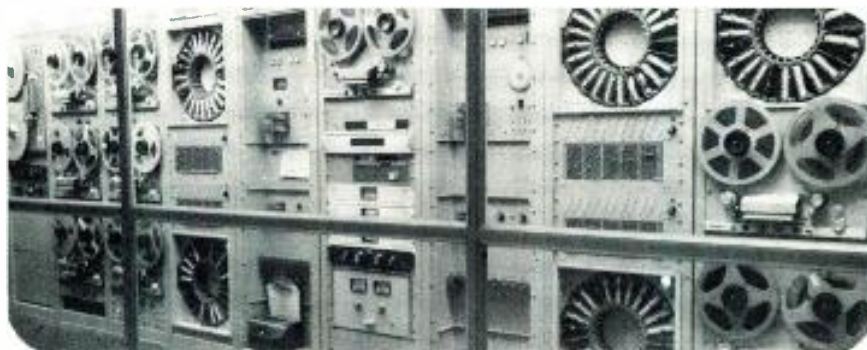
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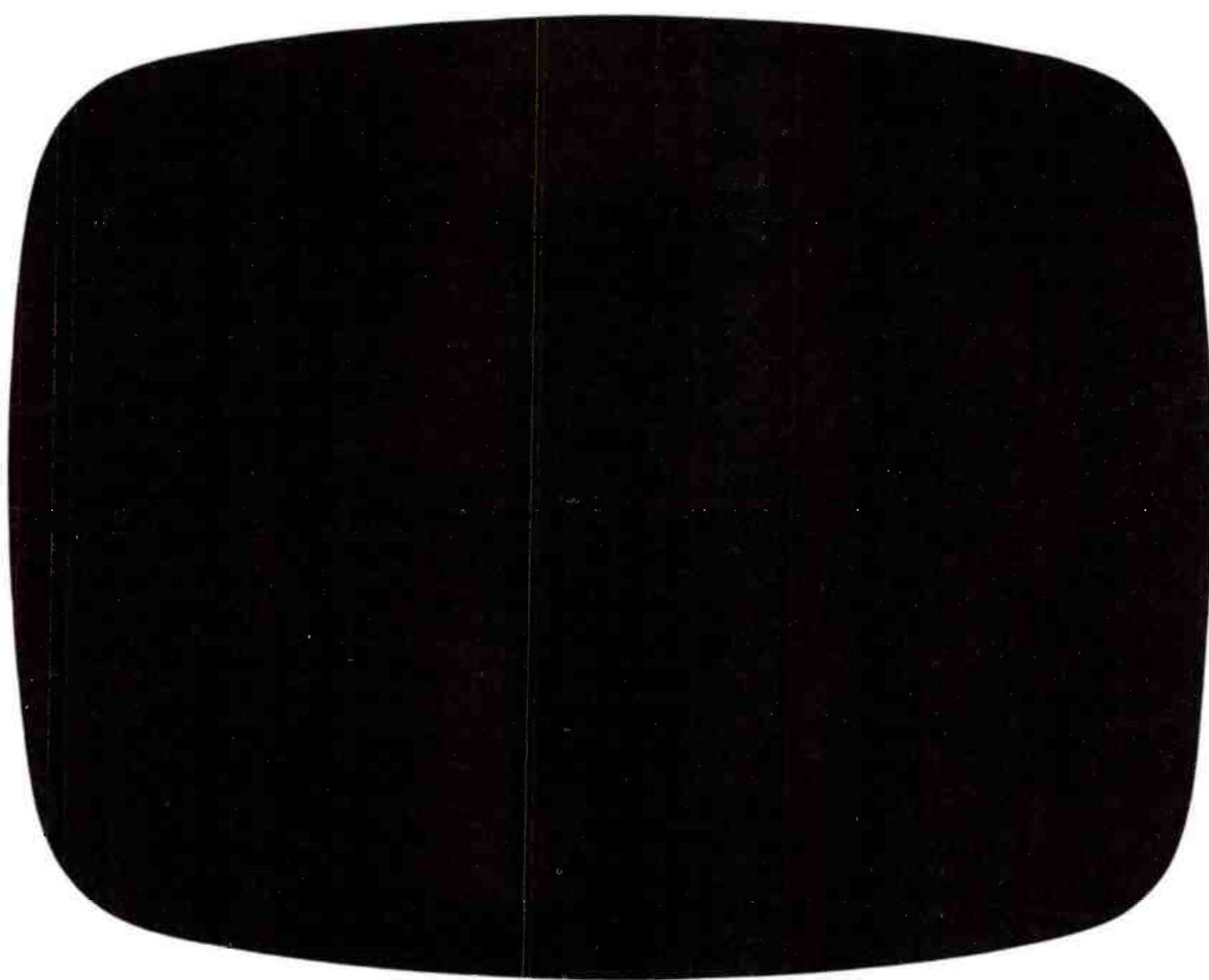
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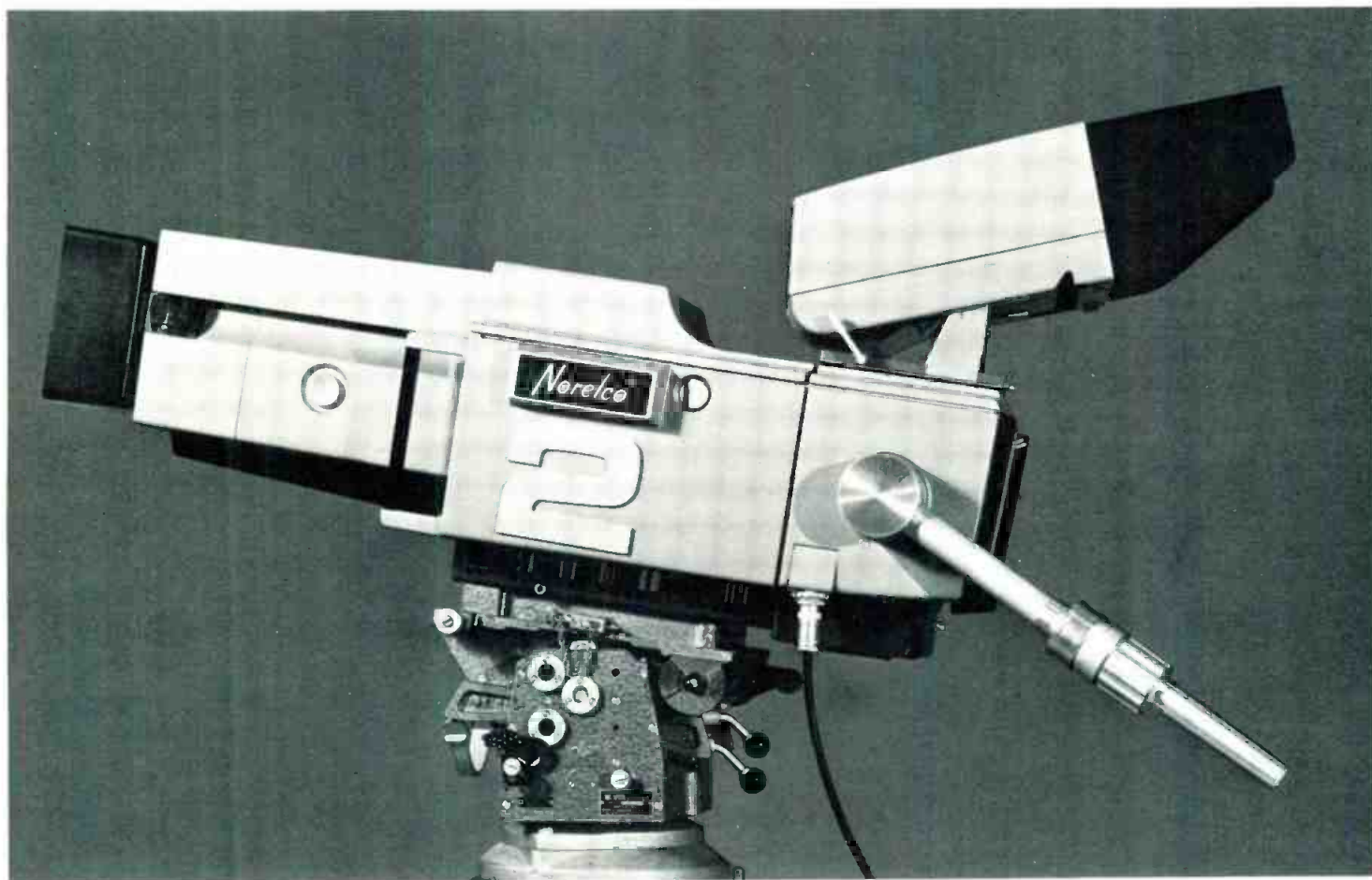
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A new approach to control room monitoring

By Jimmy D. Laird*

In this day of high pressure broadcasting, more and more is demanded of the DJ on duty, especially in the smaller markets. Here at KBWD we find this situation to be true because of our large volume of sports, remotes, and news work that makes up each day.

A new man suddenly finds himself confronted with having to join games, insert commercials, hit networks, cue records, and at times answer the phone, all while he is trying to maintain an audience by keeping a smooth sound. This probably sounds familiar, because it makes up the routine of most radio stations.

I feel that it is the responsibility of the concerned engineer, if the economy of the station will allow, to provide his air staff with whatever device will be an aid or time-saver. I qualify this statement with the condition **proves** because we might have a tendency to get "gimmicky". It is with this in mind that a few months ago we introduced to our control room a rather unique means of monitoring.

After many consultations with management and staff, we set about to design a headphone monitoring system that would best meet their needs. Of course sound quality must be the prime consideration. Comfort is another dimension which can be found only by experimentation with various types of headphones. We have tried many units from the least to the more expensive. The type we settled on was the Realistic-Koss Custom Pro stereo phones. These phones combine good reproduction, light weight, comfort, and moderate price.

The basic concept of our system is that we use a stereo amplifier, or to be more specific dual mono amplifiers: one for each headphone. On the left channel we monitor the output of the board continuously.

*Technical Director, KBWD,
Brownwood, Texas.

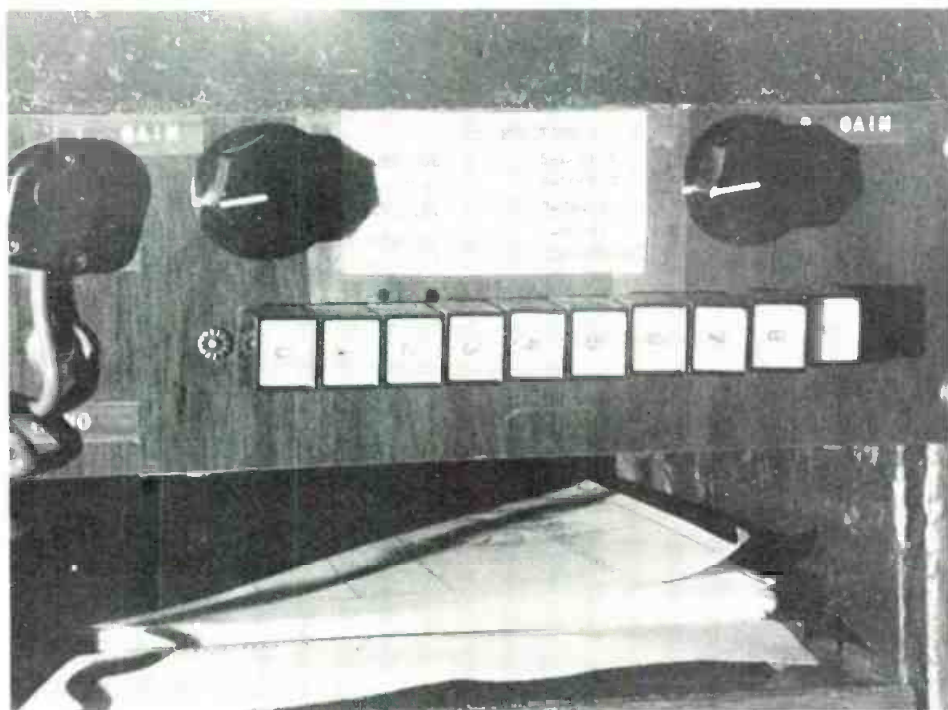


Fig. 1 Console headphone control panel. Note that KBWD can select any of nine inputs to one side of the headphones.

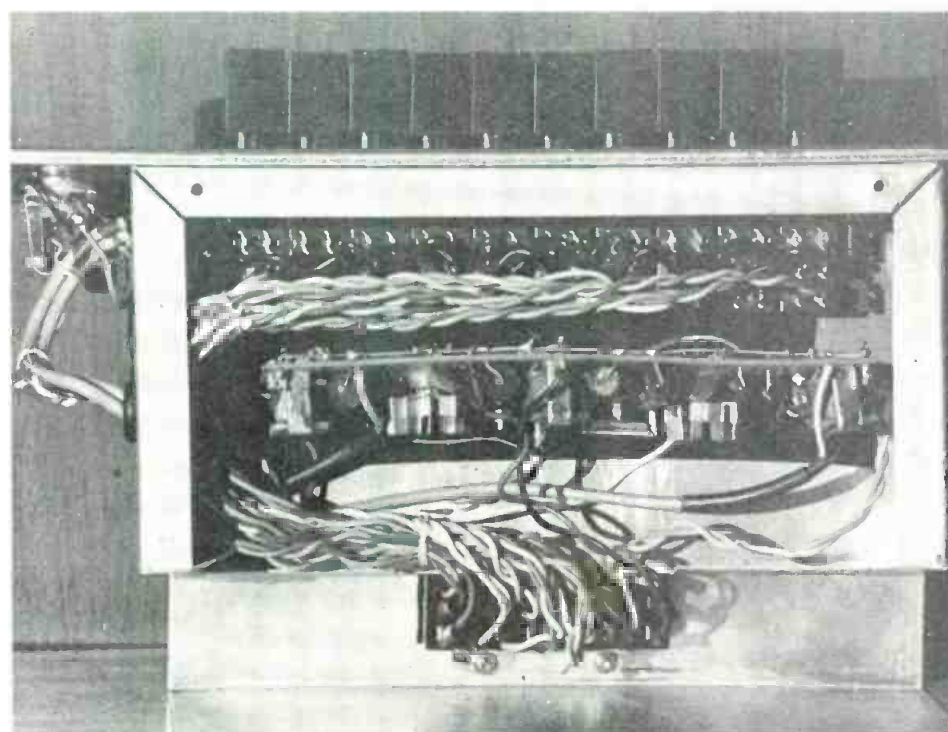


Fig. 2 Underside wiring of the headphone amplifier panel.

On the right channel we use a pre-select switch to select any of ten different sources, i.e., the Mutual news network, the Texas State Network, any of three phone loops (remotes and ballgames), the audition channel "channel two" of the console, the patch panel multi input, the turntable cue system, the control room telephone bridge, and of course the board output.

This system allows the announcer to preview the various sources in the right ear and still be able to hear himself and other programming in the left ear. In this system we used the new Switchcraft DW type pushbutton switches. The price is very reasonable and the convenience of immediate selection is to be appreciated. The amplifiers we used were Sylvania linear integrated circuits type ECG-716 which provide about 250 milliwatts of power to each phone. While this may seem low I have yet to find anyone here operating them wide open.

The frequency response and distortion characteristics are excellent and meet our criterion for good quality.

The Circuit is essentially the same as the "Stereo Headset Amplifier" design included with the IC, with the exception of a 10 K to 2 K ohm bridging transformer in the input to prevent loading or unbalancing the lines monitored. Individual volume controls are provided for each channel. While we did not use it, I might also recommend some type of tone control to be installed to adjust for each user's taste.

DC power for the unit is provided by a regulated power supply of 20 Volts which is mounted remotely from the amplifier. All connections are made through a 24 contact Cinch-Jones jack mounted on the rear of the amplifier chassis. The IC sockets, transformers, and associated components are mounted on perforated board with junctions made with flea clips. Everything excepting the phone jacks and volume controls is mounted in a 2x8x4 inch steel box. The front panel is a piece of aluminum rack panel cut to our required size and then covered with "FORMICA" to match the console decor. This makes for a very neat installation.

PARTS LIST

C-1	15mfd at 25 volt
C-2	10mfd at 25 volt
C-3	50pf
C-4	25mfd at 25 volt
C-5	1.0mfd at 25 volt
C-6	240pf
C-7	25mfd at 25 volt
C-8	50pf
C-9	15mfd at 25 volt
C-10	1.0mfd at 25 volt
C-11	240pf
R-1,R-2	5k ohm volume control
T-1,T-2	1k to 8 ohm output Archer 273-1380 or equiv.
T-3,T-4	10k to 2k ohm bridging Archer 273-1378 or equiv.
S-1	Switchcraft DW "multi-switch" #70101k-206
J-1	CINCH-JONES S-324-AB socket 24 contact
J-2	Switchcraft 13B 2 circuit phone jack
IC-1,IC-2	Sylvania Ecg-716

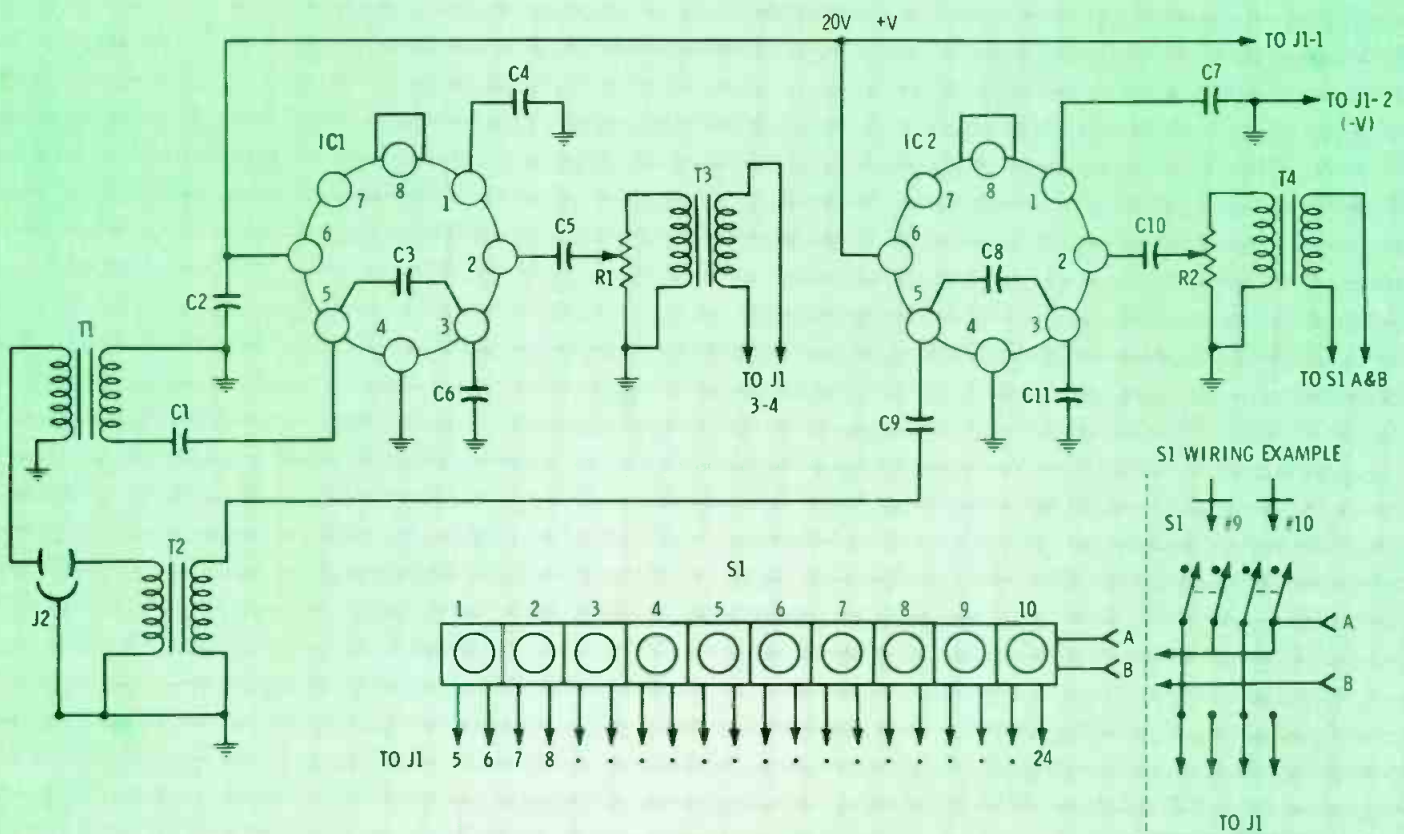
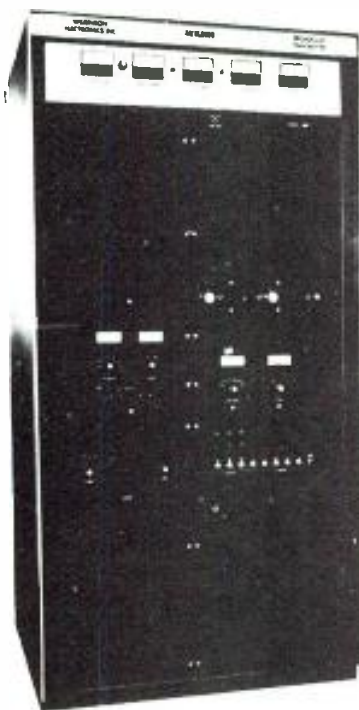


Fig. 3 Schematic for the KBWD headphone selector and amplifier.

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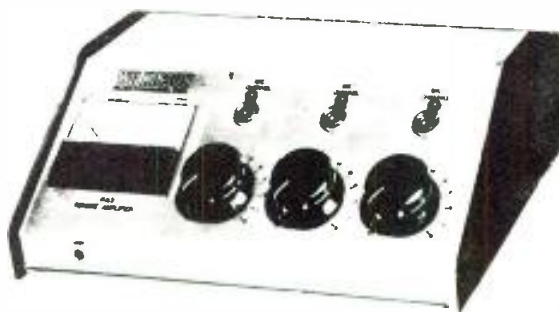
AM TRANSMITTERS - 250 W
1 KW - 5 KW - 10 KW - 50 KW



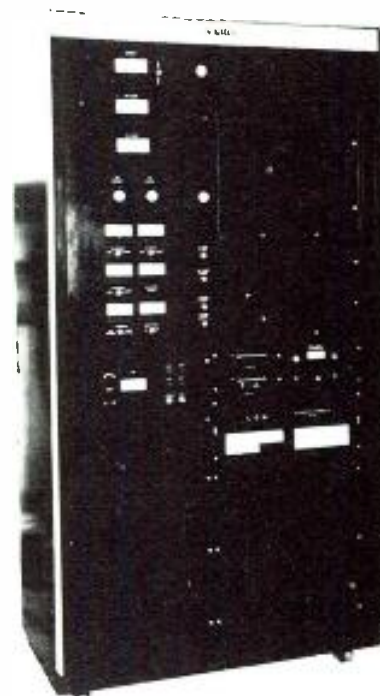
LIMITERS - Mono and Stereo



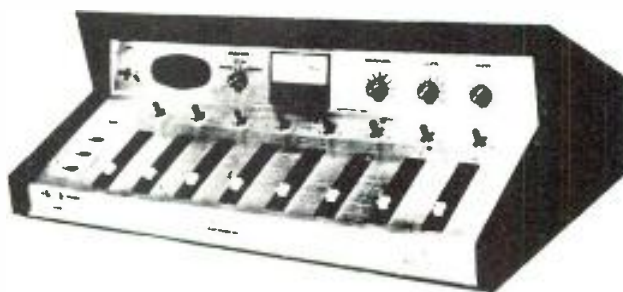
ACC AMPLIFIER - Mono and Stereo



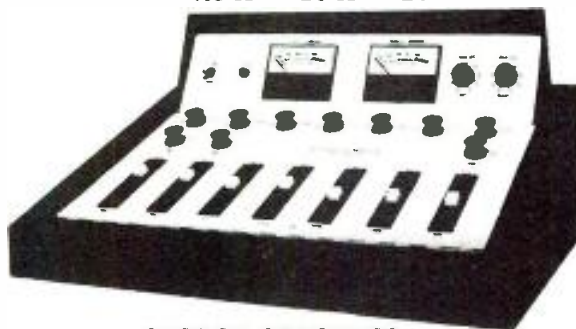
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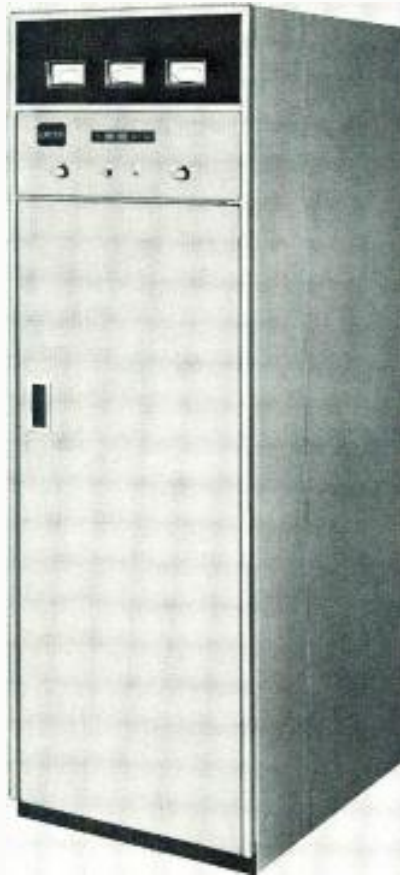
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By the way, with spring just around the corner, so is the introduction of our new solid state VHF line—1 Watt and 10 Watt solid state VHF translators, to be exact.

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While we're not particularly surprised, we are grateful. Grateful you appreciate our MKH 805's unusually wide, flat response, extreme directionality and high overload resistance. Grateful you appreciate its ruggedness, compactness and light weight. And most of all, we're grateful you use it so widely, both in studio and field-recording, that it's become the most talked-about microphone success story in decades.

But the MKH 805 shotgun microphone was a hard act to follow, especially since we don't bring out new products for change's sake. Now, however, we are pleased to bring you our new MKH 415 and 815—the "littleshot" and the "bigshot"—two remarkable microphones representing a third generation of Sennheiser condenser microphone design.

the littleshot

Not too long ago, we discovered our shotgun microphone being used for applications beyond our original intentions. Because of its small diameter and longer-than-normal size, reporters used it for interviews at normal miking distances. And because of its flat response and high directionality, studios often used it to pick up performers and to actually "close-mike" instruments from a distance, due to its lack of proximity effect, and "pop" reduction.

"Why not," we reasoned, "create a new condenser microphone especially for these diverse applications, where extreme directionality is not required?" The MKH 415, "the littleshot" is the result.

Using an improved combination of pressure-gradient and interference principles, the MKH 415 is truly a remarkable microphone. Directionally speaking, it behaves as a super-cardioid below 2 kHz; at higher frequencies, it exhibits a beam-type (or baseball-bat) pattern. Besides reducing leakage, this design provides higher on-axis conversion efficiency, with two more benefits.

First, pops and wind-noise are reduced, even without its accessory windscreen and shockmount. But even more important in many applications, is the MKH 415's virtually total freedom from proximity effect, which, coupled with its unusually flat response, makes possible "close-miking" of singers and instruments without need for bass attenuators. Beyond these features, the extremely wide response, low ambient noise, high output and overload resistance characteristic of all Sennheiser microphones have also been retained.

Physically, the MKH 415's 10" length provides reporters and other outdoor users with the added "reach" they seek, while performers will find the design less fatiguing to use and more aesthetically pleasing, since they need not hide their faces to project their sound.

the bigshot

In the MKH 815, all the good things that made its predecessor's reputation in filmmaking and broadcasting have been retained. And another advantage has been added: through an improvement in the microphone's interference design, by increasing the number of slots along the microphone's sides (to reduce the area of individual ports), the MKH 815 has additional resistance to pops and wind noise. Thus, in many situations formerly requiring additional precautions, the MKH 815's accessory windscreen and shockmount will not be required.

more encores

Besides the amazing new "littleshot" and the improved "bigshot," there are many more new things on the way from Sennheiser. While we'll be talking about them in the future, you can find out about them now by requesting the second edition of our Micro-Revue—which contains a good deal of useful audio information besides. Please write or call:

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*Vidifont used in 1972 Winter Olympics, Sapporo, Japan

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Production guidelines for good picture quality

By E. Carlton Winckler*

Since color became the normal aspect of the television picture several years ago, rapid advances in equipment engineering and the expanding expertise in technical operation have made good broadcast quality the rule rather than the exception—even in the smallest stations.

Unfortunately, extremely fine pictures from an engineering standpoint can sometimes be very poor pictures for the intent of the program being produced! Close observation at station after station often reveals highly skilled technicians and equally skilled production people working against each other with unhappy results for each area revealed on the home screen for all to see. Of course, these groups aren't trying to work against each other at all—they merely haven't considered what each is trying to do and then coordinated their activity to produce the effective and harmonious result of which both are fully capable.

The home audience isn't aware of the conflicts between technical and production areas...they just say that about the only thing that looks good on TV is old movies. Movie technicians and production people learned to work together many decades ago and have prog-

ressed in harmony every since, so the home audience may be quite right...and too often.

Lighting For Color

Where can we start to compromise our differences and make the kind of pictures that we cannot only be proud of technically, but which do the right job for the subject matter, too? Our observations indicate that the biggest problem is in the area of lighting—usually too much light—reflected back from sets and costumes whose brightness values have not been properly balanced for the requirements of electronic photography. Yes, this is a subject with many ramifications—but they are not complicated ones—not mysterious, and can readily be understood by anyone who is willing to think out their project.

Let's take a look at what we just said in the last paragraph and see if we can apply it to day-to-day operations.

Too Much Light

Too much light was noted as a major problem. The amount of light reflected into the lens of a camera determines the F stop at which the lens diaphragm is set for the best exposure. The F stop setting in turn determines the depth of field in the resulting picture. A high F stop—F16 or F22, due to very high light level, gives almost universal depth of field—or focus—

so that both foreground and background, and all in between, are in sharp focus.

Remember, this can mean that your star performer and the cracks in the scenery are equally sharp, a most undesirable situation from a program standpoint, but regarded by some engineers as a technically perfect picture admittedly requiring great skill to achieve. A low F stop such as F 3.5 or F .4, due to very low light level, gives a very shallow depth of field and means that movement of a few inches can cause your star to go in and out of focus and usually this isn't desirable for either engineering or program.

Most of the time a medium depth of field is the best solution—where the program star or other center of interest is clear and sharp and the background is just a little soft. This is the way our eye sees things when we concentrate our attention on a person or object and, therefore, the slightly soft background appears quite natural. Of course, there are many times when universal depth of field is most desirable, or even necessary: a parade, sports, ballet, acrobats. But usually in a studio show the best picture has the center of interest sharp and all else a trifle soft. This condition dictates the amount of light to be used—both, therefore, determined by the intent of the scene.

Too much light always causes trouble one way or another. In

(Continued on page 66)

*Director, Design and Shop Services,
CBS Television Network.

Color Production

(Continued from page 65)

addition to an undesirable depth of field, it distorts the basic composition of the picture. With too much light and lighter areas in the scene become very bright because they reflect a high percentage of the light striking them while the dark areas reflect a very low percentage of this light and by comparison appear even darker than they actually are, resulting in a picture which does not resemble what is on the stage at all. When the right amount of light is present and the lens opening is properly set for this condition, the picture on the monitors should look about the same as the real scene looks to the eye.

The Center Of Interest

A moment ago we mentioned another key point—the center of interest.

The center of interest is where the whole composition of the picture should start—the technical, the design, and the program planning of the shot, because that is

what the picture is about. The center of interest in our picture may be the star, or stars, the news commentator, a product in a commercial, a demonstration. The variety is endless. It is the point to which the intent of the scene demands that the audience attention be directed. And where we want the attention the lighting should be optimum and all other areas a bit less bright, with the design of the set and costumes arranged to direct viewers' concentration, and have the camera focus exposure and video levels set for ideal reproduction. Everything else in the picture is of secondary importance to this center point.

We must bear in mind that every shot has a center of interest whether we plan it or not—an element which attracts and holds the attention of the onlooker. It is up to us to make sure that this center of attention is where we plan it to be and not some accidental element which steals the scene. It is

these accidental elements which too much light or too great a depth of field tend to promote to a point where they take over with a resulting loss of program intent.

Of course, excessive light is not the only cause of picture problems, or even of poor lighting—so perhaps we should review together the whole project of constructing pictures for electronic photography.

Color Picture Construction Review

Picture planning starts with skin tone. Skin tone is the element used by the home viewer to adjust the color on his receiver. There is no way the viewer could possibly know the color of the background or of the clothing in the studio or on the remote pickup, but everyone has a concept of proper skin tone—usually pretty close to actual color ranges.

Camera balance and exposure and, naturally, light levels, should

(Continued on page 68)

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(Continued from page 66)

be adjusted to provide ideal skin tone. Skin tone normally reflects about 30 to 40% of the light—about step 3 on a gray scale (on which 1 is pure white and 10 is dead black). In order to provide the good separation skin tone requires, costume and background

elements should be either lighter or darker than step 3—never the same value as the faces.

And here is the next important consideration in picture composition—the “value” of the colors to be used. “Value” is a term used to describe the amount of light reflected by the color selected—the brightness or darkness of that color. The same color used on the same type of surface always reflects the same percentage of the light striking it whether the volume of light be 10 Foot Candles or 2000 Foot Candles, and, therefore, can be compared to the steps of the gray scale—and it should be compared because the gray scale is a ruler used to measure the reflectance value of all elements in your scene. This comparative measurement (1) assures good visual separation in the color picture, (2) allows you to remain within the 30 to 1 contrast range of the color television system, and (3) assures a satisfactory black and white picture. Remember that any

two elements of color having the same brightness value come out the same gray in the monochrome picture and a #3 value spot in the background could cause the star to vanish when he or she walks past!

Watch That Contrast

We went by an important one there kind of fast—the 30 to 1 contrast range limitation of the electronic system. And that is a very important one! Your eye can handle almost any contrast range—the film camera is happy up to about 100 to 1 (the brightest element being 100 times as bright as the darkest item of which any detail is to be seen) but the electronic system can handle only 30 to 1. Exceeding the range on the high side means a bloom and loss of all picture quality—exceeding on the low side does no special harm—the area exceeding merely becomes dead black with no detail or color whatsoever.

The usual result of even a slight excess brightness is dark faces. This condition is usually caused by attempting to use pure white in your scene. Pure white reflects 85 to 90% of the light so it is obvious that a face reflecting 30% is going to look dark by comparison. Pure white should always be avoided—substitute television white (or Technicolor white) which is a very light gray reflecting only 60% of the light—this appears on either film or electronic pictures as white but reduces the contrast problems to a minimum.

In order to avoid picture problems in the studio it is suggested that you check colors in the planning stages. This is easy. Put color samples on a table under a bright incandescent light of about 3000° Kelvin (such as a Tensor light) and view them with a gray scale through a 2.0 Density Viewing Glass. This takes out enough of the color so it is easy for the eye to match values with the gray scale chips.

This system, with a bit of practice, is sure fire and avoids a lot of last minute problems. It is especially useful in checking graph-

(Continued on page 70)

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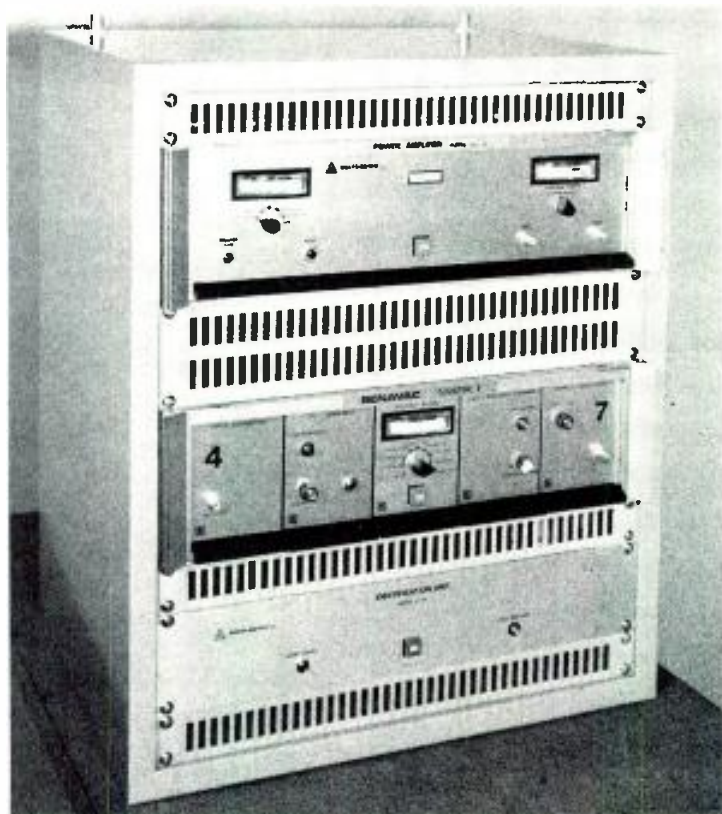
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Color Production

(Continued from page 68)

ics of all types where the rule is one full step separation for good legibility and two full steps for impact. As a side note, graphics less than 8% of the verticle picture height are hard to read and often do not resolve clearly on many receivers. When small graphics are necessary, it is recommended that red be avoided as a color—experiment has shown that white, yellow or green is more effective.

A Matter Of Taste

You will note that this last sentence is the first time a hue or color has been mentioned. Color is a matter of taste—the system reproduces any color you choose. Our only comment is to remind you that light reds, yellows and greens are the impact colors, the attention getters. Blues, the purples, magentas and darker reds tend to stay in the background. On all systems blues intensify slightly over the original color and all sys-

tems vary slightly in their individual responses to reds. Here you must know your own system in making color decisions. One point in selecting colors is important to keep in mind: a bright spot of color attracts attention just as a bright light does, so reserve the bright colors for the center of interest area and keep other colors just a touch subdued.

As one more step before directing our attention to lighting, it might be well to devote a few paragraphs to costumes and makeup.

Costumes For Color

All costumes, whether modern, period, or character should, of course, be selected to enhance the appearance of the wearer and their color should complement the natural coloring and complexion. Pure white must be avoided whenever possible as explained earlier and, of course, this applies to ornaments, collars, or shirts which are near the face as they will always make the face appear dark or, at best, a deep red. Blue shirts are often substituted for white and there is no objection to this except that blue is a very definite color and may be distracting. Gray or tan shirts are more acceptable, in the opinion of the writer. Ties, suits, or dresses with a small repetitive design such as fine plaids, checks or dots will moire (flicker) and prove most distracting at certain camera positions—(widening or tightening the camera shot will usually end this effect temporarily).

Fabric used in the costumes affects color to some degree. When a shiny surfaced fabric such as satin is dyed exactly the same color as a fabric with a soft or matte finish, the shiny surfaced material will appear a shade or two lighter than the matte finish.

Talent Makeup For Electronic Photography

Makeup for electronic photography should, first of all, match the natural coloration of the subject. Everyone does not look alike

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(Continued on page 76)

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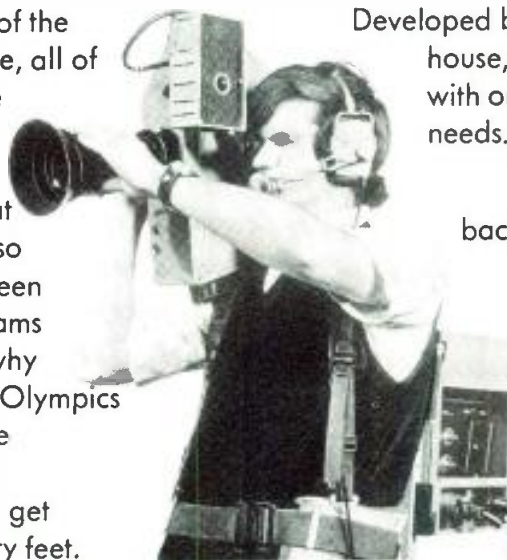
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Engineering Society Continues To Grow

**Annual Meeting Will Be Held April 9.
Application Form On Page 74.**

The Society of Broadcast Engineers will hold their annual meeting Sunday, April 9, at 3:30 PM in the Williford Room of the Conrad Hilton Hotel.

The agenda will include the election of officers and directors. Nominations for officers include: Robert W. Flanders, WFBM AM-FM-TV; Richard T. Monroe, KYW-TV; Gordon W. Trout, WIRE. Flanders is the current president of the SBE.

The list of nominees for directorship reads more like a broadcast engineers hall of fame. They are: Al Chismark, WHEN; Edwin T. Karl, Beck-Ross Communications; Ben Wolfe, Post-Newsweek Stations; and James Wulliman, WTMJ AM-FM-TV-Cable TV.

For those of you who are not familiar with the SBE, we are including here a short SBE history and membership details.

In The Beginning

The Society of Broadcast Engineers has never been a numbers group. Rather, its membership includes many of the innovators of the broadcast-communications engineering community. The SBE's Ben Wolfe won last year's NAB engineering award. The list goes on to Al Chismark, Lou Wetzel, Jim Wulliman and a host of others who are contributing to the field.

In 1963 the Institute of Broadcast Engineers was formed. It was conceived mostly because no other professional society served the professional interests of the broadcast engineer, exclusively.

It was one year later, during the 1964 NAB convention, that the Society held its first general meeting. And it was at this time that the

name was changed to the Society of Broadcast Engineers. A year later the Society was incorporated in Washington, D.C. as a non-profit organization. In the following years, the national meeting has always immediately preceded the opening of the NAB convention.

Since its beginning, the SBE objectives have been to: Provide a forum for exchange of professional discussion of mutual broadcast engineering problems; to provide for and to maintain professional recognition of members; to group together broadcast engineers generally in a body to assist in the professional education, and to raise the technical standards of broadcast engineers and to advance the broadcast technician and novice; and to encourage a continuing interest in the broadcast engineering field by students of technical and engineering courses on broadcasting.

Membership

Because the SBE doesn't come on as strong as some national organizations, membership has not grown by leaps and bounds. Yet every time you count them up, it's growing. More than 1,600 members at this time.

The grades of membership are: Student, Associate, Charter, Member, Senior Member and Fellow. Qualifications for Member grade are 'at least a First Class Phone License or equivalent and adequate experience.

Details for membership are included in the "Constitution and Bylaws" and may be received by writing to: The Society of Broadcast Engineers, P.O. Box 88123, Indianapolis, Ind. 46208.

THE SOCIETY OF BROADCAST ENGINEERS
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I agree to abide by the Constitution and By-Laws of the Society if admitted.

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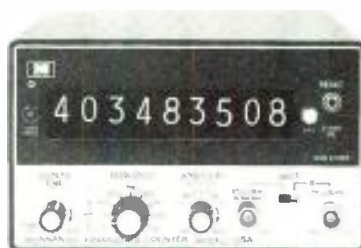
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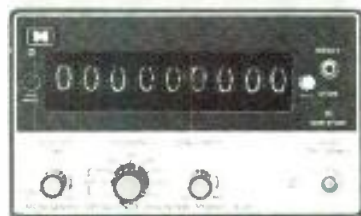
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Color Production

(Continued from page 70)

and there is no reason why the makeup applied should attempt to make them all the same color. As a second rule, the less makeup that can be applied, the better. It should accent and enhance, but never be visible as an applied substance. If makeup is to be applied, then all exposed skin areas should be covered and everyone in the scene made up.

For the ladies a carefully applied street makeup is usually adequate, but eye shadow must be applied sparingly and lipstick should be in clear pinks and light reds. Any lipstick color having blue in its composition tends to appear purple or magenta. Smooth application and careful blending is essential to all makeup.

For the men, makeup is only necessary to reduce shine or to cover unusually heavy beard shadows. Lip makeup is not usually used and any makeup base should not be carried over the lips—just keep them clean and natural. Very often an application of powder which closely matches natural skin coloration is adequate, but when the subject is to be on camera under the lights for more than a few minutes a pancake or panstick base lightly applied and powdered over will prove more satisfactory.

Character or corrective makeups, of course, require the skill of a professional makeup artist.

Basic Lighting Tips

Lighting for the television camera is a highly controversial subject. There are as many approaches to lighting a scene as there are lighting practitioners and, as a whole, one approach is as good as another. However, there are several basic points on which most practitioners agree and these are the ones we will discuss.

Let's try to dispose of the question of volume of light first. (The amount of light should be measured with the light meter pointed toward the light source—it is extremely difficult to gauge light intensity by eye alone.) The light levels are determined by the type of camera being used and by the age of the

pickup tubes. The technical or engineering department of your station would be the best source of reliable information on this point.

Normal light levels vary between 180 Foot Candles and 300 Foot Candles for the acting areas. If more than 300 Foot Candles are recommended, it would be well to review the whole situation very carefully with special reference to F stops, filters and electronic lineup of the cameras. Cameras should always be lined up on test charts or targets having the same volume and quality of illumination as that to be used in the studio.

Quality Of Light

Quality of light is of major importance in lighting the studio and illuminating the test charts. Quality is measured in degrees Kelvin and has nothing to do with volume. You can have 2 Foot Candles at 3000 Kelvin or 2000 Foot Candles at 3000 Kelvin. The quality refers to the amount of blue (high Kelvin) or red (low Kelvin) in the light. 3200 Kelvin is normal white light and it is practical to vary 200 to 250 degrees + or - without apparent effect on color response. Most studios try to average out about 3000 Kelvin, which gives good color reproduction while making allowance for old light bulbs, slightly aged reflectors, and lens surfaces not ideally clean.

On exterior shots where natural daylight is part of the plan you will find the Kelvin temperature running 4000 to 12,000 Kelvin and the cameras can be adjusted to produce good color at that level. Obviously, the cameras cannot handle both interior and exterior lighting under the same setup adjustments.

I'm sure that all of us are familiar with the general procedure of lighting for the electronic cameras: (1) The base of fill light which provides general illumination and helps to wash out shadows (the units providing fill or base should never be used without diffusion filters); (2) the key light which is the apparent source of illumination and models the actor's faces;

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BROADCAST ENGINEERING

(3) the back light which provides separation by rimming the actor with a light outline (this source is in current practice usually much too bright and is the greatest single problem child. Back light intensity should never be more than enough to make the light barely visible—otherwise it becomes an incorrect center of interest and destroys the entire balance of the scene); (4) modeling or accent lights whose names explain their function, and (5) the set lights which illuminate and model the scenery, provide atmosphere, time and mood. However, few of us stop to think that there is a second side to lighting—a half equally important as light itself...the shadows.

*The Problem
With Shadows*

Every light in the studio causes each item in its range of illumination to cast a shadow, and multiple shadows are both distracting and destructive to the picture composition. Cinematographers call such shadow patterns "dirty light." Therefore, a major portion of the job of lighting for electronic photography is washing out shadows or placing them where they contribute to composition rather than destroying it.

There are two general methods of controlling shadows. One is to place the spot lights in a position where the key shadow falls naturally and other, or secondary, shadows fall into inconspicuous places or below the frame line of the camera shot. More on this below. The second control method is through the use of spun glass diffusion filters on all flood lights. These filters, in effect, make the light sources so large that shadows are minimized or are so faint that other flood sources tend to wash them out.

Key lights, modeling lights, back lights and accent lights are usually some form of "spot light"—either a Fresnelite, an ellipsoidal unit, or an openfaced quartz focusing unit. Each of these luminaires is normally equipped with four-way

(Continued on page 78)

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Color Production

(Continued from page 77)

barn door shutters, or they should be so equipped, to permit sharp cutoff of the beam at top, bottom, or sides—thereby avoiding shadows from, or illumination of, unwanted areas. This ability to mask off unwanted light is a most important feature of any luminaire, as without having the ability to control light beams exactly it is impossible to handle unwanted shadows.

This cutoff control is very effective on lens type "spot light" units but requires some special attention in the case of the open-face quartz units. These latter units are very efficient in volume of light output but the barn doors with which they are equipped mask off only the main beam leaving the spill light uncontrolled. Because of the high brightness, this spill light is strong enough to cast sharp unwanted shadows.

This situation can be controlled and units made very practical by

either of two methods: (1) a metal "snoot" consisting of a plate cut to fit the color frame holder with a 4" diameter hole centered, with a 4" diameter by 6" long metal tube extending forward from the plate. This assembly should be entirely painted black to avoid any reflections and the result will be an excellent "spot light" of good intensity and effective beam control. (2) The second method is to cut a 4" diameter hole in a 14" x 14" piece of Masonite and hang this cutout about 12 inches in front of the open-faced "spot light" carefully lining up this Masonite "gobo" so that the main beam from the luminaire passes through the hole and the spill light is blocked off by the solid Masonite areas. This method is just as effective as the "snoot" but is a bit more difficult to set up and focus. (Incidentally, this same gobo technique can be used with lens spots when barn doors are unavailable.)

Placement Of Units

The placement of the "spot light" type units in relation to faces, products or backgrounds is a matter requiring very careful consideration on the part of the lighting practitioner for both light and shadow controls.

The key light must be placed slightly to one side of the center line of the shot—far enough to the side to model a face or other object by making one side a little brighter than the other, but not too far to the side lest the result is a sharp nose shadow on one cheek and a profile shadow on the opposite shoulder. Usually somewhere between 10° to 20° off center is best for faces or other heavily modeled objects.

Next, the matter of height of the luminaire position must be considered. The luminaire must be low enough to avoid heavy shadows under the eyebrows, yet high enough so that the shadow of the

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head falls well below the shoulder line behind the subject. (This important shadow placement is a key reason why subjects should never be too close to the background—you need special separation to help lose shadows, among other reasons.)

Back light must be placed low enough, or, if you prefer, at a flat angle so that it does not project steeply downward over the forehead adding unwanted facial highlights and shadows. Also, it should not project a sharp shadow of the subject onto the desk or floor where it is a distracting note in the picture composition. It is not necessary to have the back light directly behind the subject—it may be moved a bit to the side if that helps the shadow problem. We also point out again that the back light should never really be bright enough to cause a shadow so hard as to dominate a picture.

Modeling lights are less apt to cause serious shadow problems but they can do so. Disposing of these shadows is again a matter of horizontal or vertical movement of the luminaires.

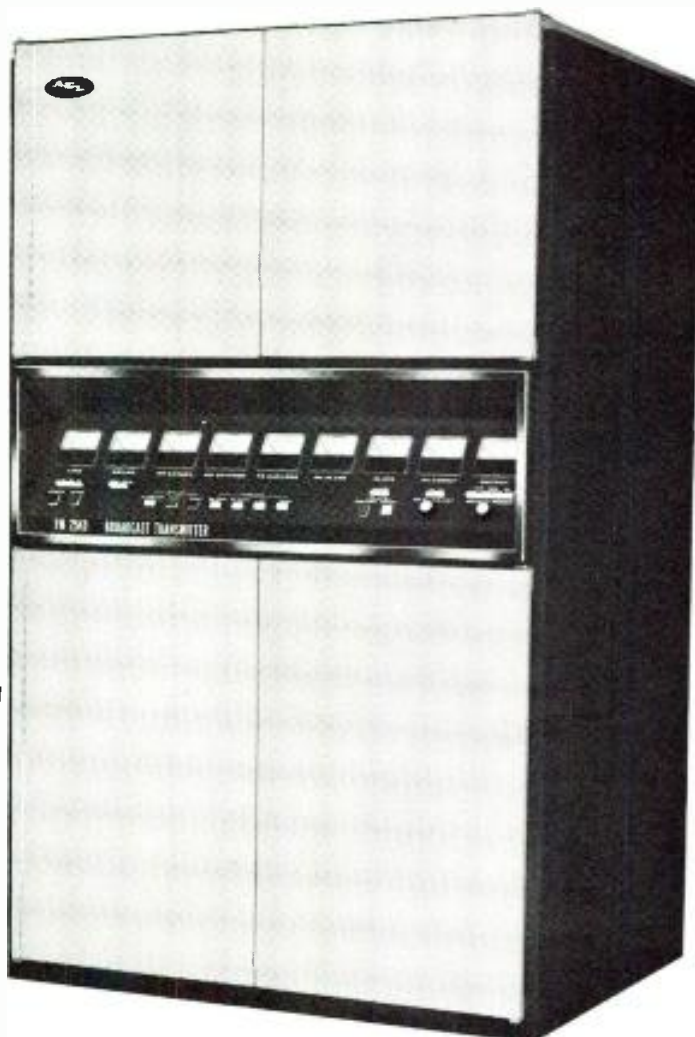
Fill or base light is normally supplied by scoops or quartz broads of some type, usually hung in front of the playing area about seven feet above the floor. As noted earlier, these should always have spun glass diffusion filters both to reduce shadow problems and for the comfort of the performers obliged to face them.

Summing Up

So, keeping in mind the objectives of using no more light than is required, at a color temperature (in studio) of around 3000 Kelvin, with luminaires carefully placed and masked to provide effective shadow patterns, and having all scenic, prop and costume elements controlled to a reflectance value range of 30 to 1, your air pictures will have a quality of which both Engineering and Production can be proud. ▲

Color Production Starts page 65

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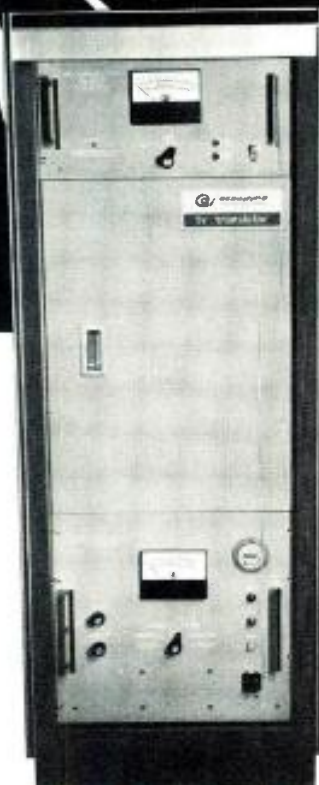


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SMPTE Survey Focuses On TV Picture Pattern

A recent survey of television viewers in and around Rochester has confirmed the results of a previous study showing that there are considerable variations in the area of the transmitted picture received on home sets.

Sponsored and conducted by the Rochester Section of the Society of Motion Picture and Television Engineers in conjunction with stations WHEC, WOKR, WROC and WXXI, the survey was made by broadcasting a special pattern and asking the public, through newspaper notices, to complete questionnaires indicating how much of the test pattern could be seen on their home receivers. About 6000 persons responded.

Preliminary tabulation of the results showed that while some viewers were seeing all or most of the picture transmitted, many others received considerably less.

According to Roland J. Zavada, Eastman Kodak Company, and a member of the special SMPTE Committee conducting the test, the results will help TV producers and photographers of TV programs and commercials determine how to compose the pictures that will appear on the home screen so that critical subject matter is not lost. Television set manufacturers and repairmen will also find the information useful.

A similar test conducted in New York City in 1957 showed that only about half the sets were receiving nearly all the picture transmitted. Others received less, some of them considerably less. This test was the basis of the existing "safe title area" and "safe action area" recommendations.

An oral presentation of the results of the new test were made by Zavada at the 6th SMPTE Winter Television Conference at the Sheraton-Dallas Hotel, Dallas, February 5. A complete technical report will be published subsequently in the SMPTE Journal.

Warning: Fire Protection Necessary

By David Hebert, CE, KXRO

Fire safety doesn't receive half the attention it deserves in many businesses. Neglect, carelessness, or just plain lack of knowledge on this subject can bring on disaster at any time. Many stations are simply inviting devastation by their inattention, and if things aren't "just right" where you are, then read on.

Types Of Fires

The National Fire Protection Association has established four classes of fires, which are grouped according to the type of material that is burning, and materials that are used to extinguish them. A class A fire involves ordinary combustibles such as wood, cloth,

paper, rubber and some plastics. Foliage could also be grouped as class A.

Class B fires involve flammable or combustible liquids, flammable gasses, greases and similar materials. Class C fires involve energized electrical equipment. And class D fires involve certain combustible metals.

For our purposes, we will disregard the class D fire, as combustible metals are ordinarily found in the laboratory.

Potential Fire Sources

Fire can start anywhere in the building: it is not limited to the transmitting apparatus. The best way of making your operation

immune to fire is just to keep a "clean house". Firemen agree that a dirty building invites destruction, and, similarly, "cleanliness is next to safeness".

A glance around your station might find piles of papers (old program logs, newspapers, rubble, sales pitches, or rate cards) which could fuel a burner. You might find dirty electric baseboard heaters, gas heaters that are close to combustible materials, a neglected oil furnace or over-fused electrical circuits.

Water-base paint is good insurance because of its natural fire resistance over lead-base or other types of paint.

(Continued on page 82)

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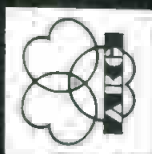
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Smoke, Smoke, Smoke

Radio people probably smoke more cigarettes-per-person than any other occupational group. Full ashtrays can become small torches if they are touched off with partially lit cigarettes or matches. In the normal pressure of business, almost any handy container becomes an ashtray, occasionally: coasters, vases, garbage cans, wastepaper baskets, and empty coffee cups. Have you ever carelessly dumped an ashtray containing a partially lit cigarette into a full wastepaper basket, only to observe a small stream of smoke moments later? Blushingly, almost all of us smokers would have to plead "guilty".

Almost every station has a "junk room". Boxes, flammable liquids and the like create spontaneous combustion. Be especially on the lookout for dirty rags, and opened containers of tape head cleaner, printing fluid, paint, and other solvents.

Fire marshalls concede that electrical fires can be started through improper fusing of equipment, poor maintenance, and bad installation. With overloaded light and power wiring, fires can ignite inside walls and within circuit breaker panels. Generally speaking, all your AC wiring should be done with at least number 12 gauge "Romex" or equivalent. AC power receptacles should be installed every six feet in service areas to avoid extension cords. When you are installing AC service, be sure to keep all screw-type connections tight and firm—this is no place for shoddy work, as loose connections can generate heat and burn terminals. You can check for overrated light switches by checking for heat when the switch is on.

The US penny has started elec-

trical fires. Don't start the habit of replacing screw-in fuses with a penny to get you by until you can buy another box of proper fuses.

The equipment should be properly ventilated, which falls into the area of improper installation. The instruction manual's advice on proper air flow should be followed to the letter. Unsafe switching procedures, defeat of interlocks on the transmitter, and exposed cables carrying more than 600 volts invite fires and FCC citations. A thorough maintenance program will keep the gear from producing large amounts of heat, and insure that lint and dust don't build up on heat-producing components.

Fighting the Fire

You can save lives and equipment by simply knowing what to do and how to do it if a blaze does erupt. The purchase of the proper types for extinguishing equipment will pay for itself many times in terms of protected property and peace of mind.

The most popular extinguisher for electrical fires is Carbon Dioxide or dry chemicals. Most prefer the CO₂ because there is no residue left on the surface it is used upon. The ten pound size is quite popular for the transmitter room, and it's easily mounted in a convenient location.

For the class A fire, water or soda-acid are your best friends. Simple Baking Soda is quite effective when fighting the class B fire. It would be wise to keep the proper type of extinguisher in the appropriate locations where the various types of fires are likely to occur. Avoid a water extinguisher in the control or transmitter room, and you wouldn't care to mount a CO₂ extinguisher in the store room.

The NFPA recommends at least one extinguisher for every 3,000 square feet of building floor space. Each extinguisher should be plainly marked and located not more than approximately 75 feet from normally occupied work areas. The personnel should be made cognizant of the location of each extinguisher and its proper use.

When purchasing fire extinguishers remember that some materials will work satisfactorily with more than one class of fire. By referring to the four classes of fires we discussed at the beginning of this article, you'll recall that extinguishers for class A fires will carry a green label, for class B fires will carry a red label, class C extinguishers will carry a blue label, and a yellow label will denote an extinguisher for a class D fire. Sometimes, a combination of these labels can be found upon the extinguisher, noting its varied usage. Again, the National Fire Protection Association recommends only the purchase of extinguishers labeled "UL" (Underwriters' Laboratories), "ULC" (Underwriters' Laboratories of Canada), or "FM" (Factory Mutual). These labels show that the extinguisher has been tested for reliability and effectiveness.

You can construct a "poor man's extinguisher" from a one-pound coffee can filled with baking soda. Fasten a lid to prevent the accumulation of moisture, label the entire can "For Fire, Only", and keep it in a handy location.

Getting Out

There should be at least two unblocked ground-level doors to provide quick exit from the typical medium size building. If windows are not too far from the ground level and large enough for adult passage, they can spell the difference between life and tragedy. You can retard the progression of fire by closing all doors behind you when leaving the building. The most important weapon against a fire is self-control; just keep calm.

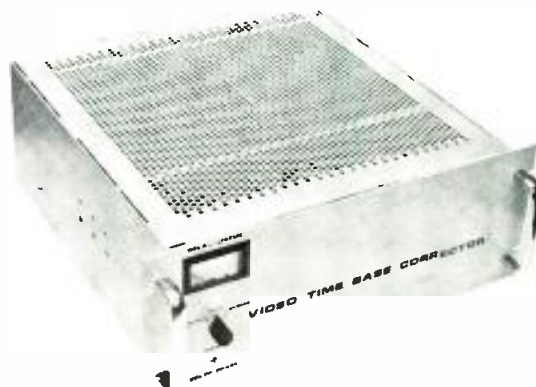
Insurance companies are known to offer lower premium to businesses that are fire safe. It's also nice to know that your operation is not a potential blaze and subsequent financial catastrophe. The author recommends a simple telephone call to your friendly neighborhood fire marshall for his suggestions and tips for your particular operation. Fire safety is everyone's business.

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108. CHRONO-LOG CORP.—

A new bulletin describing new features of the Series 30,000 IC Digital Clocks and Calendars used in telemetry and data handling systems which require real-time or elapsed time inputs is now available. A large variety of standardized options enable the system designer to select from over 3000 configurations at off-the-shelf prices. Among these options are: time ranges from day-of-year to resolutions of .0001 seconds; time bases from line frequency to internal crystal oscillators stable to 1 part in 10^7 per week; displays of BCD lamps or Nixies; choice of several power supply voltages, in-

cluding internal standby power; parallel and/or serial readouts; and remote displays. Other features include: TTL and DTL compatible output logic levels; gated and buffered outputs; pulse rate outputs from the count down chain. Front panel controls are provided for time setting. The clocks can also be remotely controlled.

109. CTS CORPORATION—

CTS Corporation's six-page industrial distributor product line catalog describes the capabilities of 47 types of CTS carbon, wirewound and cermet trimmers/potentiometers and 212 series rotary selector switches. Distributor quantity prices are also included.

111. DIALIGHT CORPORATION

—Dialight's new Bulletin R05031 details their new series 739 solid state readout assembly. The 739 is an assembly with character heights of 0.625 inch that can be made with 1 to 10 digits. Each character is made from high efficiency discrete gallium phosphide diodes arranged in a seven-segment format. Current passing through the diodes, generates a bright, highly legible red character with the lowest power consumption for a character this size. The contrast ratio between the illuminated and non-illuminated segment is further enhanced by a red non-glare window. Each character is mounted on its

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112. THE FINNEY COMPANY—

Detailed architectural engineering specifications for Finco's completely new line of Master Antenna Television Systems products are presented in a specially designed hard cover three ring binder catalog. The new line of MATV equipment trademarked the "Greenline," is presented in detailed specification sheets which picture each product and give detailed engineering and electrical specifications, and an Architect's Description. In addition to the individual product detail sheets, supplemental materials, such as an Architectural Engineering Specifications outline, together with gummed backed system component descriptions are provided for ease in making project submittals. The individual product pages are also made available for detailing project submittals. A series of "Technical Aids" covering such subjects as Signal to Noise Ratio, Eliminating Spurious Signals in Systems, Cross Modulation, and a number of pertinent conversion tables are provided. Also, Finco's manual on designing MATV systems is included.

113. GENERAL AUTOMATION, INC.—A brochure describing the three new processors of the General Automation SPC-12 Family of Industrial Minicomputers is now available. The six-page, two-color illustrated brochure highlights the outstanding features and capabilities of the new SPC-12/20, SPC-1/15, and SPC-12/10 Industrial Minicomputers. These three new computers can execute stored programs in excess of 230,000 instructions per second, and can input and output data in excess of 460,000 words per second. The organiza-

tions of the SPC-12 Family allows a more efficient use of memory than in any minicomputer in its class. 4,096 words can be directly addressed, almost eliminating the necessity of paging. It provides a 12-bit parallel adder; six addressing modes; eight 12-bit hardware registers, including an accumulator and three index/accumulator registers; 52 basic commands; a processor-controlled priority interrupt system; a console lock, and a teletypewriter interface.

114. HEWLETT PACKARD—The use of IMPATT diodes for microwave power generation and amplification is discussed in a new 32-page application note (Hewlett-Packard AN 935). The new note acquaints the reader with principles of operation and construction of IMPATT diodes and describes how the diodes are designed into oscillator and amplifier circuits. Several practical IMPATT diode circuit designs are described. The

(Continued on page 86)



TV pac
total pollution
abatement package
for the TV industry

TV pac regenerates processing chemicals and chemically destructs toxic effluents resulting from news film processing. This new pollution abatement package is the first commercial pollution control system based on the new W. R. Grace ozone generator. It is an economical, compact, air-cooled, low maintenance generating unit having all the features of the 300 lb./day Grace ozone generator.

For more information on TV pac, or Grace ozone generators, call 1 (301) 727-3900 or write Manager, Pollution Control Systems, Dept. 0032, W. R. Grace & Co., Davison Chemical Div., Baltimore, Maryland 21203.



Circle Number 54 on Reader Reply Card

AUDIO SWEEP GENERATOR

\$108.09

Available as Kit \$84.85



Continuously sweeps the entire audio range ELECTRONICALLY!

Or use it as a function generator.

SPECIFICATIONS & FEATURES

Functions: sine, square, triangle, positive and negative sawtooth with variable slope control

Controls: range, frequency, functions, attenuator, sweep speed (VCO frequency), VCO amplitude

Frequency Range: 0.02 Hz to 20 KHz.—all functions

Dial Accuracy: better than 2% linear

Power: 115 vac, 50/60 Hz

Output Impedance: 50 OHMS

Output Voltage: 0–10 volts, peak-peak

Sweep Speed: variable 1/25 sec.–10 sec.

Sweep Width: continuously variable
maximum: 20Hz–20KHz.
minimum: zero!

Waveform Distortion: less than 1% (sine, square, triangle)

Frequency Response: 20Hz–20KHz ± 1 db

Frequency Stability: 0.1% per °C (0–50° C)

Square Wave Rise Time: less than 80 ns.

Triangle Linearity Error: less than 0.5%

VCO Access: use the ASG-200 to trigger other equipment, or use other outputs to trigger the ASG-200!

Added Features: smooth continuous sweep, no external inputs needed, short-circuit proof!

Dimensions: 4 1/4 in. high, 8 1/4 in. wide,
6 1/2 in. deep

Weight: 48 ounces

Purchase price includes factory assembly and testing, two year warranty and a ten day money-back guarantee if not satisfied for any reason!



PHASE CORPORATION

315A Boston Ave., Medford, Mass. 02155
617-395-4401 DEPT. G

SHIP ORDER TO _____

() Check Enclosed For \$ _____

() Charge My Master Charge # _____

() Charge My BankAmericard # _____

() Ship C.O.D. _____

Mass. Residents Add 3% Sales Tax _____

Pre-paid shipping on all cash orders

3/72

Circle Number 43 on Reader Reply Card

(Continued from page 85)

note is liberally illustrated with electrical and mechanical diagrams, and with graphs that describe circuit performance. An extensive bibliography is included.

115. HICKOK ELECTRICAL INST. CO.—The newly published four-page brochure, Hickok oscilloscopes, contains complete descriptions, specifications and prices for the Models 5000A and 5002A. The 5002A is a dual channel oscilloscope, with bandwidth to 25 MHz and simplified, stable triggering to beyond 50 MHz. The two Hickok oscilloscopes offer high performance, compact size, rugged construction at an economical price. Options and accessories are also included in the brochure.

116. SEMICONDUCTOR DIVISION—A four-color brochure, illustrating the step by step use of Circuit Zaps is now available from International Rectifier Corp. Circuit Zaps are copper component patterns, pads and conductor paths to enable the hobbyist, laboratory technician or design engineer to create prototype or customized circuit boards without the use of chemicals, photoprinting, etching and other costly steps associated with prototype construction. The new literature graphically details production of a board in eight steps, using a punched printed circuit board. IR Circuit Zap patterns are designed for use with .100-in. center pre-punched boards. The instructional brochure details the specifications of each pattern, methods of designing a board when low frequency or RF testing is involved, and techniques for repairing conventional boards.

117. KALART VICTOR CORP.—A new 28-page catalog that describes its full line of audio-visual and educational television products is now available. Featured is the new KALAVOX Sound Slide System that utilizes a new concept of Audio Slide Cassette that combines picture and sound in a single unit. KALAVOX sits atop a Carousel or Ektagraphic slide projector to give voice to slide shows—to let each individual slide speak for itself. Model 392 is for record and

solves all five common connector problems



SWITCHCRAFT



AUDIO CONNECTORS SIMPLIFY YOUR JOB

Sure, all connectors "work" — at least when they're new, but only Switchcraft's time-and-trouble-saving design solves all these problems—at NO extra cost:

1. TOUGH TO WIRE?

No! Q-G connectors' easy-open design and larger, uniquely designed solder cups cut wiring time in half — by actual test.

2. GROUNDING TROUBLES?

Never! Exclusive extra "Ground Terminal" electrically integral with shell automatically engages the "Ground Contact" of the mating shell.

3. HIGH IMPEDANCE NOISE?

Forget it! Exclusive thermosetting plastic inserts virtually eliminate noise problems in high impedance circuits.

4. SEARCHING FOR SCREWS?

Nope! "Captive Design" insert screw for fast, simple assembly and disassembly... can't drop out and get lost.

5. OLD-HAT STYLING?

Hardly! A compact, logical, modern departure from the old fashioned bulky-and-boxy styling associated with conventional connectors.

And, Q-G plugs and receptacles mate with all other quality connectors with similar insert arrangements and from 3 to 6 contacts. Mating chart and cross-reference guide are yours for the asking.

WRITE FOR CATALOG C-502B, or See Your Local Switchcraft Authorized Industrial Distributor for Immediate Delivery at Factory Prices.

SWITCHCRAFT®

5535 Elston Ave., Chicago, Ill. 60630

U.S. Patent No. 3,219,961

Circle Number 131 on Reader Reply Card

play-back only. The full line of Kalart Victor 16mm sound motion picture projectors is covered, complete with detailed specifications. Projectors for regular and daylight projection, repeater models, self-contained recording and stop-motion models, as well as projectors synchronized for TV camera pick-up are illustrated and detailed with more than 50 separate models listed as available.

118. McMARTIN INDUSTRIES, INC.—McMartin Industries has completely revised and updated the full catalog for Engineered Sound Systems which are available through over 250 franchised sound contractors throughout the United States.

119. MICROWAVE ASSOCIATES—A six-page technical and color brochure describing the MA-12G total solid-state remodulating Microwave radio rated at 1.5 Watts (Max.) in 10.7 to 11.7 GHz Common Carrier Band and 1 Watt (Max.) in the 12.2 to 12.7 GHz Business Radio Band and 12.7 to 13.2 GHz CATV and Broadcast Bands is now available. Technical performance ratings and specifications for video, FDM Message and PCM are given. Applications information for Common Carrier, Business Radio, Educational, Municipal, Medical, CATV and Broadcast is included.

120. NATIONAL SEMICONDUCTOR CORP.—A new 130-page Transistor Catalog is now available. The catalog provides complete data on National's entire transistor line including NPN and PNP small signal transistors, Field Effect Transistors, and Pro-electron types. In addition to specifications, the catalog provides Process No. design/application data and test limit information. A glossary of terms and package outlines are also provided.

121. PHONPLEX CORP.—Phonplex Corporation's Solid State Voice Response System, the only voice response system to electronically store "phonemes" (the smallest parts of speech) rather than putting entire words on bulky or short-lived tape, is detailed in a new

(Continued on page 88)



Spotmaster

Multi-Cartridge Decks Grow with Your Needs!



1 × 303C = 3 decks 2 × 303C = 6 decks 3 × 303C = 9 decks

1 × 305C = 5 decks 2 × 305C = 10 decks 3 × 305C = 15 decks

Mix and match these new SPOTMASTER multi-cart decks. They're designed to meet your needs today, and grow with them tomorrow.

Look at our 303C and 305C Mini-Decks. Space-saving combinations of 3, 5, 6, 9, 10 and 15 decks accept type A carts. Slightly wider is our Mini-603C (not shown), accepting both type A and B carts, three decks to a unit, six decks to a compact rack.

All these mini-giants feature plug-in, modular, solid state construction with separate audio amplifiers, selectable output level (−10, 0, +8), logic switching, and many more features. They're ideal for manual operation or programmed automation systems.

Save still more money with our time-tested Five-Spot and Ten-Spot multi-cart players. You can even get plug-in record modules. Write or call for complete information:

BROADCAST ELECTRONICS, INC.

— A Filmways Company —

8810 Brookville Road, Silver Spring, Maryland 20910 • (301) 588-4983

\$50⁰⁰

SPOTMASTER DISCOUNT CERTIFICATE

\$50⁰⁰

Limited time offer—Get any Spotmaster tape cartridge machine or system for \$50.00 off the regular price!

SAVE THIS VALUABLE CERTIFICATE AND SEND WITH ORDER

Offer applies to Spotmaster Ten/70, 500 and 400 series and all multi-cart players including new 300 and 600 Mini-Series, Five-Spot and Ten-Spot. Limit: One Discount Certificate per order.

Can be redeemed through local authorized distributor; or call or write for catalog and price list: BROADCAST ELECTRONICS, INC., 8810 Brookville Road, Silver Spring, Maryland 20910 • (301) 588-4983

Offer expires April 30, 1972

BE-3-14

(Continued from page 87)

16-page brochure now available. Use of the ordinary telephone as a means of immediately interrogating and receiving information from a voice response interfaced computer bank for numerous applications such as retailing, education, banking and finance, insurance, manufacturing, medicine, stock ex-

**THE PRICE RANGE
for broadcast automation is
\$8500 to \$50000**

COMPLETE!

see
"the makers of the carousel"



**systems
marketing
corporation**

BLOOMINGTON, ILL.

BOOTH #220

Circle Number 57 on Reader Reply Card

changes, common carrier systems and other verbal reporting uses, is explained. The many advantages of voice response over print-outs, CRT and other information retrieval terminals are also discussed.

123. RF COMMUNICATIONS INC.—A complete line of frequency synthesizers and RF power amplifiers for laboratory, test systems, and communications use are illustrated and described in the eight-page 1971 Condensed Catalog. Included in the brochure are general information and specification sheets for the company's synthesized signal generators, frequency synthesizer, broadband and tunable amplifiers, and amplifier modules.

124. RHG ELECTRONICS LABORATORY, INC.—A new eight-page technical information bulletin describing their ultra-precision matched logarithmic IF amplifiers is now available. Known as Log Amp Bulletin LA 201, it details the problems, considerations, circuit concepts, test methods and computer checkout procedure em-

ployed to establish the linearity, stability and matching of their precision log IF amplifiers. Block diagrams, photos and scope displays are included along with a listing of standard log amplifiers.

125. TELEDYNE SEMICONDUCTOR—A new Digital Application Note #1, showing how the circuit designer faced with solving logic noise problems can quickly overcome his problems with a few simple design techniques, is now available. The Application Note discusses industrial applications of HNIL to replace switches, relays, latching relays, stepping relays, and mechanical counters. The Teledyne HNIL family operation is in the 12 to 15 Volt range with a guaranteed noise immunity of 3.5 Volts. This obvious advantage over conventional TTL logic removes the necessity for regulated power sources and can drive indicator lights and relays directly.

**Send Your Industry News
To Broadcast Engineering
For Better Coverage**

ELECTION '72



Captions for election pickups, tabular display of election slates, and horizontal crawl over regularly scheduled programs for flash election results.

Immediate title inserts, simultaneous two-channel display, four-page display memory, and simple, convenient audio tape storage.

**Large, readable characters.
Model D-2400—only \$5,000.**

For demonstration, write or call

DATAVISION, INC.

**2351 Shady Grove Road, Rockville, Maryland 20850
(301) 948-0460**

Circle Number 58 on Reader Reply Card

Increase Head Life with ISOLAIR New Clean Air Unit by LIBERTY

This unit provides a laminar down flow of the cleanest possible air at the critical video head area. Excessive wear and damage by airborne contaminants are virtually eliminated, extending head life by 100% or more and insuring better overall VTR performance, as well as saving time and money. The unit is suspended from the ceiling thus requiring no additional floor space. It is easily installed and maintained and meets Federal Standard 209a, Class 100.

An additional positive effect is the cumulative result of the constant filtering of air from the entire room, so that during an extended period of use, the level of contaminants in the surrounding environment is progressively reduced



Liberty Industries has the capability for providing complete clean air environments for any size or type of operation. Our sales engineers are ready to help you.

Call or write.



LIBERTY INDUSTRIES, INC.

**598 Deming Road, Berlin, Conn. 06037
Telephone (203) 828-6361**

Circle Number 59 on Reader Reply Card

EVALUATE VIDEO TAPES

Off-line

using the field-proven

RECORTEC

VIDEO TAPE EVALUATOR



- Display total number of edge damages.
- Display total number of surface defects.
- Display total tape time.
- Tape fully cleaned, uniformly packed and degaussed.

Longitudinal testing of video tapes at high speed makes it possible to evaluate and re-wind a one-hour reel in 10 minutes. Tape edge damage which can cause control signal variations and audio dropouts is readily identified. Detected video dropouts exhibit excellent correlation with results obtained by evaluating the same tape on a VTR.

If your operation requires testing of tapes, this equipment will quickly pay for itself by keeping your valuable VTR for more productive applications. Additional savings can be obtained by rehabilitating tapes and reducing VTR head wear.

Incidentally, it can also be used as a cleaner/winder for tapes with recorded program.

Write or call us for details. Ph. (415) 961-8821

RECORTEC, INC.

160 East Dana St., Mountain View, California 94040

OTP Director Attacks The Fairness Doctrine

The problems facing broadcasters today do not belong to broadcasters alone. In a speech last month before the Colorado Association of Broadcasters, OTP Director Clay T. Whitehead pointed out that these problems are equally those of the advertiser. The following are excerpts from that address.

From all the reports I've seen, last year was not a great financial success for broadcasting, but it was not as bad as some expected when a future without cigarette billings seemed to be a very bleak future indeed. That's the business side; nothing very exciting in 1971, but the economic prospects look good for the coming year. On the government, or regulatory side, broadcasters were beset by threatening developments at the FCC and in the courts: license renewals, fairness and access, cable television, spectrum reallocations, and children's programming among other issues. But serious as these developments are, they are being over-shadowed by a new problem.

The problem I refer to is the regulation of broadcast advertising and the conditions the advertiser finds when he chooses the broadcast media for his messages. Try this list of issues: advertising and the Fairness Doctrine; mandatory access for editorial ads; advertising in children's programs; licensee responsibility as to false and misleading advertising; campaign spending limits on broadcast ads and political advertising in general; ads for certain types of products; and counter advertising. The nature of commercial broadcasting depends heavily on how these and other similar issues are resolved. What is commonly called "free" broadcasting is actually advertiser-supported broadcasting, and the regulatory framework for broadcast advertising deals with the economic core of our private enterprise broadcast system. Similarly, advertising is now so dependent on broadcasting that the issues faced by the advertising industry have been transformed into broadcast-advertising issues.

Of course, there were ads before there was broadcasting and, of course, many of the ads in the pre-broadcasting days were crude deceptions. Deceptive and misleading advertising is still an important issue, but now the overall issue is much broader than the traditional concerns about questionable advertising. If it were only a case of advertising taste or excessive "puffery," I think most people would take advertising with the proverbial grain of salt that one relied upon in listening to the "medicine men" at country fairs or reading the back pages of comic books and other popular literature. But now broadcasting, especially TV, has raised the advertisement to a popular art form. TV advertising is not only pervasive, it is unavoidable.

In these circumstances, it seems that advertising itself has become an issue. Some people tend to view

CLEAN AND WIND TAPES

Off-line

using the field-proven

RECORTEC VIDEO TAPE CONDITIONER



Our transport uses a vacuum chamber for gentle tape handling, combined with vacuum grid cleaners to avoid scratching or cutting valuable tapes.

- Extends tape and head life by removing loose oxide and debris from tape surfaces.
- Improves quality of video recording due to reduced dropouts.
- Minimizes tape damage by improving the tape pack.
- Increases VTR utilization.
- Options such as erase, splice count, audio playback, etc., are also available.

If you take your car in for preventative maintenance regularly, why not do the same for your valuable tapes to extend their useful life?

There are many users here and abroad. This equipment pays for itself in less than one year. Let us show you how much you can save in your tape operations.

Write or call us for details. Ph. (415) 961-8821

RECORTEC, INC.

160 East Dana St., Mountain View, California 94040

it as the means by which an insidious business-advertising complex manipulates the consumer and leads public opinion to goals that are broader than simply purchasing the products being advertised. Some feel that what is being sold the American people is a consumption-oriented way of life. This becomes a political issue that is a fit subject for government redress—a remedy in addition to the traditional controls on false and misleading advertising.

I think that some of these broader concerns about TV advertising are now motivating the Federal Trade Commission. The FTC filed comments in the FCC's Fairness Doctrine inquiry, proposing that there be compulsory counter advertising for almost all broadcast ads. The FTC's counter advertising proposal would provide an opportunity for any person or group to present views contrary to those raised explicitly and implicitly by product ads. In the Trade Commission's own words, counter advertising "would be an appropriate means of overcoming some of the shortcomings of the FTC's regulatory tools, and a suitable approach to some of the present failings of advertising which are now beyond the FTC's capacity." The Trade Commission wants to shape the Fairness Doctrine into a new tool of advertising regulation and thereby expand the Doctrine's already chaotic enforcement mechanism far beyond what was originally intended and what is now appropriate.

The Trade Commission also suggested that broadcasters should have an affirmative obligation to provide a substantial amount of free air time for anyone wishing to respond to product ads. This goes beyond the requirement in the *BEM* case that broadcasters must allow persons or groups to purchase time. In a business sense, that is not too intrusive on the broadcasters' operations, and some right to purchase time for the expression of views on issues would serve an important purpose. But a requirement to provide "free" time in response to paid advertising time would have all the undesirable features of any market in which some people pay and some do not. It is, in any event, misleading to call this free time. There would be a hidden subsidy and the public would end up paying for both advertising and counter advertising messages.

Even if there were no problems with a broad free time requirement, we would be critical of the FTC for suggesting that "Fairness" responses be required for ads involving disputes within the scientific community and ads that are silent as to the negative aspects of products.

The FTC, however, doesn't think that these regulatory tools are effective enough or thinks that they are too troublesome to apply. It is disturbing, however, that the agency charged with overseeing the content of advertising in all media has stated that the FCC is better able to achieve the Trade Commission's regulatory goals for the broadcast media. Of course, the Trade Commission would like to bring the FCC into the process and by-pass the difficult job of making factual determinations concerning advertising deception.

Circle Number 198 on Reader Reply Card

New Products

(Continued from page 36)

Sound Synchronized Projector

Bell & Howell is introducing a new movie projector which combines the ease of cassette film loading with the Filmosound 8® system of producing sound-synchronized movies.

The new instant loading model 478Z projector utilizes Bell & Howell Auto 8® movie cassettes — the convenient system to show, retrieve, index and store super 8 or regular 8 movies which was first introduced by the company a year ago. Lip-synchronous sound are obtained when the new projector is used in connection with the Filmosound 8 system, a unique system marketed by the company in a variety of models since 1968.

The Bell & Howell sound system uses conventional super 8 film and features three basic pieces of equipment — camera, sound-synchronizing portable cassette tape recorder, and projector. Words and sounds of movie subjects are recorded to match precisely with every picture taken by the camera. During projection, every word and sound played back on the tape recorder is matched with every movement on the screen. Each of the three units can also be used independently of the system.

Circle Number 158 on Reader Reply Card

Camera Sun Gun

GTE Sylvania will be showing the new Sun Gun SG-65 EXG at the NAB Convention. This is a new lightweight higher performance model of the popular SG-65 used so successfully by TV news departments for a number of years. The SG-65 EXG has a lighting head weighing 1½ pounds as compared to the old unit at 2½ pounds. It uses a 250 Watt lamp that provides the lighting performance of the old unit with a 350 Watt lamp. As a result of the lower wattage requirement, the effective shooting time is extended to thirty minutes when used on a fully charged SG-65 EXFA 30 Volt battery pack.

Circle Number 159 on Reader Reply Card

(Continued on page 90)

another new mcmartin console "FIVE"channel mixer



B-501 Mono Console \$750.00

B-502 Stereo Console \$1,050.00

McMartin has designed a series of 5-mixer consoles for production or subcontrol room application . . . with enough flexibility to serve as the main control console in smaller station operations.

Two models are available: The B-501 mono and the B-502 stereo version.

Plug-in card design for all program circuits permits full latitude in assignment of ten input sources to the five mixing channels.

Professional performance . . . human engineering . . . attractive design . . . combine to offer the user the ultimate in monaural and stereo five-mixer consoles.

For complete information, contact: Director of Sales (402) 342-2753

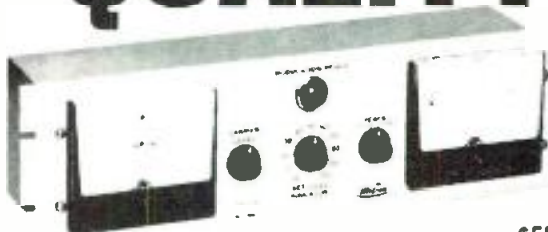
McMartin

• 605 north thirteenth street • omaha, nebraska • 68102 •
Circle Number 56 on Reader Reply Card

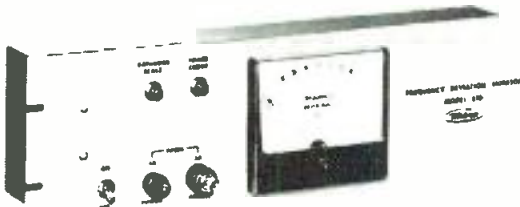
QUALITY



AM BROADCAST MONITORS



506 B-1 Modulation Monitor \$550



510 Frequency Monitor \$795



520 Frequency Monitor \$995

ALL SOLID STATE DESIGN

- All models FCC type approved
- Compact — 5¼" high on a standard 19" rack
- Excellent stability
- Highest quality workmanship and components used throughout
- Designed and manufactured for years of reliable dependable service
- Remote metering available — models 506 B-1 and 510
- Low cost — Fast delivery



METRON INSTRUMENTS, INC.

1051 South Platte River Drive Denver, Colo. 80223
(303) 744-1791 • TELEX 04-5729

Circle Number 62 on Reader Reply Card

The ROH 200 Series BROADCAST AUDIO EQUIPMENT



A modern, flexible solution to many of your present audio needs.

This quality equipment has been designed to provide optimum performance at the most reasonable price. All ROH equipment is conservatively rated and unconditionally warranted for one year.

MODEL		PRICE
201	10 module card tray.....	\$170.00
202	10 module card tray; accepts Model 205 P.S.....	\$190.00
203	3 module card tray.....	\$120.00
	1 amp power supply.....	\$130.00
204	2 module card tray with	
	1 amp power supply.....	\$150.00
205	2 amp 24V DC power supply module.....	\$ 70.00
210	10 watt monitor amplifier.....	\$ 70.00
211	1 x 5 audio distribution amplifier.....	\$ 70.00
212	1 x 5 audio distribution amplifier with output transformers.....	\$120.00
213	12 x 1 active combining network.....	\$ 55.00
214	Preamplifier, 60 db gain.....	\$ 65.00
215	Program amplifier with transformer output.....	\$ 65.00

ROH CORP.

3161 Maple Drive, N.E.
Atlanta, Georgia 30305 • 404/261-1429

Circle Number 60 on Reader Reply Card

(Continued from page 89)

Audio-Video Routing Switcher

The new CDL VS-900 is the latest word in 4th generation all solid-state audio/video switching systems for broadcasting, surveillance or instructional uses. It incorporates many advances in control and switching technology and sets high standards in performance, reliability and economy, according to spokesmen at Central Dynamics.

- High performance standards through newly-developed linear integrated circuits.
- Flexible, programmable control and tally through state-of-the-art digital circuitry.
- Fully interchangeable cards without performance compromises.
- Completely solid-state audio systems.
- Full selection of economical standard systems—VS-900 has eliminated costly customization of hardware. VS-900 is cost effective over the full range of 10 x 10 up to 300 x 300 inputs

and outputs.

- Program grade, vertical-interval switching on all buses.

The CDL Series 900 is modular in concept, and can be expanded at will. The basic building block is an array of ten input, single output switches, each handling ten signals to one destination. Matrices are formed from groups of ten switches, thus providing one hundred cross-points in the basic system sub-assembly. You can buy one matrix with ten or even less cards now, and add to it any time later.

Circle Number 160 on Reader Reply Card

Modular Cart Series

Sparta Electronic Corporation will introduce the Century Series, a completely new modular line of ultra-compact tape cartridge equipment. Record and playback modules are the same size; three will mount side by side in standard racks. Single and multiple desk models are also available.

Features include "touchbar" operation, built-in audio switcher, electronics on a single plug-in printed circuit board, three audio

how to Deliver an FM signal with

SOCK!

It's easy to do. Not too expensive either. Good stereo demands low VSWR. Our circular polarized "Penetrator" antenna guarantees a VSWR of 1.1 to 1 before it's even mounted. And after installation it may be field trimmed to reproduce a VSWR value of 1.08 to 1. This provides a superior stereo signal.

The "Penetrator" will also increase your audience by penetrating difficult areas and by reaching more car receivers and small portables. It's the only circularized FM antenna with variable horizontal-to-vertical gain ratios. It delivers a signal with sock!



JAMPRO ANTENNA COMPANY

A DIVISION OF COMPUTER EQUIPMENT CORPORATION

PHONE (916) 383-1177

6939 Power Inn Road • Sacramento, CA 95828

J
A
M
P
R
O

Circle Number 64 on Reader Reply Card

inputs to record amplifier, and optional secondary tone. Mono playback can be field-converted to stereo. Replacement circuit boards are available at a nominal exchange price after the one-year warranty period.

Circle Number 161 on Reader Reply Card

Battery Operated Remote Microphone

Dyma Engineering, Inc. will introduce their broadcast quality dynamic microphone with self contained, solid state amplifier and



power supply. The compact and rugged omnidirectional TRAVELER and its cord are all you need. Uses low cost, universally available batteries, built-in windscreen, frequency response tailored for remote use. It is economical for permanent use at regular remotes. Ideal for back-up equipment or emergency broadcasting from transmitter.

Optional: Telephone connector unit available.

Circle Number 162 on Reader Reply Card

Symbol Generator

The Olympic games at Sapporo, Japan, which NBC is televising internationally starting February 1, mark the debut of some new technical "magic" in television.

TELESTRATOR Industries Incorporated announced that its first TELESTRATOR* Model 420 Symbol Generator has been purchased by NBC and is installed ready for action at the games.

With the TELESTRATOR Symbol Generator, a sports commentator can instantly insert electronically-created arrows, crosses, asterisks, ski flags, the American flag, or even the NBC logo into live action video or during instant replay. The commentator merely points a pencil-like probe at the place in the picture where he wants

the symbol and it appears instantaneously. Symbols are selected by push buttons and can be rotated, changed in size, repeated or moved in a scene at will. As many as eighteen custom-designed symbols can be employed singly or in any combination.

Circle Number 163 on Reader Reply Card

Chroma Keyer

CBS Labs will display their NTSC Chroma Keyer Model 7000 at the NAB. The TV Broadcaster can now chroma key from any composite video signal with maximum effectiveness.

The unit uses a unique comb-filter to separate luminance and chrominance, removing annoying noise and "color crawl" from the key signal. Inserts can be keyed from previously recorded video tape, from any network scene, or at the output of the composite program switcher. Completely eliminates cumbersome RBG keying problems.

Circle Number 164 on Reader Reply Card

(Continued on page 92)

STEP-TYPE CONTROLS FOR BROADCAST CONSOLES



These reliable attenuators are available for new or replacement requirements. Solid silver-alloy contacts and switching mechanism assure low noise performance. Split dust cover is standard.

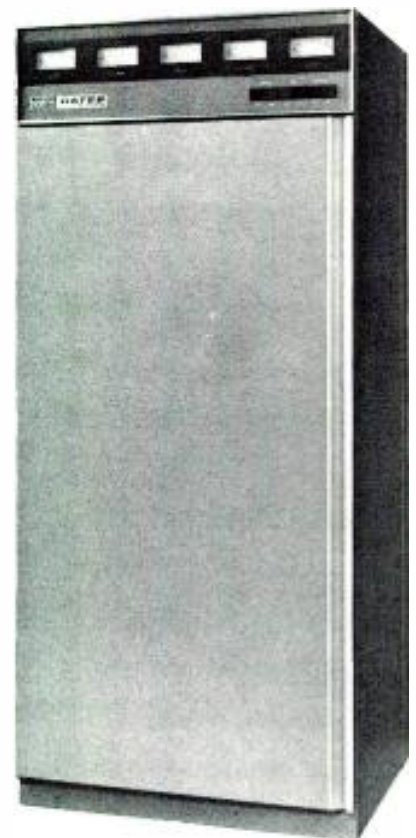
SEND FOR YOUR 1972 CATALOG/HANDBOOK ON AUDIO AND R.F. COMPONENTS AND DEVICES.

Shallco

SHALLCO, INC. HWY 301 SOUTH
P. O. BOX 1089 SMITHFIELD, N. C. 27577
PHONE 919/934-3135 • TWX 510/939-1455

Circle Number 45 on Reader Reply Card

Here's today's newest 1 kW AM transmitter GATES' BC-1H



Gates' new BC-1H 1000 watt AM transmitter features reliable, long life 833A tubes, solid state oscillator, instantaneous power cut back to 250 watts, and 120% positive peak modulation capabilities. It will be operating reliably at your station for years to come. Get the details on tomorrow's transmitter today. Write Gates Radio Company, 123 Hampshire Street, Quincy, Illinois 62301.



Circle Number 65 on Reader Reply Card

(Continued from page 91)

Low Cost VI

Production Switcher

DYNAIR Electronics, Inc., will show a new low-cost vertical-interval production switcher. The VS-153A is a remote-controlled

mount in the 7-inch arm of inexpensive consoles. The electronics unit is remoted by means of a multi-conductor DC control cable.

Special effects capabilities include inserts from each of the four corners, full horizontal and vertical

The KCP-40A features include: camera with viewfind options; thin camera cable; camera line-up is possible without scope; grid-pattern generator and level measuring sets are built in; RGB or NTSC encoded output signals; two automatic control circuits for adapting diaphragm and amplifiers to varying light conditions; voltages stabilized by way of Triac-type automatic control; and automatic equalization of cable length for pulse supply.

Circle Number 166 on Reader Reply Card



unit with a full color programming capability. Ideal for the more sophisticated small studio, it has provisions for eleven video inputs with basic single re-entry effects and mixing. The control panel is only 3½ inches thick, allowing it to

wipes and internal or external keying and matting. The inserts can be expanded horizontally, vertically and diagonally. Illuminating push buttons and automatic preview are also provided.

Circle Number 165 on Reader Reply Card

CCTV Color Camera

Robert Bosch Corp. will introduce their Fernseh KCP-40A color camera. The Plumbicon color camera chain KCP-40A has been

designed for live operation and meets the stringent requirements of closed-circuit television. Under certain conditions it may also be used in broadcast studio applications.

Solid State Control, Switching Equipment

Schafer Electronics has developed and will display a new series of all solid state control and switching equipment to provide economical and flexible broadcast automation systems. The Model 900 Control Unit is arranged to work with Model 901, 902 or 903 Memory Units, the choice being dictated by the flexibility and memory capability desired by the user.

A typical control and memory system will occupy only 14" of rack space as shown in the attached



Don't lose your head

Loose oxide dust can do in a tape head all too soon. It's rough on tape, too.

MS-200 Magnetic Tape Head Cleaner is an efficient antidote for oxide dust. Even the valve on the can is designed to deliver a wet spray to flush away oxide build-up on heads and stray particles embedded in tape. Can be applied while tape is running.



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I intend to use MS-200 on: _____

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Company _____

Address _____

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Circle Number 84 on Reader Reply Card

photograph. The Model 900 Control Unit contains interface circuitry for 16 audio sources for any reel-to-reel or reel-to-cartridge equipment, and includes stereo line



is currently on-the-air and which is next to play.

The Model 902 Switch Memory Unit or the Model 903 Keyboard Entry Memory Unit is used in conjunction with the Model 900 Control Unit for system programming. Both feature a clock with digital readout. The Model 902 Switch Unit provides sixty memory positions plus twelve clock oriented positions; any one of which can be used to insert a single event or a cluster, jump, skip to another event, or to restore to a position in the original program format.

The Model 903 Keyboard Memory Unit is capable of inserting a single event or a cluster of events to start at any selected minute during a days programming. Network join and leave, with control to the second, is also provided. The Model 901 Manual Control Unit can be used in conjunction with the 902 or 903 Memory Units so that the system can be taken over at any time for special news event or live programming.

Circle Number 167 on Reader Reply Card

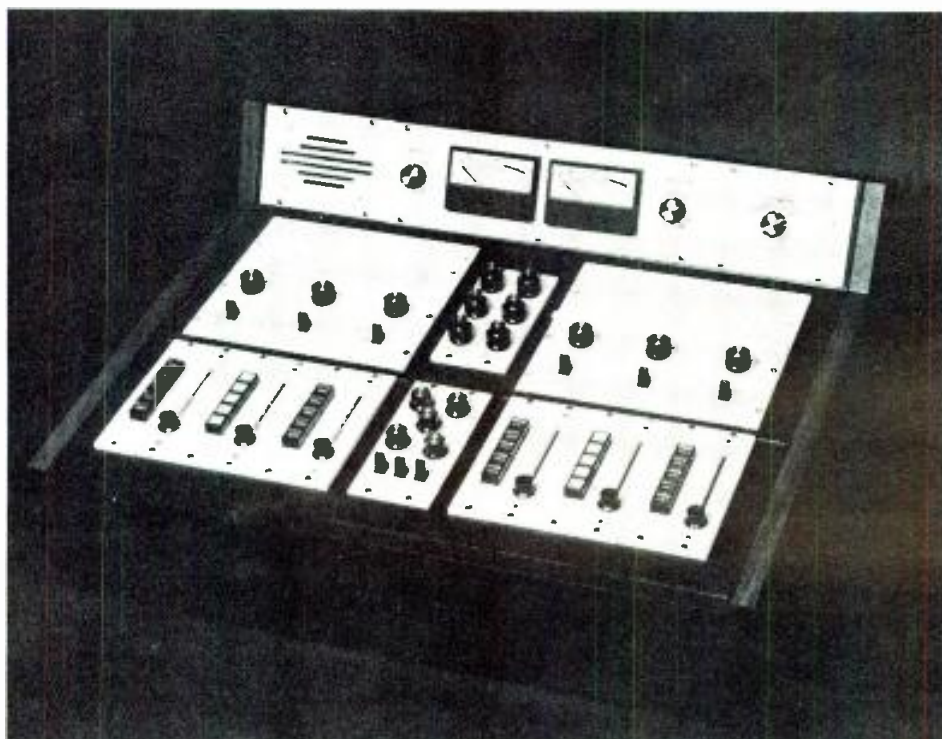
New Console Series

Visual Electronics Audio Division, Pasadena, California announces it's new M1100 Series Consoles. They are available in two basic configurations namely dual channel and stereo. They use the same high quality amplifiers and components featured in Visual's Custom Consoles.

Optional items available allow customizing either now or in the future. They are designed for operational efficiency and are easy to maintain. Last but not least the pricing is attractive and delivery is four to six weeks. See them at Booth #301-302, Continental Room.

Circle Number 168 on Reader Reply Card

(Continued on page 94)



For Phase - Current Ratio - Signal Strength

WE'VE MADE THE BEST EVEN BETTER!



FIM-21 Field Strength Meter, 535 KHz to 1605 KHz Lightweight, easy-to-use, the '21' is the new solid state replacement for the time-proven Nems-Clarke FIM-120 (RCA WX-2). Using six standard D cells, the unit features a ceramic IF filter, ganged osc/receiver tuning, front panel speaker and illuminated meter and dial. Field strength values between 10 microvolts/Meter and 10 volts/Meter. An external RF input jack is provided for tunable voltmeter applications.

FIM-41 Field Strength Meter. 540 KHz to 4.8 MHz This lightweight unit measures AM broadcast harmonics to -80db. Exceptionally stable over a wide temperature range, it includes the same features as the Model FIM-21. Exceptionally easy to use, it is particularly well suited for transmitter 'proof-of-performance' reporting as defined by FCC Rule 73.47(a)(5).

AM-19 Antenna Monitor The basic instrument for measuring phase and loop current ratio, the AM-19 can monitor up to 12 towers and accommodate DA-1, DA-2 and DA-3 patterns. Phase meter resolution is 0.5 degrees. Loop current accuracy is $\pm 1.5\%$ with a 0.5% resolution.

The **AM-19-D** offers digital readout of phase angle and loop current ratio to provide phase and current resolutions of 0.1 degree and 0.1% respectively.

For complete information, please write or call:

NAB
SHOW 72



BOOTH
#209

POTOMAC INSTRUMENTS, inc.

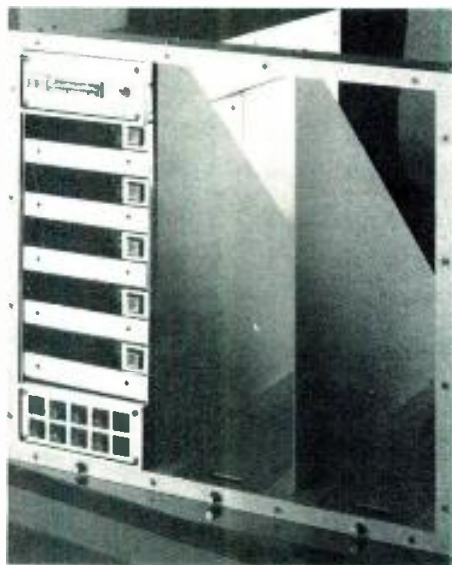
932 Philadelphia Ave.
Silver Spring, Md. 20910
Phone: (301) 589-3125

Circle Number 71 on Reader Reply Card

(Continued from page 93)

Multi-Channel Cart Playback Systems

Broadcast Electronics, Inc., manufacturers of the world famous Spotmaster tape cartridge systems,



announces the availability of the new, mini-series, multi-channel cartridge tape playback systems. Models 303C, 305C and 605C are designed to provide "mix and match" flexibility, offering space

saving combinations of 3, 5, 6, 9, 10 and 15 decks.

All of these new models feature plug-in, modular construction, logic switching and many other features required for programmed automation systems or manual operation. Interchangeability of some circuit boards has been developed between these new units and our single-deck ten/70 series.

Circle Number 187 on Reader Reply Card

Automatic Bulletin Alarm

Broadcast Automation Associates will show a bulletin alarm designed for use in control room or other remote locations from news ticker to give a visual indication of bell count informing operator of the importance of the message coming through. Unit ignores 1, 2, or 3 bells, indicating testing or inter-office signaling.

The Bulletin Alarm is designed to operate with all news service systems using a bell tone signal.

Circle Number 188 on Reader Reply Card

Film Balanced Three Color Meter

A new instrument to assist the photographer and the lighting man in obtaining correct color balance has been announced by the Photo Research Corporation. The new



Spectra Film-Balanced Three-Color Color-Temperature Meter "sees light just as the film does," and reads-out in either color temperature or color-balancing filters. A successful test program conducted by the impartial Motion Picture and Television Research Center of Hollywood was described in a paper given at the recent S.M.P.T.E. Convention in New York.

Circle Number 195 on Reader Reply Card

Low Light Level Camera

The Impossible Model SL-4X camera is a unique new intensified silicon target low light level CCTV camera, designed to be used in very low light level TV applications primarily in the security-surveillance, industrial, law-enforcement, military, and medical fields, but also would have application in the CATV and broadcast fields. It was demonstrated at the NAEB by Impossible Electronics.

Circle Number 196 on Reader Reply Card

Vector Voltmeter

Two basic parameters, amplitude and phase, are measured with a new Hewlett-Packard instrument, the Model 3575A Gain Phase Meter.

Phase and amplitude accuracies depend upon frequency and signal level. For example, at signal levels higher than about 20 millivolts, at



**Russco Dual 15 Watt
NEW MONITOR AMPLIFIER**

MONITOR MASTER 215
Standard 3½"x19" rack mount

**DESIGNED by THE BROADCASTING INDUSTRY
for THE BROADCASTING INDUSTRY**

- ★ Balanced or unbalanced bridging input, without transformers!
- ★ Built-in input pads!
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PHONE, AC 209 . . . 299-2167

Circle Number 66 on Reader Reply Card

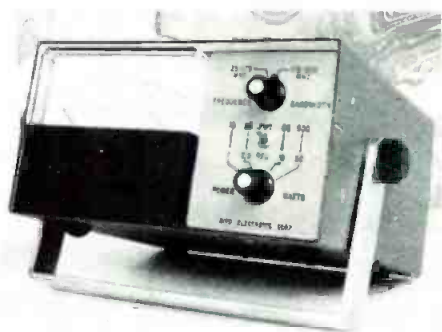
less than 10 kHz, phase measurement accuracy is ± 0.5 degrees. Amplitude accuracy, above about 2 millivolts and below 1 MHz is as good as ± 1 dB. Resolution of the digital readout is 0.1 degree for phase, and 0.1 dB for amplitude. Reading rate is 4 per second.

The instrument has 80 dB dynamic range over its frequency range of 1 Hz to 13 MHz. Input signal levels from 0.2 millivolts to 20 Volts are handled by the Model 3375A—two input voltage ranges are set by front-panel controls. With a 10:1 divider probe, signals up to 200 volts can be measured.

Circle Number 171 on Reader Reply Card

Directional Wattmeter

The new Bird model 4370 is the first THRULINE® directional high-power wattmeter to cover 25 to 500 MHz from 1 Watt full scale to 500 Watts full scale without changing plug-in elements. This universal flexibility is accomplished by eight easily switched ranges: Four forward power levels (10-500 Watts) and four reflected power values (1-50 Watts). The lower



reflected power ranges are also available for forward readings by reversing RF connections.

The new multi-range model 4370 THRULINE Wattmeter is ideal for CW, AM, FM, SSB and TV signals, for design and maintenance of oscillators, transmitters and transceivers, for antenna matching, design and development of RF components such as filters, sensors, loads and power transistors. Since it requires neither AC nor battery power, the model 4370 is equally at home in the lab or atop an antenna tower, at a remote base station or in a car, boat or plane. Booth No. 323 NAB Convention.

Circle Number 172 on Reader Reply Card

(Continued on page 96)

Projecting the Perfect Image...

with known photometric specifications



SPECTRA® TV OPTOLINER T.M.

PROJECTS A UNIFORM, HIGH RESOLUTION ILLUMINATED PATTERN DIRECTLY ON SENSOR FACEPLATE. TEST AND EVALUATE — LINEARITY — RESOLUTION — DISTORTION — LUMINOUS SENSITIVITY — REGISTRATION — AND CONTRAST.

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Memo to Consulting Engineers

Broadcast Engineering's "Professional Services Section" is your most economical and effective way to display your Professional Card.

● LOW MONTHLY RATES

\$16 per monthly issue, 12 or more times
\$18.50 per monthly issue, 6-11 times
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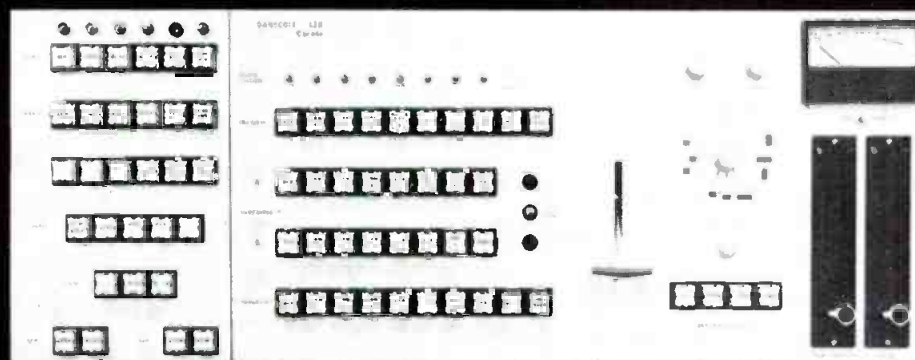
● REACH ALL PROSPECTS

Greater at-station circulation: FM, AM and educational radio; TV, ETV, CCTV and CATV; recording studios.

● MORE AD SPACE

Your Professional Card in BE is a full column wide!

production switchers



The overall performance of the Danscoll line of production switchers meets color broadcast standard specifications at the most economical cost.

An automatic sync comparator is built in so that automatic cut occurs if a mix or effect is attempted between two mutually non-synchronous video sources.

Vertical interval switching is employed on all busses. The centralized switching

matrix may be located up to 500 feet away from the control panel. All circuitry is solid state with extensive use of integrated circuits.

For complete details on video switchers and other terminal equipment, write Danscoll Ltd. 9721 Cote de Liesse, Montreal 760, Canada.

DANSCOLL 

Circle Number 136 on Reader Reply Card

AIR COOLED NEW 5kW Load NO FANS • NO WATER

The new Bird Model 8785 TERMALINE® Coaxial Load Resistor dissipates 5000 watts continuously in ambient air without blowers or cooling water.

It is ideal as a "dummy" antenna for design, testing, and maintenance of transmitters, and for RF power measurement of CW, AM, FM, SSB and TV signals to 5kW average in conjunction with a Bird THRULINE® Wattmeter.

A 7.5kW version is currently under development.

SPECIFICATIONS:

TERMALINE® MODEL 8785 RF LOAD RESISTOR

POWER RATING: 5000 watts continuous

VSWR: 1.10 max DC to 1 GHz

1.25 max 1 to 1.5 GHz

INPUT CONN: 3 1/8" — 50 or 51.5 ohms

SIZE: 17" DIA x 33" H (38" with dolly)

PRICE: \$1295

THRULINE® MODEL 460 RF WATTMETER

(shown mounted on Load)

POWER RANGES: 1 — 5kW

FREQUENCY RANGES: 2 — 1000 MHz

PRICE: \$235 Plug-In Element: \$50



NEW 5kW TERMALINE®
(shown with THRULINE®)



BIRD

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Circle Number 76 on Reader Reply Card

There's more than one better idea

Ours was the Fidelipac 300 Tape Cartridge . . . the original tape cartridge. And the same better ideas it had when it first came out are the better ideas it still has today . . . operating superiority, true sound fidelity and long life. The only difference is that they've all been improved. The Fidelipac 300 is compatible with all standard broadcast cartridge machines and is available in all standard lengths.

That's why we've sold over 25 million of them.

That's why Fidelipac is the standard for the Broadcast Industry.

For additional information on the Fidelipac 300 as well as the Broadcaster Comprehensive Fidelipac Cartridge Line, call your local Fidelipac distributor or write to

See Us At NAB Booth No. 409



Fidelipac

a division of TelePro Industries, Inc.
3 Olney Avenue, Cherry Hill, New Jersey 08034
(609) 424-1234

Circle Number 77 on Reader Reply Card

(Continued from page 95)

Miniature Cam Head
LISTEC Television Equipment Corporation announces two changes in its line of camera mounting equipment manufactured by Vinten, Ltd., England.



Photo shows new Mark V miniature Cam Head for new, smaller broadcast color cameras. The new Head weighs 25 lbs. and features extended tilt elevation and depression of $\pm 70^\circ$. Special new operator's drag controls are provided and these changes have also been incorporated into the existing Vinten Cam Head now designated Mark III-A. All existing optional equipment will fit both new Heads.

Model Mark III-A and Mark V Heads can be seen at the upcoming NAB Convention (Booth No. 312, Continental Room and on various camera manufacturers' exhibits).

Availability of the new Mark V Head is July and is priced under \$1,000. Changes in the Mark III-A have been introduced with current shipments at no extra cost.

Circle Number 173 on Reader Reply Card



Light Weight Remote Video Camera

Editel will make their first show appearance with a unique video camera. They call it the Mark III. Editel says the color camera, which

weighs less than 20 pounds and can be operated from 12 volt car batteries. Options include a wide selection of lenses, including a 10 to 1 zoom lens.

Designed with video taping from remotes as its prime use, the Mark



will be on display in the Editel hospitality suite in the Essex Hotel (Room 214-216), has already proven itself.

Although the Mark III was designed for studio quality, its recent use has been on remotes in network

III is rugged enough for reliability. Also, the camera has attempted to insure reliability and ease of use by reducing the camera to basic essentials. The Mark III has been in field use since January, 1972.

Circle Number 174 on Reader Reply Card

Adjustable Cartridge

The Fidelipac 350 Cartridge is offered by TelePro for service in applications requiring extreme accuracy of tape guidance at the corner post. It includes an adjustable corner post which uses a crossarm to guide the tape vertically. Turning the adjustable screw raises or lowers the arm as required. Access to the screw is through a hole in the cartridge cover. The cartridge is preset to the industry standard height of .562 ±.002" above the deck so that the cartridge may be used in normal service without additional adjustment.

Advantages of the Fidelipac 350 Cartridge are most notable in stereo operation. Phase differences can be minimized by simple adjustment using an oscilloscope arranged for a Lissajous Display, a screwdriver and any cartridge machine. In monaural operation, the 350 can be

adjusted to improve frequency response.

Circle Number 175 on Reader Reply Card

Function Generator

Total Technology is introducing an inexpensive voltage controlled function generator. It is offered as a 14 pin module (Model 12-050) or mounted on a standard 4.5 x 6.5 inch plug-in board with trimming controls and a 10 Volt reference source for control voltage (Model 12-051).

The frequency range is 0.1 Hz to 20 kHz producing three wave-

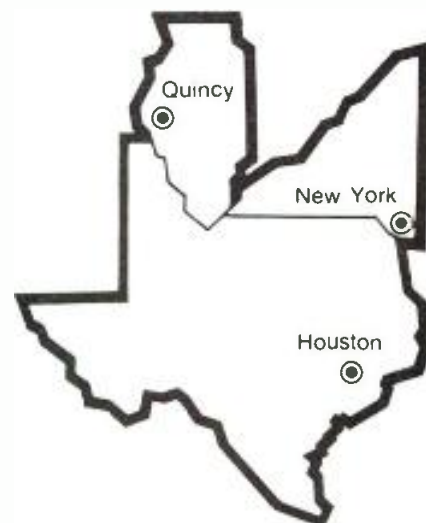
(Continued on page 98)

FREE CATALOG
HARD-TO-FIND PRECISION TOOLS
 Lists more than 1700 items—pliers, tweezers, wire strippers, vacuum systems, relay tools, optical equipment, tool kits and cases. Also includes four pages of useful "Tool Tips" to aid in tool selection.

JENSEN TOOLS AND ALLOYS
 4117 N. 44th Street, Phoenix, Arizona 85018

Circle Number 67 on Reader Reply Card

Call Gates for the most complete line of radio broadcast equipment . . . available from three separate centers.



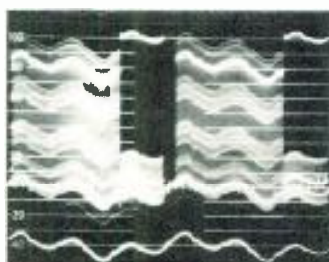
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Circle Number 68 on Reader Reply Card

STOP GROUND-LOOP HUM!

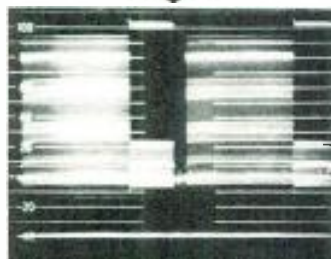
VIDEO
HUM STOP COIL
HSC-1



NEW!



NEW!



- Will ELIMINATE HUM and other INTERFERENCE in Video Lines caused by differences in Ground Potential!!

- For Color and Black & White
- FLAT — DC to 6.5 MHz.
- No Low-Freq. or Hi-Freq. Roll-off.
- No Differential Phase Distortion.
- No Differential Gain Distortion.
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- Reversible.
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☐ Enclosed is remittance of
☐ Please Invoice on 10 day Free Trial
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Station or Co.Title.....
Address
City State.....Zip.....

Circle Number 69 on Reader Reply Card

(Continued from page 97)

forms; sine, square, and triangle. Tuning ratio is 20,000:1 with one capacitor and a 0-10V tuning voltage. Operating voltage range is $\pm 10V$ to $\pm 18V$. Output is 10 Volts peak to peak with a $\pm 15V$ power supply. Ideal for use as a tone generator or for creating special effects. Also available as a complete package unit with power supply (Model 12-052).

Circle Number 176 on Reader Reply Card

Mono-Stereo Mixing Console

Rupert Neve, Incorporated, Bethel, Conn., will show its model PSM...a mixing console.



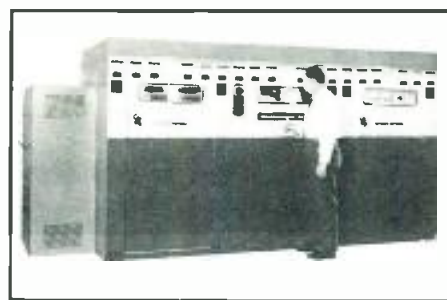
The Neve PSM is a fully professional portable sound mixing console of extremely compact dimensions, designed for high quality mono or stereo recording and broadcasting. Eight or 12 Full mixing input channels with equalization and two principal output groups are provided, each controlled by precision horizontal faders. Two Direct input channels, auxiliary output, studio foldback, communication, cueing, speaker and headphone monitoring, and signalling facilities are included. Modular amplifiers are used throughout. All active circuitry is on plug in modules employing the highest grade professional components. All inputs and main outputs are balanced and earth free.

Circle Number 177 on Reader Reply Card

New Audio Tape Line

Nortronics Company, Inc. has introduced a new line of professional recording accessories for reel-to-reel, cartridge and cassette machines.

Designated QM-SERIES quality maintenance accessories, the new line is the outgrowth of more than three years of investigation into the factors which degrade the performance of recording equipment.

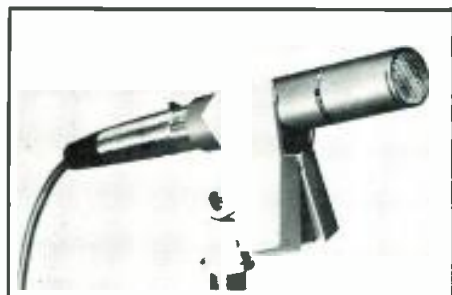


CONTINENTAL ELECTRONICS "GOLDEN 50 KW" AT NAB'S 50th!

Continental's 50th 317C 50,000 Watt Transmitter will be shown at the 50th NAB Convention. This has become the most wanted, best accepted radio transmitter of this power level in history. See the "Golden 50 KW" and other Continental Electronics transmitters and equipments at Booth 200, NAB Show.

BOOTH #200

Circle Number 142 on Reader Reply Card



BEYER M.101N DYNAMIC MICROPHONE

The M.101N is an extremely small omnidirectional microphone weighing under four ounces. It is completely impervious to hand holding noise and has an absolutely flat frequency curve. Ideal for modern music applications it accepts speech modulated voltages up to two volts. It can also be used as an ultra-sensitive talk-back microphone. Frequency response 40 - 20000 Hz ± 2.5 db. \$85.00. REVOK CORPORATION, 155 Michael Drive, Syosset, N.Y. 11791. (516) 364 1900.

BOOTH #420

Circle Number 137 on Reader Reply Card

almost every
automated radio
station has a

CAROUSEL!

if you are automating
see the experts
who make the carousel

S M C
systems
marketing
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BLOOMINGTON, ILL.

BOOTH*220

Circle Number 70 on Reader Reply Card

Nortronics' QM-SERIES includes liquid and spray tape/head cleaners, cartridge and cassette head cleaners, cartridge reel-to-reel and cassette head demagnetizers, bulk tape erasers, splicers, splicing tape, reel-to-reel and cassette alignment tapes and a series

of dual purpose products that clean and demagnetize or clean head and capstan. Additional products including professional splicing blocks and professional bulk erasers for 1 and 2 inch tape will be added to the line shortly.

Circle Number 178 on Reader Reply Card

Frequency/Modulation Monitor

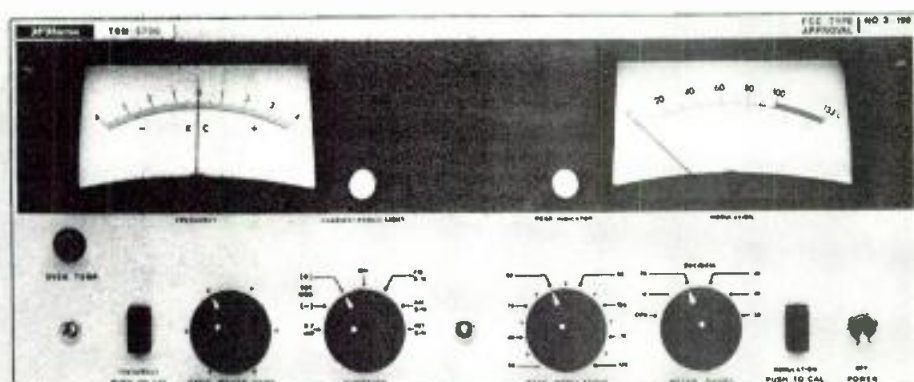
The new McMartin TBM-3700 combines the FM frequency deviation and modulation percentage monitoring functions in a single, 7-inch rack mount unit.

The two functions are independent of each other. Frequency measurement and calibration ad-

ratios can be measured directly.

The absence of an input RF signal automatically mutes the audio output. Auxiliary alarm contacts are provided for interconnection of an external carrier failure alarm. All critical circuitry is placed on plug-in, glass epoxy printed circuit boards accessible from the rear.

A kit is available for remote



justments may be made without interruption of modulation monitoring.

A precise, internal reference signal permits calibration of the 100% modulation point at any time. The inherent internal FM noise of the TBM-3700 (typically -75 dB below 100% modulation) as well as system AM and FM signal-to-noise

monitoring of frequency deviation and modulation percentage, as well as the peak flasher.

Dual, isolated composite output signal terminations provide drive for the McMartin TBM-2200 Stereo Modulation and/or the TBM-2000A SCA Frequency/Modulation monitors.

Circle Number 179 on Reader Reply Card

Solid State Monaural Console

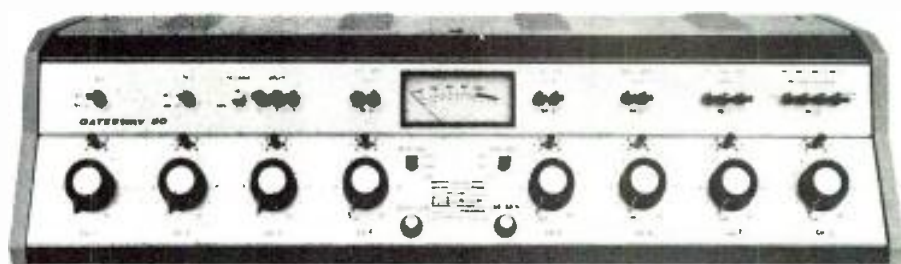
With the introduction of the Gatesway 80, an eight-channel solid state monaural audio control console, Gates Radio, a division of Harris Intertype Corporation, has provided broadcasters with the third model bearing the "Gatesway" name.

The flexibility of the Gatesway

80 is in its wide choice of inputs... 18 inputs can be switched into eight mixing channels which include: five microphones, four turntables, five tapes (cartridge or reel-to-reel), three remotes and network. For future expansion, the console has been designed with three unwired utility keys.

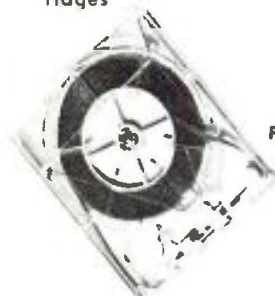
Silicon transistors, used through-

(Continued on page 100)



Just send your worn cartridges to us
Our individual professional reconditioning

Assures you of properly serviced cartridges



FOR BETTER
LONGER
PERFORMANCE

—JOA will inspect, service and reload your cartridges with ANY LENGTH tape

NO MINIMUM—NO EXTRA CHARGE FOR—

- (a) FOAM TEFLON-FACED PRESSURE PADS
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All cartridges PRETESTED under actual broadcast conditions—48-hour Processing 20 or more cartridges SHIPPED PRE-PAID

Need NEW CARTRIDGES fast? JOA will ship immediately... from stock... any size Fidelipac, precision manufactured NAB cartridge.

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Circle Number 48 on Reader Reply Card

IMITATED BUT UNMATCHED!



SP SERIES REPRODUCERS
SP-0001 \$625

- 8½ Inches Wide
- 450 RPM Direct Capstan Drive Motor, Electrolyzed Shaft
- Quiet, Air Damped Solenoid
- Hi-Speed Cue Option
- Monophonic or Stereophonic



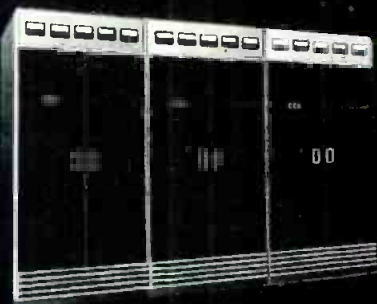
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CCA ELECTRONICS 50 KW AM

with
**CONVENTIONAL
HIGH LEVEL MODULATION**
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AIR COOLING



You are cordially invited to visit our plant and watch the AM 50,000 go through its paces!!

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BROADCASTERS 1st CHOICE for 1KW AM



CCA AM-1000D

Sorry, you'll not be exclusive when you buy your CCA 1KW AM Broadcast Transmitter!! Your fellow relaxed hi-fi broadcaster has already "got-ten the word"!!



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716 Jersey Ave., Gloucester City,
New Jersey 08030 • (609) 456-1716

Circle Number 72 on Reader Reply Card

(Continued from page 99)

out the Gateway 80, assure the console of meeting performance specifications and optimum console operation over a wide ambient temperature range.

The cue, monitor and program amplifier and new plug-in printed circuit modules are all interchangeable and have similar electrical design and construction.

Circle Number 180 on Reader Reply Card

Computer Video Tape Editing System

This computer controlled system can edit "off-line" on helical scan video tape machines, and assemblies on quadruplex machines. Central Dynamics' new SMPTE time code generator and code "reader" assist this computer based system in editing to single frame accuracy.



The system can perform combined audio/video, video only and audio only edits, and can be programmed to operate in conjunction with the Ampex HS-200 teleproduction unit.

Other options include an edit log/edit file (up to 600 scenes) mass storage unit that permits rapid program assembly of a master tape. Also available are video switching, mixing and special effects equipment, control of audio tape machines and Central Dynamics' new color frame corrector.

Circle Number 181 on Reader Reply Card

**Want A Free
Subscription?
Send Requests To
Broadcast Engineering
1014 Wyandotte Street
Kansas City, Mo. 64105**

SUITE 1906A HILTON

SARKIS TARZIAN

**Try it,
you'll
Like it!**

BOOTH #104

Circle Number 148 on Reader Reply Card

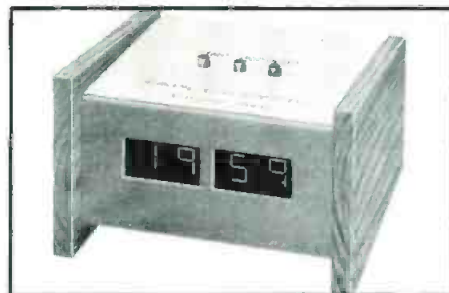


BEYER DT100 HEADPHONE

The all modular built DT100 headphone is probably the first to be designed specifically for rough tough studio usage. Due to its plug-in capsules, leads, headband, cushions, etc. it need never go back to the manufacturer for repair making it the most popular headphone in Europe for studio applications, particularly with its forgiving power handling capabilities! Available with or without microphone in 5, 400 and 2000 ohms plus other impedances to special order. \$57.50. REVOK CORPORATION, 155 Michael Drive Syosset, N.Y. 11791. (516) 364 1900.

BOOTH #420

Circle Number 138 on Reader Reply Card



CARTRIDGE TIMER

Precision electronic stop watch. May be operated manually, by remote contact closure or from remote voltage source. Net Price \$150.00. TAPECASTER TCM, INC., Box 662, Rockville, Md.

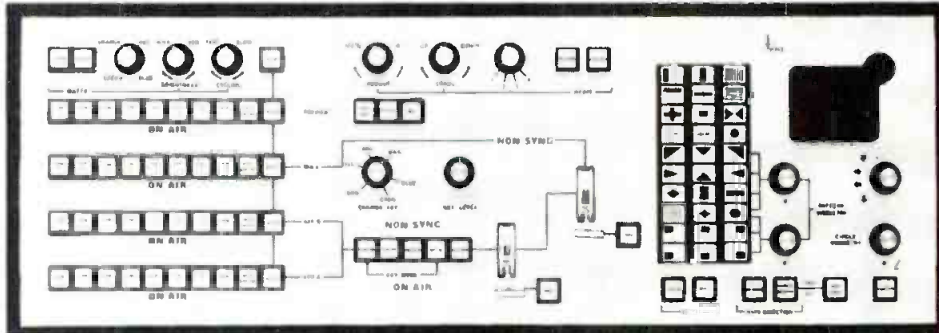
Circle Number 89 on Reader Reply Card

BROADCAST ENGINEERING

Studio Production Switcher

Richmond Hill Laboratories will show their RHL VPM 1000 Series Video Production Switchers have been expressly designed to meet the market requirement for an economically priced unit. It also has been found that many applications

optional extras are included as standard equipment. The remaining economical options offer versatility and an exciting variety of production capabilities. Features include: simple routing and effects/mixing operations, the VPM 1000 Series Production Switcher has a built-in Black Burst Signal Generator with pulse timing adjustment and 360°



for production switchers require only a few video inputs, such as teleproduction mobile operations, video tape editing switchers and transmitter booth operations. The standard VPM 1004 Video Production Switcher has been designed particularly to meet these applications.

Features offered previously as

Reference Burst Phase Range, the VPM 1004 having Mix and Effects Amplifiers with individual Fader Controls places the VPM 1000 Series Switchers in a class by themselves, background color generator included, and sync comparators included to prevent non-synchronous transitions.

Circle Number 182 on Reader Reply Card

Low Cost Color Camera

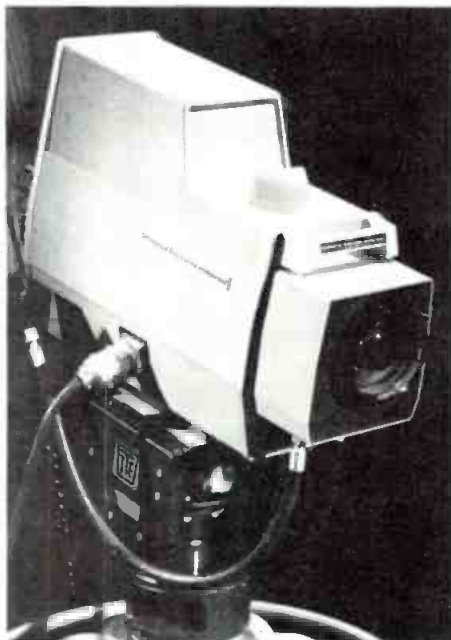
Commercial Electronics Incorporated has designed a Plumbicon color television camera for broadcast and high quality closed circuit applications. Called the CEI-280, it is a full NTSC color camera system and offers several unique features for a camera in the low

price group.

The camera electronics are completely remote controlled; the only set-up adjustments in the camera head are those used when changing pick-up tubes. Color balance, registration and other engineering functions are remote controlled. A separate camera operating panel with lens iris servo, master gain, master black level and paint pots is supplied for mounting either adjacent to the engineering control panel or in a more convenient location. The CEI-280 will operate on 500 feet of mini-cable or up to 2500 feet of standard TV-81 broadcast camera cable.

The camera viewfinder will display a variety of video signals, including a choice of two external sources (special effects and program, for example). Two channels of intercom are provided and a choice of zoom lenses is available. The CEI-280 is completely modular in construction and the camera head weighs less than 50 pounds with lens and viewfinder.

Circle Number 183 on Reader Reply Card



CCA TRUE CIRCULAR FM ANTENNAS



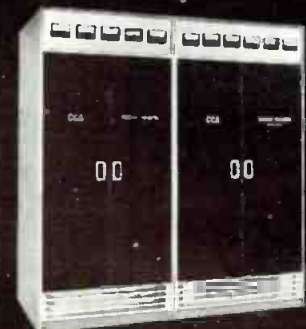
MODEL FMC

CCA offers its 2nd generation design — model FMC — with increased power rating, corona free construction, and identical phase centers for horizontal and vertical components!!

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N. J. 08030 • Phone: (609) 456-1716

CCA ELECTRONICS Announces a 25 KW FM

AIR COOLED TRANSMITTER WITH INDEPENDENT 3 KW DRIVER AND ONE POWER AMPLIFIER TUBE



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2.

What is CHIRON II doing at NAB '72?

A.

Impressing people.

For those not easily impressed, CHIRON II is the most advanced, the most versatile...

Electronic Character Generator System available today.

CHIRON II can do more things, in more ways, more quickly, more colorfully and more efficiently than any other character generator system in operation today.

For example, CHIRON II can display:

- any type font
- in any size font
- intermix styles
- intermix sizes
- colors (letter by letter)
- flashes & blinks
- "roll" or "crawl" modes
- different speeds
- custom fonts
- symbols, logos, etc.
- line art and more.

For a graphic demonstration of this claim, you must see NAB '72 Booth 121/East Hall



Systems Resources Corporation
223 Newtown Road, Plainview, N. Y. 11803

Circle Number 75 on Reader Reply Card

New Products

(Continued from page 101)

Photo Chemical Pollution Control

Computerized Pollution Abatement Corporation, of Leicester, N.Y., has designed the TV-PAC system, a new concept in chemical recovery and pollution control. A high-current density, low maintenance silver recovery cell contained within the TV-PAC unit, yields 98% pure, tight-grain silver from used fixer. The fixer is recirculated through the electrolytic cell in a closed-loop system, allowing reuse of the fixer after desilvering.

Ozone is then utilized to bring overflow bleach back to its original, fresh state for re-use resulting in substantial chemical cost savings in addition to the benefits from silver recovery.

In the waste water section of the TV-PAC, ozone again is used to pretreat the final effluent so that it may be discharged without violation of the existing sewer codes.

Circle Number 184 on Reader Reply Card

LPB
*is definitely
not
fattening...*

LPB is a manufacturer and distributor of Studio and Broadcast equipment at low, low prices. It's worth your time to find out more, so call Dick Crompton or Ted Davey or write



LPB Inc.
520 Lincoln Highway
Frazer, Pa. 19355
(215) 644-1123

Circle Number 44 on Reader Reply Card

Reel-To-Reel Recorder

Revox will exhibit their reel-to-reel tape recorder, the A77, and a full line of microphones and headsets.

The A77 employs the Dolby audio noise reduction system, and has automatic rewind, allows two consecutive fully synchronized tracks to be recorded simultaneously, motor speed control, and remote control accessories.

Optimum bias and equalization are obtained through separate electronics for each speed and channel. Various head configurations are offered.

Circle Number 185 on Reader Reply Card

8-Track Tape Cartridge

Memorex announces the addition of eight-track recording tape cartridges to complete its line of audio recording tape products.

The new, high-quality Memorex eight-track cartridges are available in 40-minute, 64-minute and 80-minute configurations. The Memorex line of audio recording tapes now includes 5-inch, 7-inch and 10½-inch polyester reels, 30-, 60-, 90- and 120-minute low noise, high output cassettes, 60- and 90-minute chromium dioxide cassettes, and 40-, 64- and 80-minute cartridges.

Circle Number 186 on Reader Reply Card

Most of the ads in BE in this issue depict products that will be on display in the exhibits at the convention. Since most new products are shown for the first time at the convention, this issue should serve as a guide for what's new in '72. However, because of deadlines and a number of manufacturer considerations, some new products are not shown in this issue. We will bring you up to date in the May issue.

If you don't make the trip to Chicago for the convention, use the Reader Service card to get more information on the new equipment in our special products section and in the ads.

**Yes, We Pay For
Engineer's Exchange
Articles**

Broadcast Engineering

New Cable Rules

CATV Requirements Explained

Nonbroadcast Channels

Noting its obligation to ensure that cable systems had available adequate channel capacity to fulfill their "recognized functions," the Commission said that it saw a future for cable in which potential sources of income would result from services other than transmission of off-the-air signals. While acknowledging that some systems with 40 or more channels were being installed, it commented that it did not wish to impose "unreasonable economic burdens on cable operators" and therefore it would not set minimal channel standards for any but the top-100 markets. In these markets the Commission said that 20 channels was "the minimum consistent with the public interest." It also specified that for each broadcast signal carried, the cable systems in these markets must make an equivalent signal available for nonbroadcast use.

Cable systems will be required to make available a public access channel without charge on a first come, first served basis. They would also have to reserve a channel for educational use and one for local government use. There would be no charge for these facilities during a "developmental period."

Any extra channels available in the system may be provided for leased use, the Commission said. It pointed out that channels designated for various public uses, or blacked out because of exclusivity, may also be made available for lease.

Cable systems will also be required to make additional channels available as demand develops. The Commission set standards to determine when additional capacity must be added, noting that "this requirement should encourage the use of the system with the knowledge that channel space will always be available, and also encourage the cable operator continually to expand and update his system." It

said it planned later to initiate a rule making proceeding to assure "that our requirement of capacity expansion is not frustrated through rate manipulation or by other means." It said that the proceeding would also deal with rates for leased channels.

The Commission said that regulation of access channels for non-broadcast programming was "properly" its concern because they "fulfill Communications Act purposes and...are integrally bound up with the broadcast signals being carried by cable." It pointed out, in addition, that the leased channels would very likely carry programs being transmitted by satellite or microwave facilities—services which come under the Commission's jurisdiction. Local regulation of these channels, the Commission said, would put them under a double obligation and would be "confusing and impracticable." In communities outside of the top 100 markets, where access channels are not required, the Commission said it would permit local authorities to require access services based on the standards for the major markets.

Cable operators will not be permitted to censor or exercise any kind of program content control over material presented on the access channel and may not discriminate in making the channels available. Advertising, including political spots, lotteries, obscene or indecent matter will be prohibited. Similar rules will apply to leased channels where a rate schedule will be required.

Cable systems will be required to maintain production facilities for those using the public access channels.

The Commission pointed out that its regulatory approach in this area was tentative, that it believed its best course was to "proceed with minimal regulation in order to obtain experience" and that it could



NEW MODEL CX-1

COAXIAL CABLE STRIPPER

Developed and used by NASA ■ Prepares cable for connectors in 10 seconds ■ Adjusts for stripping requirements of all standard co-ax connectors ■ Close-tolerance adjustment prevents nicked conductors ■ With removable inserts, accepts cable from .075" to .435" OD.

PRICE \$39.50 F.O.B. San Clemente

Specify cable O.D. when ordering

Western Electronic Products Co.

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THREE FOR THE PRICE OF TWO



3D SERIES REPRODUCERS 3D-0001 \$1395

- Three Rugged Cartridge Machines in One Small Package
- 450 RPM Common-Capstan, Direct-Drive Motor
- Independent control and Audio for Each Deck



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CORPORATION

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Telephone: 309-828-1381

Circle Number 133 on Reader Reply Card

alter the program "as we gain the necessary insights."

Franchises

Acknowledging that federal licensing of cable systems would be an "unmanageable burden," the Commission cited the value of local authorities in administering franchise matters and in following up service complaints. Operating under a "deliberately structured dualism" the Commission said its

function would be to set minimum standards for franchises issued by local authorities, covering such matters as the franchise selection process, construction deadlines, length of franchises, fees, complaint handling and rate changes. These areas would be administered in the certificating process the Commission said. It asked that all franchise actions be public proceedings with published notice of filing and public hearings. It also pointed out that

it was the prerogative of the local government to determine character qualifications for franchise applicants.

While conceding the competence of local authorities in establishing franchise areas, the Commission stated that provision must be made to bring cable benefits to all areas of a community—not just the more affluent sections. It also set standards to insure that franchises were established promptly. It specified that cable systems must begin construction within one year after a certificate of compliance is issued, and that the facilities must be extended to cover at least 20 percent of the franchise area each succeeding year. (It added, however, that the percentage might vary according to local conditions.)

Noting that long term franchises are an "invitation" to obsolescence, the Commission said that it felt that franchises generally should not exceed 15 years. It said it would permit local authorities to regulate rates charged to subscribers.

ask about our new am|fm|tv monitors



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BELAR ELECTRONICS LABORATORY, INC.

Delaware & Montrose Avenues, Upper Darby, Pa. 19084 Box 83

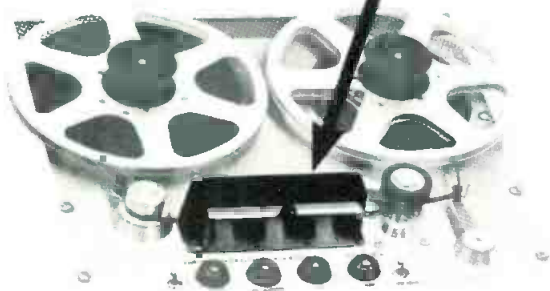
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ERASE RECORD REPRODUCE MONO - STEREO

Professional Direct Replacement Heads with complete written and pictorial instructions

Our factory will clean, rebuild, adjust and test your head ASSEMBLY...install new MMI heads...replace minor hardware and modify your gate to accept our "NON-POPPING" springs



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Professional program production

An intermediate sized television program production console, the PC-2 contains all of the capabilities necessary to produce professional quality programs... includes all popular effects... vertical interval switching eliminates picture disturbance. Console monitors for two cameras, a special effects preview monitor, and line output on a fourth and larger monitor. Provides audio mixing of three mics and an audio recorder. Also includes intercom between cameras and console. For complete information, write Nasco Television Systems, Dept. PC-2.



**television
systems**

947 Janesville Ave., Fort Atkinson, Wis. 53538

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SMC sells the finest
throws in
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COMPUTER OR MECHANICAL
AUTOMATION



systems
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"makers of the carousel"

BLOOMINGTON, ILL.

BOOTH #220

Circle Number 83 on Reader Reply Card



CARTRIDGE TIMER

Precision electronic stop watch. May be operated manually, by remote contact closure or from remote voltage source. Net Price \$150.00. TAPECASTER TCM, INC., Box 662, Rockville, Md.
Circle Number 82 on Reader Reply Card



THIS SPACE CONTRIBUTED BY THE PUBLISHER

BE Direct Current Pompous Forecast For 1972

CATV Technical Standards: The Commission has recently adopted new rules establishing Technical Standards for CATV systems (a special article in next month's BE will describe these in detail). However, these standards apply only to so-called "Class I" cable channels, which carry the signals of television broadcast stations. The Commission will form a new Committee to consider increasing the scope of the present CATV Technical Standards, and to keep the existing standards current in the light of the "state-of-the-art" improvements expected with new and improved technology.

Coded Television Commercials: The Commission will continue to struggle with the problems arising from the inability of the Digisonics coding system to meet the requirements of the Rules providing for the use of this code. The Commission will also study aural coding systems as a possible supplement to or substitute for a visual code.

Operator Requirements: The Commission will continue to study the NAB proposal to permit the use of third-class operators for many tasks for which the rules require a first-class ticket. Any rules in this area are likely to be tied to pending proposals for the remote control of AM directional antenna systems and the use of type-approved phase monitors at the remote control point.

Use of AM Clear Channels: The twin issues of higher power for Class I clear-channel AM stations, and the assignment of additional daytime-only or fulltime Class II stations to the clear channels are essentially dead. Look for no activity of any consequence in this area for the coming year.

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Three play-back cartridge units

check these STANDARD features...

- ✓ High speed cueing (RAPID-Q)
- ✓ Heavy duty cast head-mounts
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- Precision, Micro-Adjust Head Assembly
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- 450 RPM, Direct-Drive Motor
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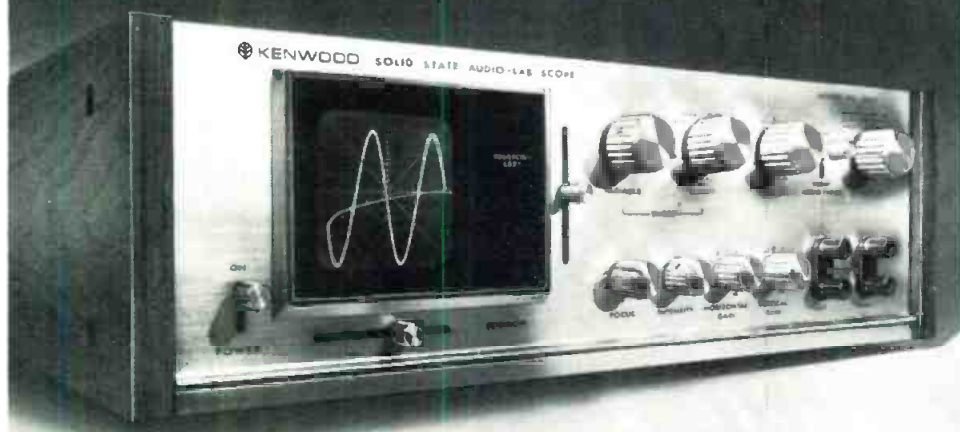
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LOW COST FM STEREO MONITORING...

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- 3"-screen Oscilloscope ■ Built-in 1 kHz Oscillator
- 5-position Selector Switch ■ Built-in Sweep Generator
- Solid-state Circuits ■ Price: \$219.95



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72-02 Fifty-first Ave., Woodside, N.Y. 11377

Circle Number 35 on Reader Reply Card

Canadian Group Set For May Convention In Regina

The Annual Conference of the Western Association of Broadcasters, Engineering Section (W.A.B.E.), will be held in Regina, Saskatchewan on May 2nd, 3rd, and 4th, 1972 at the Hotel Saskatchewan.

This conference has now grown into a major radio, television, and associated equipment display for Western Canada. The interest and response for display space, so far this year, indicates that the conference will top all records.

Several interesting technical papers will be on the three day program. The total conference is geared to gather as much information as possible for station engineers who want to keep up with the latest technical advancements.

The ladies are extended a welcome to attend the conference. A two-day program is planned, which will be of interest to the ladies.

Detailed information may be obtained by writing to Box 2000, Regina, Saskatchewan.



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VTR manufactured
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Professional head hunters know that only at Taber can you find the kind of value you seek in VTR heads. Taber heads are:

- Precision made in a sophisticated laboratory, tested to produce total response and playback.
- Guaranteed to meet or exceed equipment manufacturer's specifications.
- Priced at only \$310.00 for 4 new heads installed, or \$100.00 for 4 reconditioned heads (Add \$25.00 if monitor post needs lapping).

Free loaner assemblies available.

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"makers of the carousel"
BLOOMINGTON, ILL.

BOOTH #220

Circle Number 61 on Reader Reply Card

AEL Has New President; Dawson Up At Philips

John W. Clark has been appointed account executive for Communications Improvement, Inc. by General Manager Bob McRaney, Jr. Clark joined WLBT-TV last December.... **Paul W. McCracken**, chairman of President Nixon's Council of Economic Advisers for the past three years, has been elected a director of Harris-Intertype Corp.... **Robert Gutreuter** has joined Jerrold Electronics Corp. as Manager of the Turnkey Systems Div., it was announced by Dr. John C. Malone, President.... **Charles E. Wilson** has been named General Manager of the Colorado Springs, Colo., operations of Ampex Corp., it was announced by Charles A. Steinberg, Vice President-General Manager, Video Systems Div.... **Martin Beck** has been named Broadcast Manager/Producer for Cargill, Wilson & Acree, Inc.'s Atlanta office. He was formerly Broadcast Producer in the agency's Charlotte office.... **Robert A. Bass** has been appointed Training Supervisor at Philips Broadcast Equipment Corp.... **James F. Jennings, Jr.** has been elected Vice President, Marketing, Phelps Dodge Communications Co., it was announced by Frederick W. DeTurk, President... **Leonard L. Rosenfeld** has been appointed President of AEL Communications Corporation (AELCC), the CATV subsidiary of AEL, it was announced by Conrad J. Fowler, Chairman of the Board, American Electronic Laboratories, Inc., (AEL).... **John R. Dawson** has been appointed Manager of Applications Engineering at Philips Broadcast Equipment Corp.... **Harold F. Boreiko** was appointed regional Sales Manager, it was announced by A. W. McEwan, Marketing Manager of the ITT Electron Tube Division of International Telephone and Telegraph Corp.

Associations

Alan F. Culbertson, president of Culbertson Industries, Palo Alto, Calif. has been elected President of the newly formed IEEE Communications Society.... **Donald F. Holloway** and **Patricia L. Swenson** have been elected to the board of directors for four-year terms expiring December 31, 1975 of the National Educational Radio division of the NAEB, they were elected by the members of the National Educational Radio Division of the NAEB.... **David L. Crippens**, executive producer with WQED-TV Pittsburgh, and **Everett A. McDonald Jr.**, superintendent of schools for the Centennial School District, Warminster, Pa., have been elected to NAEB's Instructional and Professional Services board of directors.... **Charles M. Edwards** has been elected chairman of the board of directors of the 1972 Western Electronic Show and Convention, and **J. Rudy Hummes** has been named chairman of the WESCON executive committee....



MODEL 728 PROGRAM TIMER

Now from Cooke. . .

TIME DISTRIBUTOR EQUIPMENT

- PARALLEL-TO-SERIAL-TO-PARALLEL CONVERTER
- IMPULSE SLAVE CLOCKS
- PROGRAM TIMER
- DIGITAL CLOCK DRIVER
- 8-EVENTS TIMER
- REMOTE READOUTS
- STATION-BREAK TIMER
- NUMERICAL CHARACTER GENERATOR



MODEL 724
DIGITAL CLOCK DRIVER

Cooke Engineering — well known for "Quality In Communications" now introduces a new line of time distribution products for the Broadcast Industry:

728 - Program Timer — A must for any production facility. — Instant and accurate determination of time segments — Plus-or-Minus minutes/seconds read on legible Nixie Tubes — Timing count may be preset and held or started at any time — Minimizes "False Starts."

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For information on Cooke's complete line of Time Distribution Equipment and Video Patch Fields and Broadcast Products Accessories call or contact. . .

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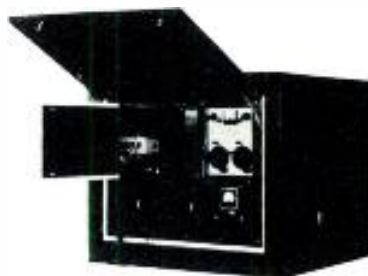
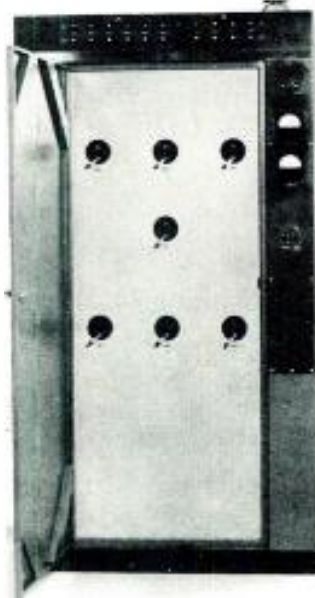
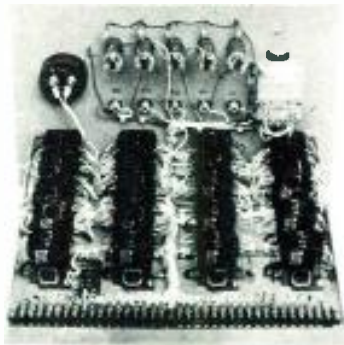
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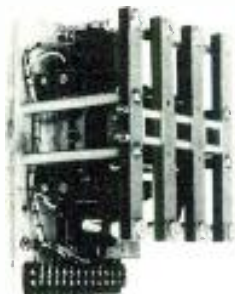
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HI-Q RF INDUCTORS Our RF Inductors provide unmatched stability for systems requiring impedance matching, phase shifting, power dividing and filtering. Typical inductors range from 15 to 100 ampere current handling capability, inductance values from 6 to 620 microhenries, and special units built to meet specific requirements. Our expansive line of **MULTIFILAR** RF inductors provide higher inductance and current handling capacities in minimum size configurations. All are suited for motor-driven applications in remote-controlled systems.



RF CONTACTORS A wide choice of rugged, recoil- and corona-free multi-pole contactors are available for high voltage RF switching. All feature strong Melamine construction for extra ruggedness and ease-of-maintenance. Ideally suited for RF applications in the VLF, LF, MF and HF ranges, they are rated from 208 to 240 VAC capability (24KV and 40KV models available).

In addition to: ☐ Folded Unipole Kits ☐ Meter Switch Assemblies ☐ Phase Sampling Loops ☐ J-Plugs (test jacks) ☐ Plug-in Meter Boards ☐ Isolation Inductors ☐ Limit Switch Assemblies for controlling motor-driven variable inductors and vacuum capacitors.

For complete information, please write or call:

MULTRONICS® INC.

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Phone: (301) 881-5774

Circle Number 86 on Reader Reply Card

bookreview

The ABC's of Electronic Power, written by Rufus P. Turner, is a concise, well-organized book on electronic power. It contains in a few chapters a surprising amount of information on the subject. Dr. Turner clearly explains what electronic power is and how to measure it. The first chapter deals with fundamental ideas of power in resistive and reactive circuits; the remaining four chapters give practical methods of measuring and calculating power in both tube and transistor circuits.

A complete discussion of power falls into two classes: DC power and AC power. DC power, being much simpler, is allotted one chapter (Chapter 2). AC power, having the added considerations of power factor, single phase and polyphase, and audio and radio frequency measurements, is covered in Chapters 3, 4, and 5.

As the book progresses, each new point is clearly illustrated by a worked-out example, with no step, however simple, in the mathematical solution being omitted.

This book is available through Howard W. Sams & Co., Inc., Indianapolis, Ind.

Circle Number 190 on Reader Reply Card

Wiring The World—The Explosion In Communications was written by the editors of the Book Division, U.S. News & World Report, Inc., with the assistance of Richard Doan, columnist and staff writer for TV Guide.

The book presents a history of the growth of cable television; a description of how cable TV works; analysis of the programming of cable TV, and the advantages and disadvantages as compared to broadcast TV; and a history of the growth of government regulation of cable TV. The book also informs the reader about picture telephones, videocassettes, and the development, present and potential uses of communications satellites.

One of the features of *Wiring the World* is an interview with Dr. Clay T. Whitehead, director of the White House Office of Telecommunications Policy. Other highlights include a short history of communications developments prepared by the Federal Communications Commission and a glossary of technical terms.

The book is 208 pages, and contains maps, charts, tables, photographs and a full index.

This book is available through the Book Division, U.S. News & World Report, Washington, D.C.

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Broadcast Engineering

Construction Delays Hit New Jersey Public Broadcast Stations

The timetable for the three proposed New Jersey Public Broadcasting Authority television stations has suffered a setback due to construction delays, but the Chairman of the NJPBA remains hopeful of having all four new stations in operation by the end of 1972.

Dr. Edward J. Meade, Jr., Chairman of the New Jersey Public Broadcasting Authority, reports that construction of the transmitter building for WNJS-TV Channel 23 in Waterford Works (Camden County) will cost the State approximately \$45,000 less than anticipated, but a delay in beginning construction work will postpone the anticipated Spring opening of Channel 23 to next Fall.

Dr. Meade explained that the delays at the Channel 23 site will have a slight effect on the two northern New Jersey stations, too. It was hoped to have WNJM Channel 50 in Montclair and WNJB Channel 58 in New Brunswick on the air by early Fall, but now a more realistic date would be December.

"It's unfortunate that we must have these delays, but we are a State agency and we must abide by the strict restrictions that are set forth to protect the taxpayers in major construction projects such

as ours," Dr. Meade continued. "The contractor for the Channel 23 building submitted a low bid that was very favorable. That's good news. But the bad news is that the contractor cannot start work until after the weather breaks. We had hoped to have the building nearly complete by then."

The Chairman explained that there were normal delays in the construction that put the timetable of WNJT-TV Channel 52 in Trenton off schedule before it finally went on the air last April.

"All of us are anxious to have these stations on the air and we have been justifiably criticized for releasing target dates for their completion that have not been met. We know all the citizens of New Jersey are excited about having their own stations and a complete state-wide network and we are very confident that our target dates of early Fall for Channel 23 and December for our northern stations Channels 50 and 58 are realistic. If the work is completed and the stations are ready to go on the air prior to those dates, we'll welcome the good news," Meade concluded.


Workmen completed erection of the 900 ft. tower and mounting of the antenna on the Channel 23 location in December. However, the building must be constructed to house the transmitter and electronic gear. After the building is complete, the highly-sophisticated electronic equipment must be installed and thoroughly tested.

The NJPBA is prepared to feed from the Trenton flagship station telecasts to all three new stations as soon as they are completed. When completed, each of the four stations will also be able to have separate programs geared to their local area through utilization of a mobile television van which will be delivered this summer.

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NAEB President's Statement

(Continued from page 16)

quality of public broadcasting that everyone is an insider. It will be far from neat, but it will be public and it will be important to people who need a communication opportunity and service which is more than an antidote for whatever the deficiencies of commercial broadcasting might be."

In his remarks, delivered at a seminar on Telecommunications Center Planning—part of NAEB's Educational Broadcasting Institute—Mr. Harley also urged that "it is the licensee who must determine what public broadcasting can do in his community that will meet the needs he should have identified."

While suggesting that "the professional capacity to analyze community needs and to develop programming services pertinent to them is less refined than it could be," Mr. Harley said the crux of the problem is "funding programming already known to be needed and valuable."

If programming control is "abandoned or transferred," Mr. Harley continued, "we have a regulatory agency which should act to restore the control. If the control is exercised carelessly or irresponsibly, there is a variety of social, legal, professional and community forces which are now developing to give local control the meaning it was intended to have."

"This is not to suggest that operating arrangements which make it feasible to facilitate a nationwide programming service have no place in public broadcasting. What is a legitimate concern is the trend of these arrangements. Does it lead to a system of local distributors for a single national program service? Or, does it by the nature of the agreements among station licensees and national interconnection and programming agencies, respect the need for sub-national and local involvement in providing program services and making program decisions? Do the funding patterns of the Corporation for Public Broadcasting and the foundations respect this principle?"

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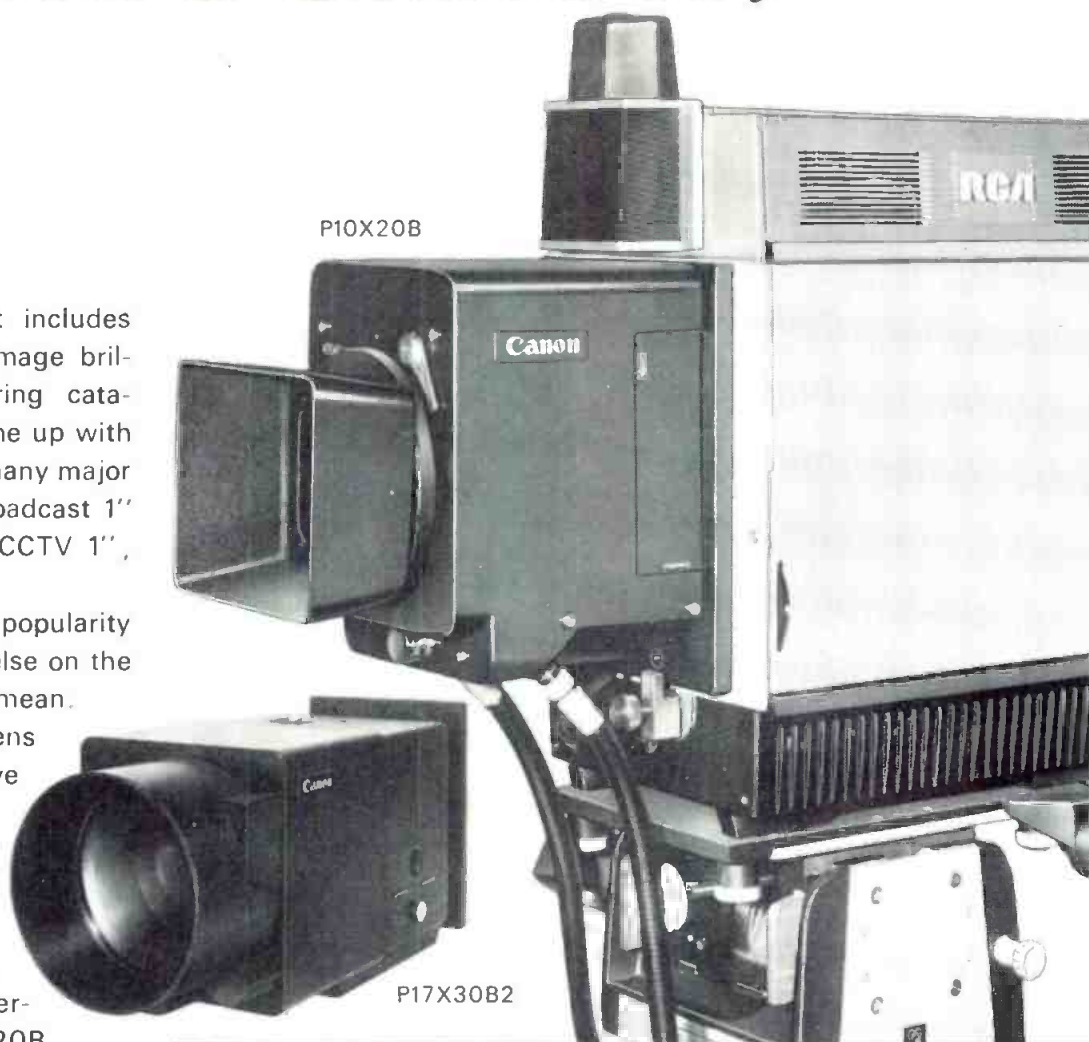
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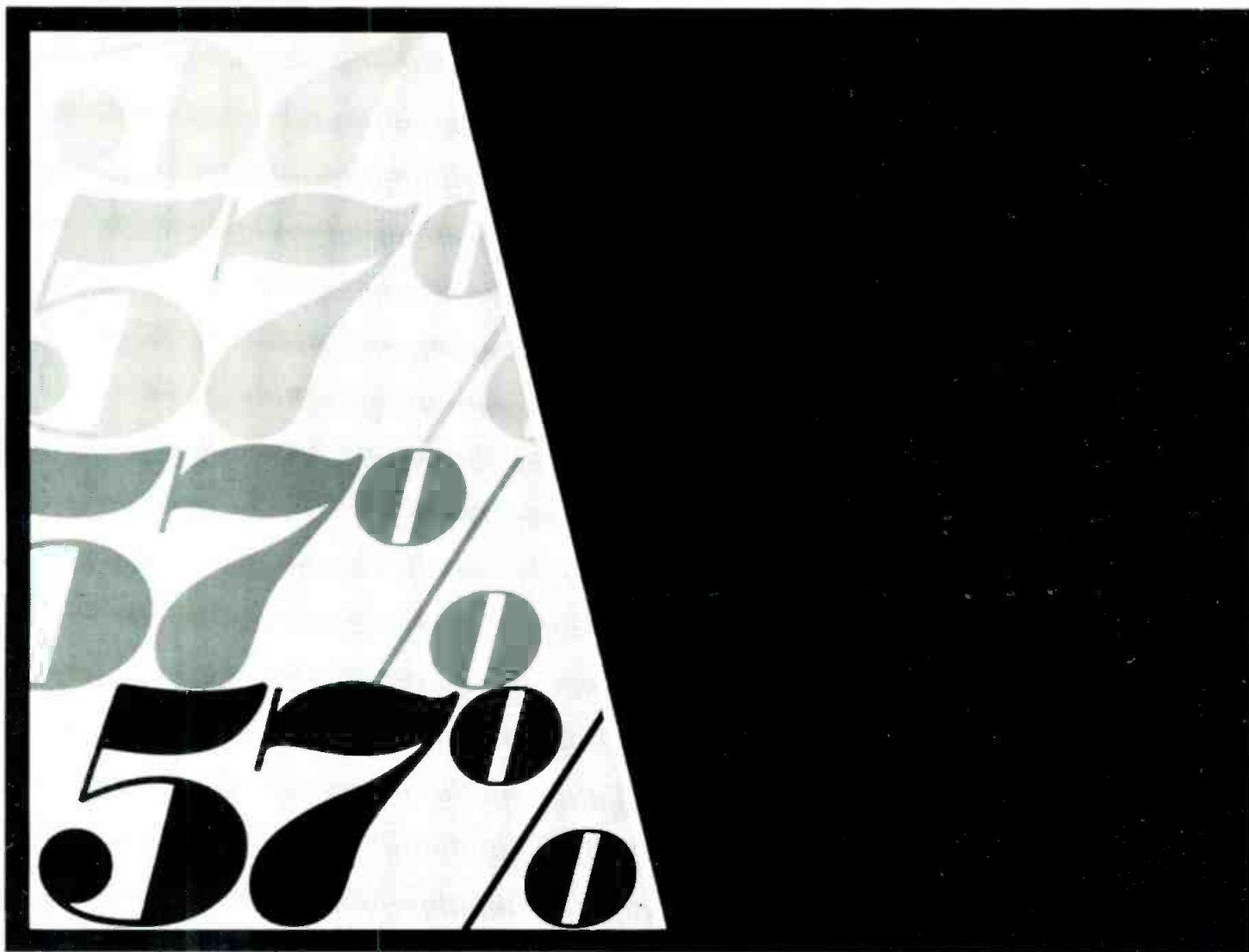


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	PV10 x 16	16—160mm	1 : 10	F 1.6
	PV10 x 15B	15—150mm	1 : 10	F 2.0
1" Vidicon	V10 x 15	15—150mm	1 : 10	F 2.8
	V6 x 16	16.9—95mm	1 : 6	F 2.0
	V5 x 20	20—100mm	1 : 5	F 2.5
	V4 x 25	25—100mm	1 : 4	F 1.8
2/3" Vidicon	J10 x 13	13—130mm	1 : 10	F 2.8
	J 6 x 13	13—76mm	1 : 6	F 1.9
	J 5 x 15	15—75mm	1 : 5	F 2.1
	J 4 x 12	12.5—50mm	1 : 4	F 1.8
Servorized/Motorized				
	Name	Range of Focal Length	Zoom Ratio	Maximum Relative Aperture
1 1/4" Plumbicon	P10 x 20B4	20—200mm	1 : 10	F 2.2
1" Vidicon	V10 x 15R (DC)	15—150mm	1 : 10	F 2.8
	V6 x 16R (AC/DC)	16.9—95mm	1 : 6	F 2.0
	V4 x 25R (AC/DC,EE)	25—100mm	1 : 4	F 2.5

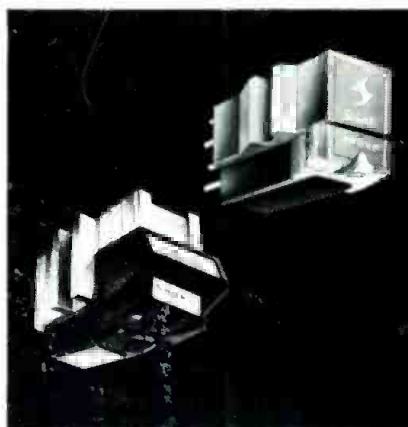
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it's on record...



Now it's official! An association survey quoted in BM/E magazine produced some very revealing information on FM broadcast equipment preferences — particularly in the category of phono cartridge usage, where a whopping 57% of the respondents expressed their preference for Shure cartridges . . . *more than all other brands combined*. It didn't particularly surprise us because we know our M44 series with its uncommon combination of clear sound, low cost, exceptional ruggedness and excellent back-cuing characteristics, has been the broadcast standard for years. And our peerless V-15 Type II Improved? There simply isn't a better cartridge for "high fidelity" FM operations. Write for the free Shure "Guide to the Conversion of Monophonic Broadcast Facilities for Stereo Records," as well as the complete Shure Phono Cartridge Catalog.

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