

Broadcast Engineering®

the technical journal of the broadcast-communication's industry



A HOWARD W. SAMS PUBLICATION



Tuning
for color

Wire service
tips


Mv/m by
helicopter



Can a tough, little \$49.20 microphone make the big time?



(A success story.)

 A good little microphone, the E-V 635A. But just how good? After all, it was intended to replace the "workhorse" Model 635... a dynamic microphone that had earned its title under fire in studios and on remotes all around the world.

So when we introduced the 635A we put it to a critical test. A major recording studio was loaned a dozen 635A's and asked to test them. The engineers weren't told the price, but they got the idea that it was somewhere near \$300.00.

They were so delighted with the sound

that they cut several big band recordings with nothing but 635A's. "Best \$300.00 microphone we've got." Then we told them the price. They were shocked. \$49.20? They couldn't believe their ears.

Meanwhile, 635A's were beginning to appear in force on music and variety shows on every TV network. Mostly hand held. Something to do with ruggedness and good balance... but mostly because of the sound. Especially during ultra-close miking.

The rest is history. Radio and TV newsmen quickly adopted the 635A as

their new "workhorse". After all, news only happens once, and the 635A was their best insurance against bad sound.

To most professional sound engineers, the E-V 635A is already an old friend, although it's only been around since 1965.

At the price, they can afford to use it almost everywhere. And they do. (We told you it was a success story.)

ELECTRO-VOICE, INC., Dept. 201V
638 Cecil Street, Buchanan, Michigan 49107

MODEL 635A Omnidirectional dynamic. Response 80-13,000 Hz. Output - 55db. Balanced low impedance. Includes Model 310A stand clamp and lavalier neck cord. Fawn beige Micomatte finish.

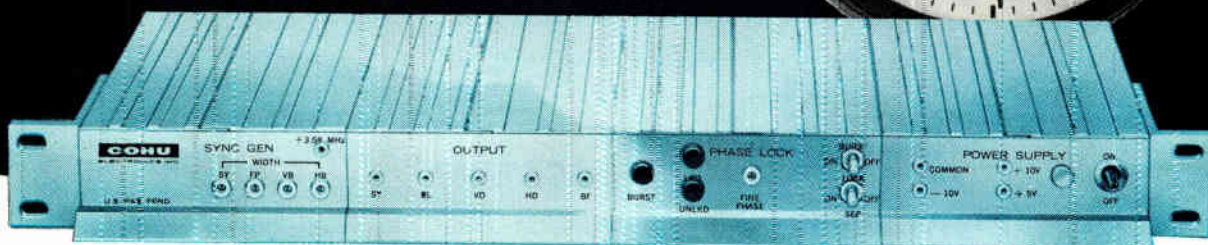
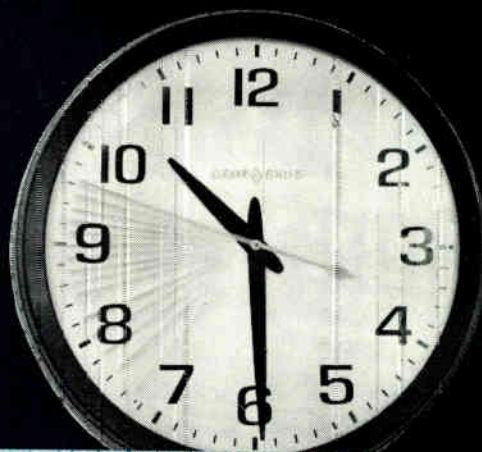
• high fidelity speakers and systems • tuners, amplifiers, receivers • public address loudspeakers
• microphones • phonograph needles and cartridges • space and defense electronics

Circle Number 1 on Reader Reply Card

Electro-Voice[®]

A SUBSIDIARY OF GULTON INDUSTRIES, INC.

timing
is
money



...that's why Cohu's new **2600 Series Broadcast Sync Generator** uses an ultra-stable digitally generated time base to insure jitter-free performance.

Everything depends on your timing pulses. So, stable leading edges are the key factor in designing a sync generator that does what the specs say it does. Our new 2600 series sync gen has digital logic circuits to produce leading edges that serve as the timing of all pulses developed in the system.

Jitter-free sync comes from sequential division of the base frequency from a temperature-compensated crystal oscillator. A precision color standard is built-in and generates pulses required for local color or monochrome broadcasting at 525 lines/frame, 60 Hz with 2:1 interlace. All pulse widths except vertical blanking, drive and sync are adjustable with no interaction of controls.

Three plug-in circuit boards make up the system, which occupies just 1¾ inches of vertical space in a standard 19-inch rack. All active cir-

cuitry is solid state with integrated circuit construction for maximum reliability.

In addition to the sync gen, output and power supply modules, the system can include an optional colorlock module. The colorlock circuitry locks the sync gen to an external NTSC composite video signal or a monochrome composite video signal.

To prevent jitter between separately locked burst and sync, the master oscillator is locked to the incoming burst and the sync is phased into coincidence. Automatic phase locking is returned to the sync gen when switching from network or remote telecasting or in the event of a signal failure.

Timing is money, and Cohu's got the clock that keeps it that way. For more details contact your nearest Cohu representative or the TV Product Line Manager direct at 714-277-6700, Box 623, San Diego, California 92112, TWX 910-335-1244.

COHU
ELECTRONICS, INC.
SAN DIEGO DIVISION

Circle Number 4 on Reader Reply Card

Broadcast Engineering

The technical journal of the broadcast-communications industry

in this issue...

-
- 28 NAB News Special.** Latest Association news and information on convention session. Includes information on engineering award and distinguished service award.
-
- 32 New Product Special.** Details and pictures of new equipment to be introduced at the convention. Includes news of all types of products that were made available at press time.
-
- 49 Exhibit Guide.** An official floor plan of the exhibit areas in the Conrad Hilton Hotel.
-
- 54 Peaking The Color Transmitter.** BE Maintenance Editor discusses transmitter stages, filters, coupling and matching, differential phase and response measurements. **Pat Finnegan.**
-
- 63 Emergency Broadcasting.** A description of the WDSU, New Orleans, complement of equipment and procedures for staying on the air during emergencies. The effort of one station that tries to learn from each new emergency situation. **Lindsey Riddle**
-
- 66 Intensity Measurement By Helicopter.** Details of how to run intensity measurements in areas where the "walk-in" would take too much engineering time. **Alvin Andrus.**
-
- 70 The Challenge of Lighting.** Coverage of the lighting techniques for the "Tonight" show. **Stanley Schwartz.**
-
- 74 Care And Treatment of The Wire Machine.** Tips on how to keep your radio wire operation more consistent. **Roy B. Carter.**

ABOUT THE COVER

Annually, the NAB exhibit areas at convention time give everyone a chance to see what will be available for the first time. BE has extended its coverage of new products. See page 32. (Photo, courtesy of Visual Electronics.)

DEPARTMENTS

Direct Current	4
Letters To The Editor . .	8
Industry News	14
Educational Broadcasting	20
CATV Scope	24
Engineers Exchange . . .	76
People In The News . . .	82
Tech Data	86
Ad Index	97
Classified Ads	98

EDITORIAL

GEO. H. SEFEROVICH, Director
 RONALD N. MERRELL, Editor
 CARL BABCOKE, Solid State
 MORRIS COURTRIGHT, Automation
 HARRY A. ETKIN, Cable TV
 PAT FINNEGAN, Maintenance
 HOWARD T. HEAD, FCC Rules
 ROBERT A. JONES, Facilities
 MIKE SMITH, Educational Stations
 A. PETERSON, Editorial Assistant
 DUDLEY ROSE, Art Director

EDITORIAL ADVISORY BOARD

LES NELSON, Chairman
 Howard W. Sams & Co., Indianapolis

CIRCULATION

R. VINCENT WARD, Director
 EVELYN ROGERS, Manager

ADVERTISING

E. P. LANGAN, Director
 R. JACK HANCOCK, Manager
 S. F. WILSON, Production
 JAKE STOCKWELL, Sales

REGIONAL ADVERTISING SALES OFFICES

Indianapolis, Indiana 46208
 ROY HENRY
 HOWARD W. SAMS & CO., INC.
 2469 E. 98th St.
 Tele: 317/846-7026

New York, New York 10019
 CHARLES C. HORNER
 3 W. 57th St.
 Tele: 212/688-6350

Los Angeles, California
 JOHN D. GILLIES
 3600 Wilshire Blvd., Suite 1510
 Los Angeles, California 90005
 Tele: 213/383-1552

London W. C. 2, England
 JOHN ASHCRAFT & CO.
 12 Bear Street
 Leicester Square
 Tele: 930-0525

Amsterdam C, Holland
 JOHN ASHCRAFT & CO.
 W.J.M. Sanders, Mgr.
 for Benelux & Germany
 Herengracht 365
 Tele: 020-240908

Tokyo, Japan
 INTERNATIONAL MEDIA
 REPRESENTATIVES, LTD.
 1, Shiba-Kotohiracho, Minato-ku
 Tele: 502-0656



BROADCAST ENGINEERING is published monthly by Intertec Publishing Corp., 1014 Wyandotte Street, Kansas City, Missouri 64105. Telephone: 913/888-4664.

BROADCAST ENGINEERING is mailed free to qualified persons engaged in commercial and educational radio and television broadcasting. Non-qualified subscriptions in the U.S. are \$6.00 one year, \$10.00 two years, \$13.00 three years. Outside the USA add \$1.00 per year to cover postage. Single copy rate 75 cents. Back issue rate \$1.00. Adjustments necessitated by subscription termination at single copy rate.

Controlled Circulation postage paid at Indianapolis, Indiana.



Robert E. Hertel, Publisher

Intertec Publishing Corp.
 Subsidiary of Howard W. Sams & Co., Inc.

Copyright, 1970, Howard W. Sams & Co., Inc. All Rights Reserved. Material may not be reproduced or photocopied in any form without written permission of publisher.

“

Frankly, when I read your statement about increasing coverage, etc. I thought, 'Yeah, I'll bet!' but we desperately needed some equipment for the purpose yours serves. Your generous offer of 30 days free trial convinced us, so we investigated. How we wish that all the equipment we purchased for our recent power increase would perform as well as the Audimax and Volumax! Our signal passes through 20 miles of telephone lines with all the amplifiers, repeater coils, attendant high resistance and other problems. We use the Audimax to feed the telephone line with a constant volume input, and we use the Volumax to compensate for losses in telephone lines and to control peaks to prevent overmodulation. Both products do a marvelous job at this even with adverse atmospheric conditions such as moisture in the line.

”



Mrs. Earlene Stebbins — General Manager WRSV, Skokie, Illinois

WRSV gets increased coverage and quality.

Audimax, automatic gain controller, offers exclusive Gain Platform operation, Gated Gain Stabilization and Return-to-Zero function. *Volumax*, limiter, offers positive prevention of overmodulation.

Both units solid state and unconditionally guaranteed. To place your 30 day Free Trial order or to get complete information, write or call collect (203) 327-2000.



PROFESSIONAL PRODUCTS

CBS LABORATORIES

A Division of Columbia Broadcasting System, Inc. 227 High Ridge Road, Stamford, Connecticut 06905 (203) 327-2000
Circle Number 5 on Reader Reply Card

DIRECT CURRENT FROM D. C.

March, 1970

By Howard T. Head

White House Plans New Communications Office

The White House has proposed the establishment of a new Office of Communications to oversee broad issues of communications policy for both government and non-government users. It is expected that the new Office would exert considerable influence on such matters as allocation of frequencies, cable television systems, and the rising communications demands of computers. Establishment of the new Office would not change present FCC responsibilities, although White House recommendations would undoubtedly be given considerable weight at the FCC.

The White House has also recommended that the Commission permit wide use of communications satellites for domestic relaying--a problem which has been under study for some five years. If these recommendations are followed, a variety of heavy communications users will be permitted to operate their own domestic satellites--rather than limited entities such as COMSAT or AT&T.

The three major national television networks, which have been in the forefront of proposals for a satellite system for domestic television relaying, have already awarded a \$100,000 contract for studies of a domestic television satellite relay system.

FM Stations May Test Four-Channel Stereo

The Commission has authorized tests of the new four-channel stereo sound system by pairs of FM stations serving the same area. Under ordinary circumstances, advance FCC approval is not required so long as each of the two stations meet all of the requirements with respect to ordinary pilot sub-carrier stereo transmissions.

The Commission has not yet authorized testing of systems which provide for the transmission of all four stereo channels by a single FM station. An experimental authorization for such transmissions is required from the Commission, and full technical details must be supplied.

The Commission's Field Engineering Bureau is acquainting the district offices with the new policy, and further details are available from your friendly local R.I.

CATV Getting Substantial Breaks

In a flurry of activity, the FCC has taken the following major steps, all favorable to fostering the development and growth of cable television systems.

(Continued on page 6)

HELIAX COAXIAL CABLE...

the ultimate
in high power
performance



3-70

The one cable that has all the advantages for transmission of high power RF. One piece connects transmitter to antenna. Eliminates the numerous flanges and bullets of rigid systems. HELIAX is easiest to plan. Easiest to install. Most reliable.

Corrugated conductors eliminate the differential expansion problems. Cable can be clamped directly to tower, buried directly in earth.

Standard types and sizes up to 8".

Communicate with Andrew.

 **ANDREW**

ANDREW CORPORATION, 10500 W. 153RD STREET, ORLAND PARK, ILLINOIS 60462, PHONE (312) 349-3300

(Continued from page 4)

1. transformed the former FCC CATV Task Force into a full-fledged bureau, placing the CATV Bureau on a par with the Broadcast Bureau,
2. forbidden telephone companies to increase charges for CATV pole line attachments and joint duct use,
3. ordered telephone companies to stay out of the CATV operations and to divest themselves of any CATV holdings,
4. exempted CATV systems having less than 500 subscribers from the requirements of Section 74.1103 of the Rules, which establishes carriage and non-duplication requirements for a CATV system (this exemption has been protested by NAB),
5. announced its willingness to permit the continued and expanded use of the 6 GHz band for CARS, except near large metropolitan areas.

Commission Orders Improved UHF Television Receiver Performance

The Commission has made final proposed Rules restricting the permissible local oscillator radiation from UHF television receivers (see Jan., 1970 D. C.). The previous Rule, in effect since 1956, held local oscillator field strengths to 500 uv/m at a distance of 100 feet, although this limit had actually been 1000 uv/m as a result of a continuous series of waivers.

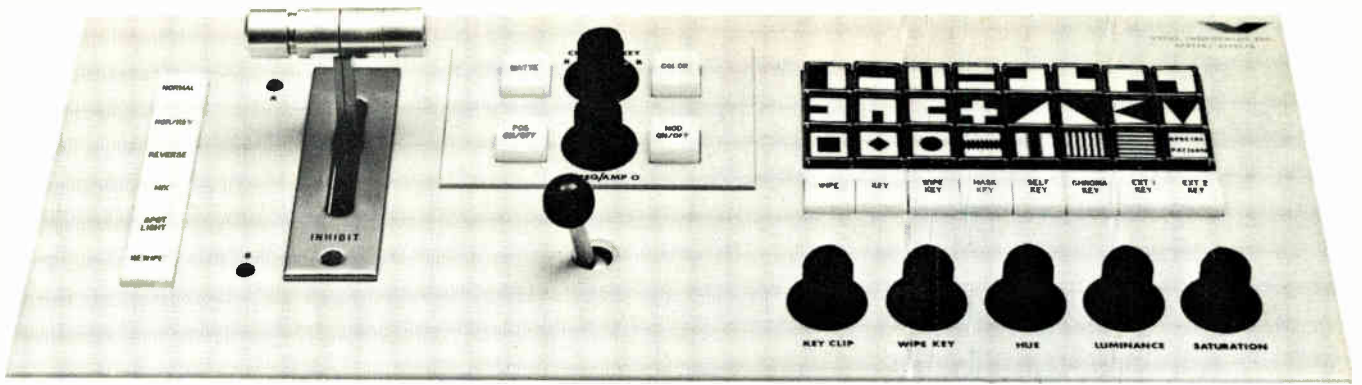
The new Rule lowers the permissible radiation to 350 uv/m at 100 feet, to be the average of several measurements taken throughout the band. No single measurement may exceed 750 uv/m.

The Commission has also proposed to require that television receiver tuners provide comparable tuning performance at UHF and VHF. The new proposal, to go into effect May 1, 1971, would apply to all television receivers with picture diagonals of more than nine inches. The new rules would not require any particular type of tuning; however, all channels would be required to be tuned by the same method whether detent, continuous or otherwise.

Performance of receiving antennas is not mentioned but is known to be under study. Perhaps comparable television receiving antenna performance will be required for all channels, a nice trick if someone can figure out a way of overcoming the antenna wave-length factor, which gives UHF an automatic 20 dB disadvantage compared to VHF.

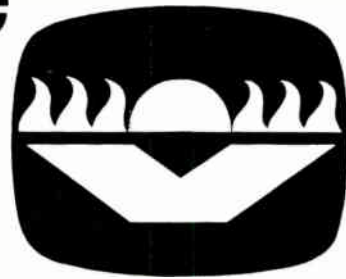
Short Circuits

The AT&T radio rate increase has been further postponed to July 1, 1970 . . . The Commission has authorized a 10-watt VHF TV translator east of the Mississippi (in North Carolina) . . . The FM Rules have been amended to permit increased power for Class A FM stations employing high antennas . . . The Commission has concluded oral argument in the matter of sharing television channels with the land mobile services and is expected to act shortly . . . The "temporary loan" of 2106.4 MHz, a broadcast auxiliary frequency, to NASA, has been made permanent . . . The Commission has called for comments on subcarrier telemetering to be used with the remote control of VHF television transmitters, hopefully the last detail to be resolved before authorizing regular VHF remote control authorizations.



FOR EFFECTIVE PROGRAMING AND COMMERCIALS

check the advantages of the Vital VSE-2000 special effects system



- Extensive use of linear and digital integrated circuits with rigid power supply regulation for optimum stability.
- All pattern selection is via momentary illuminated pushbuttons.
- Built-in effects inhibit on non-synchronous video.
- Internal (self) key, two external key inputs and chroma key with simultaneous wipe key, mask key.
- Matting monochrome and color.
- Spotlight
- 24 wipes with 8 rewipes with means to generate unlimited number of patterns.
- NO drives required from local sync. Video from A or B buss furnishes required drives and sub-carrier.
- Positioner with built-in pattern modulator and outputs for tracking camera drives.
- First "In-line" chroma key in the industry. Will chroma key on composite signals on any color.
- Includes NAM mixer amplifier.
- Full tally logic.

MAIN OFFICE: 3614 S.W. Archer Road
Gainesville, Fla. 32601 904-378-1581

3620 Ridgewood Rd., N.W.
Atlanta, Ga. 30327 404-233-9459

2644 N. Seventh Street
Terre Haute, Ind. 47804 812-466-3212

210 Elder Fields Road
Manhasset L.I., N.Y. 11030 516-627-0351

GOOD ENGINEERING IS VITAL



VITAL INDUSTRIES, INC.

Circle Number 7 on Reader Reply Card

The
**NEWEST
MEMBER**

OF

CCA

ELECTRONICS



REK-O-KUT

**REK-O-KUT
COMPANY, INC.**

1568 NORTH SIERRA VISTA, FRESNO,
CALIFORNIA 93703 • Phone: 209 251-4213

A Subsidiary of CCA

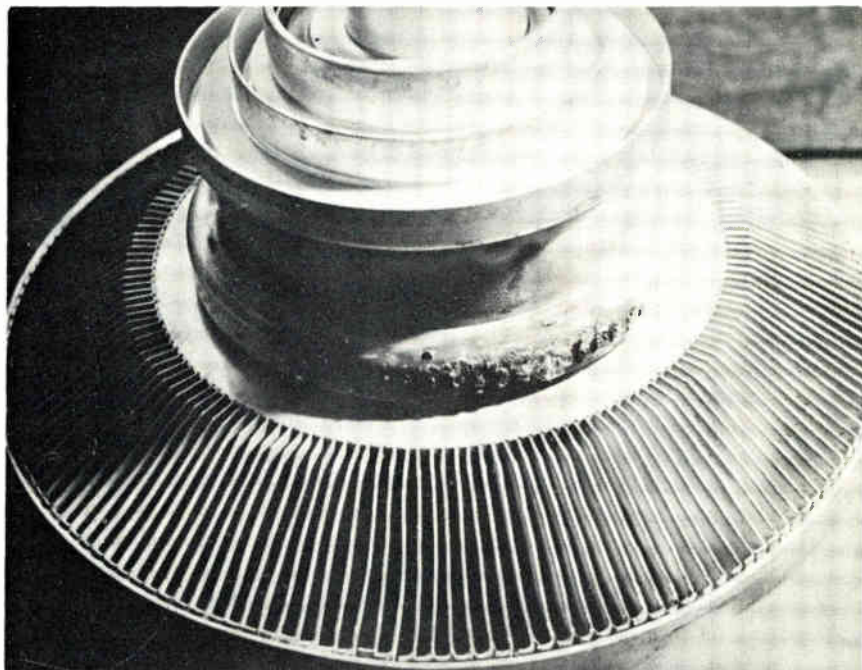
CCA ELECTRONICS CORP.
716 JERSEY AVENUE, GLOUCESTER CITY,
NEW JERSEY 08030 • Phone: 609 456-1716

LETTERS TO THE EDITOR

Save That Power Tetrode

In the January 1970 issue of **Broadcast Engineering**, the article "General Transmitter Maintenance: A Nuts and Bolts Procedure" by Patrick S. Finnegan, shows on page

37 "A UHF power tetrode showing damage that can be caused by a poor plate spring contact". Finnegan further states: "The tube shown here is damaged beyond repair."



If looks are not deceiving, that tube is an RCA 8501 or similar tetrode such as we at WYAH-TV use in our RCA TTU-10A UHF transmitter. We have had several 8501's which were damaged similarly and were reused after gently cleaning the burnt places on the plate ring of the tube with a relay burnishing tool, and then gold plating the area with one of Radio

Shack's little "Science Fair" Insant Plating kits, which sells for about \$15.

The tubes so treated have given many hours of service since this treatment.

T. L. Mann
Engineering Dept.
WYAH-TV
Portsmouth, Va.

VAB Winter Meeting On Target

The broadcast engineering shortage and FCC Rules were the two major topics of session addresses at the Winter Meeting of the Virginia Association of Broadcasters. Since most of the positions taken by the speakers would be adequate meet for a host of BE editorials, we are,

instead, recapping in this column some of the more important statements made at that meeting.

John C. Morgan, WFVA, Fredricksburg, read a speech for the NAB's George Bartlett. Bartlett was attending the NAB meeting in Hawaii at the time of the VAB meet.

BROADCAST ENGINEERING

Get it all together

And TeleMation's got it all — from the industry's best selling camera to the most complete and sophisticated television production systems. And everything in between.

For instance, video production and distribution switchers, optical multiplexing systems, 14 models of synchronizing generators, and a complete line of video test equipment.

Only TeleMation gives you one source for complete systems capability.

We've put together advanced concepts, IC/MSI/LSI technology, precision manufacturing, product availability and a distribution organization to give you the finest engineering, design and service in the business.

These are just a few reasons for our remarkable growth and ever increasing list of satisfied customers.

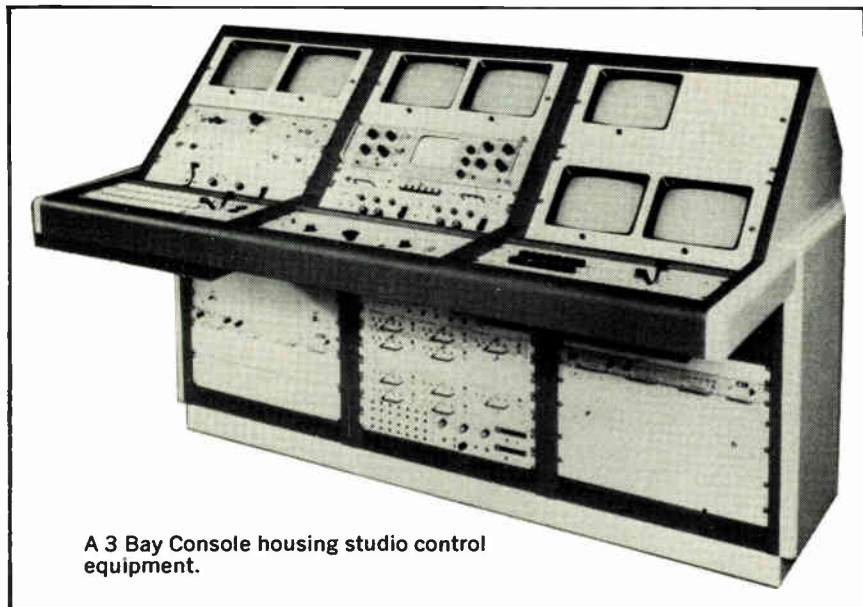
Talk to TeleMation.



Our best selling TMC 2100 Series Camera.



TSG 2000 all digital sync generator and . . . new TSG 3000 — The industry's first programmable, all-digital broadcast sync generator.



A 3 Bay Console housing studio control equipment.



TELEMATION, INC.
The Total System Supplier

2275 South West Temple
Salt Lake City, Utah 84115
(801) 486-7564

TALK TO US AT NAB BOOTH 416 NORTH HALL
Circle Number 8 on Reader Reply Card

VAB Winter Meet

(Continued from page 8)

Among other comments, he said that more of the responsibility for violations and forfeitures should be taken on by the engineer responsible. He went on to say that, contrary to popular belief, most of the Rules violations fall into non-engineering categories. But of the engineering violations, proof of performance was the leader.

Direct Line On FCC Citations

Jerry Freeman, chief of the Richmond FCC field office, said that during 1969 a number of engineers were notified of violations, and they were not notified through their station address. Since a great many industry leaders follow this line of thinking, and because the FCC seems to be in agreement, 1970 should see even more citations sent directly to the home address of the engineer responsible for the violation.

This question was brought into focus when VAB president Phil Whitney (and this year's NAB engineering award winner) described one case where FCC inspectors parked near a remote transmitter site and waited for the engineer to show up to make his readings. The engineer arrived and left a short time later. Within days, the FCC asked to look at the log of that station, and they found that his times did not agree with the time they had visually noted at the site.

Fair? Unfair? Neither is quite as accurate as log falsification. The engineer was sent a notice of violation, not the station.

Comments From The License Schools

At the same meeting, a spokesman from REI said that their schools do not pretend to put out broadcast engineers after five weeks of training. Rather, he said, they are able to pass the First Phone test and they take with them a basic background in electronics. At the same time, he admitted that it takes quite a lot longer than five weeks to cover electronics thoroughly. The

strong points of the "90 day wonder schools" seemed to be that they organized the material for their students in such a way that they could pass the test and that these "wall-paper licenses" do fulfill the requirements of the FCC.

Walker Looks At New Day In Hiring

Speaking to both engineers and management, William L. Walker (recently departed from the NAB after a long service record) told the VAB, "The day when an employer could staff his organization by hanging out a sign lettered "Help Wanted" is gone. Today," he said, "if he utilized that approach, he might just as well have the sign read 'No Help Wanted' for all the response he would probably get."

Walker is the VP of the Larson/Walker & Company consulting firm. He acts as a management consultant, assisting broadcast stations in problem solving and general trouble shooting.

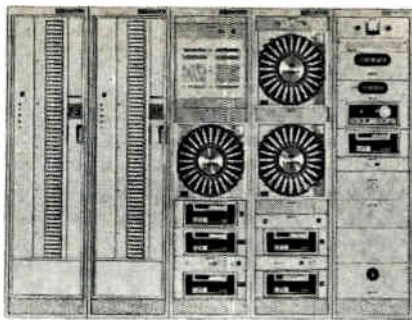
If you want to keep staff turnover down, Walker suggested these guidelines: "If you are the nit-picking manager who checks every detail, look for employees who thrive under constant supervision. If you can't stand being bothered by details, search for people who resent intrusion in the manner in which they perform their duties, so long as the end result is satisfactory. In short, seek out the type of people you can manage best, be they engineers, salesmen, or go go dancers. Try to figure out which manner of reward will best motivate them. Treat them accordingly, and you will be well on your way toward a successful organization."

BE Sees Need For Practical Engineering And Management Rules

Your editor addressed an early session on the subject of "Practical Rules for Practical Engineering." The first order of the day was to agree that percentage fines should



"LISTEN, LERSCH, --- NO MORE OF THOSE
WHITE TORNADO COMMERCIALS!"



Look what our customers say about flexible Gates automation systems...

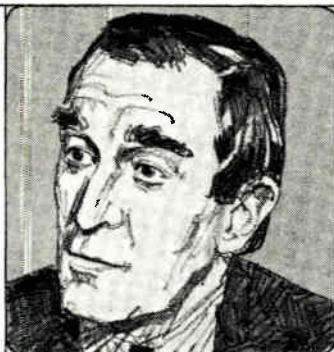


"We're in small cities and have to add spots right at air time if the sponsor asks! Our Gates automation system lets us do this with no fuss at all."

Arnold Lerner—
WLLH,
Lowell/Lawrence,
Mass.

"Our program format varies substantially during the day, and from day to day. We make these changes quickly and accurately with our Gates Tape Memory Control."

Ben Levesque—
CHRL,
Roberval, Quebec



"We find there are times we want to simulcast our news on both AM and FM. Our Gates automation system couldn't adapt more readily to meet this requirement."

Charles Wright—
WBYS,
Canton, Illinois



"We program for periods of time completely automated and at other times use a combination of automation and live. It couldn't be easier with our Gates automation equipment."

Frank Wood—
WEBN,
Cincinnati, Ohio



See the
1970
NAB
Show

Booth #219
West Hall

If you think last minute changes can't be made immediately, easily, maybe you're wrong. Gates says it's possible. So do our customers! For more information about flexible automation, call us at (217) 222-8200, or write Gates Radio Company, 123 Hampshire St., Quincy, Illinois 62301.



GATES

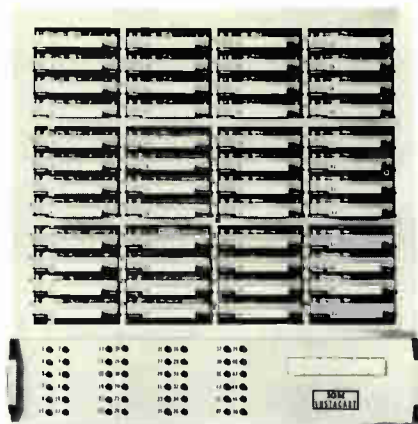
A DIVISION OF HARRIS-INTERTYPE

Circle Number 9 on Reader Reply Card

New from IGM: INSTACART —provides instant random access to 48 cartridges

Permits automated, tight formatting of spot material, news actualities, music and special programming from multiple cartridge sources. Stacked-array configuration, with four motors, four drive shafts and 48 heads for 48 cartridges, gives Instacart its back-to-back random access capability.

Standard models, for use with separate cartridge recorder, have one audio output. Models with combined recording and playback capabilities, and with multiple outputs,



available. Push button manual controls standard; remote controls and memory-type controls available.

Instacart meets all NAB specifications. For complete details, write or call International Good Music, P.O. Box 943, Bellingham, Wash. 98225. Tel. (206) 733-4567.



Tomorrow's Engineering Today

Circle Number 10 on Reader Reply Card

IGM leads again, with MOS Series RANDOM SELECT MEMORY

Memory length
unlimited
Controls up to
336 cartridges



Here is utmost capacity, compactness, flexibility and freedom from maintenance, all made possible by space age technology.

Enter or change any instruction while the unit is searching and airing material. Leave any step open for last minute additions, to be skipped automatically if not programmed by air time. Verify accuracy of entries immediately by visual readout. Correct any error by simply re-entering.

Memory length is expandable in increments at low cost.

Investigate now! For full details, write or call International Good Music, Inc., P.O. Box 943, Bellingham, Washington 98225 · Telephone (206) 733-4567.



Tomorrow's Engineering Today

Circle Number 11 on Reader Reply Card

VAB Winter Meet

(Continued from page 10)

be levied on responsible engineers after forfeitures have been accessed by the FCC.

Also, I pointed out that if the engineering staff is treated and paid as a necessary evil, the result would be (1) higher turnover in staff, (2) disappearance of loyalty and staff pride, and (3) sub-par station operations. These three do, of course, also lead to FCC citations.

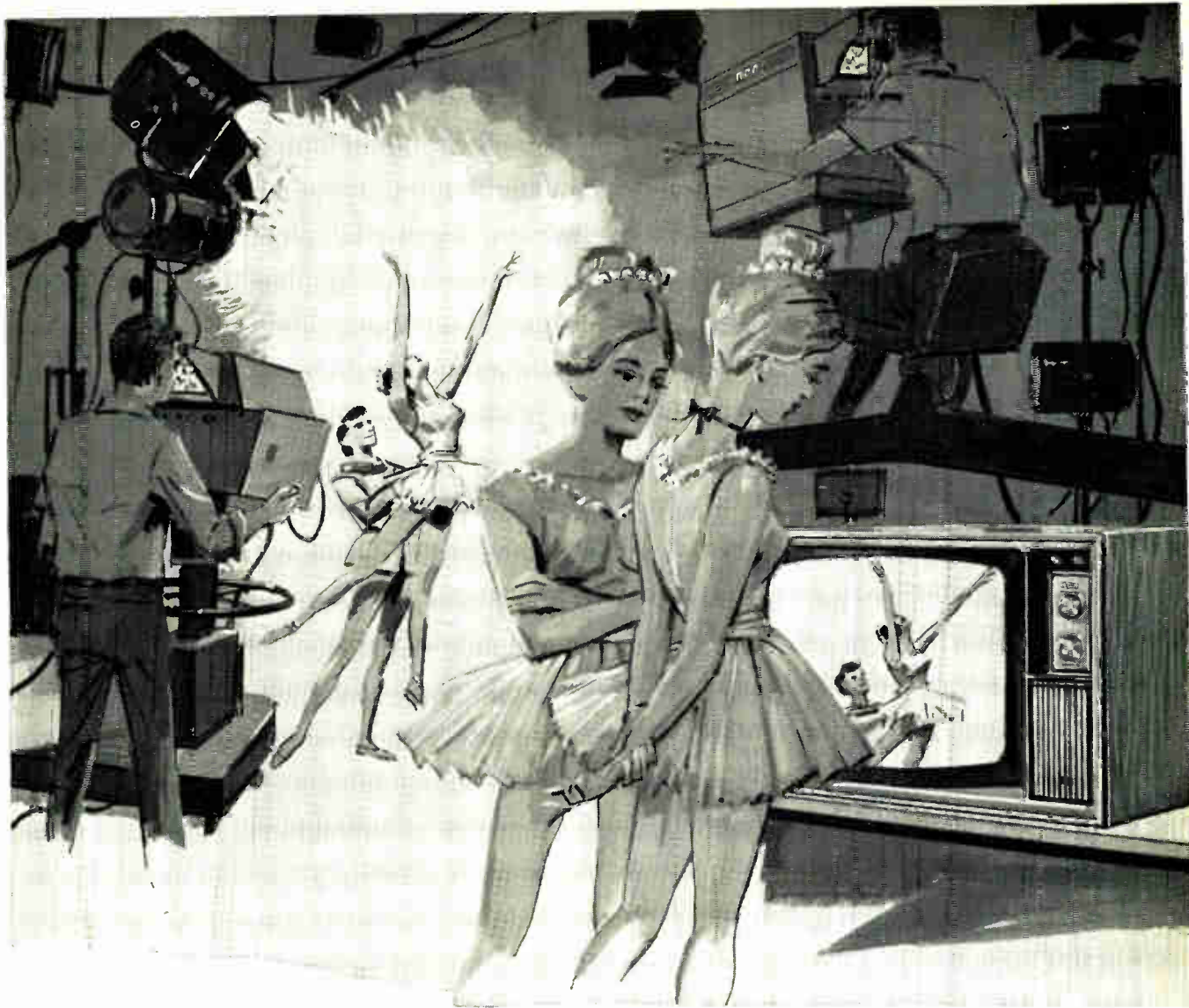
Although everyone wants at least enough salary increases to meet the rising cost of living, pay is not always paramount. Engineers can survive and help the station maintain excellent signal quality when given a working atmosphere that encourages the use of individual talents, offers further technical training, and includes high fidelity communications with station management. The record is clear that at a number of stations engineering talent is not a collection of drifters because there are high expectations, challenges, engineering-management communication, and OJT programs.

Open Invitation For Comments

Broadcast Engineering reminds you that while we do not normally run editorials, do look for interesting viewpoints to be presented in Letters to the Editor. What are your comments on the state of the art? How do you feel we can best handle the engineering shortage? Send your comments on these and other engineering oriented questions to The Editor, **Broadcast Engineering**, 1014 Wyandotte, Kansas City, Mo. 64105.

Tired of Hand-Me-Down Copies of Broadcast Engineering?

As a member of the broadcasting industry you probably qualify to receive your personal copy of B.E. FREE! We have enclosed a postage-paid reader service card for convenience—see back section of this issue. Just complete the card and drop it in the mail box. We'll do the rest.



Move in on your viewing monitor costs...

Here's an RCA Commercial Color Set that, while not suitable for all your monitor needs, can fill the bill, and really cut your cost!

Non-critical viewing spots in your studio—backstage, audience and the like—don't need the critical efficiency of technical, high cost monitor sets. RCA commercial color TV viewing monitors do the job—for under \$400 each!

Unlike a consumer set, RCA's Model JM-897W is equipped to accept RF or bridged direct TV video and audio line feed without the costly adaptors required when entertainment-type TV sets are used for monitoring functions. Yet you get every non-critical monitoring function you can ask for—picture, sound, live or tape, color and black-and-white!

Mail this coupon to arrange to talk it over with us. Show us how many spots you have waiting for non-critical monitoring. We'll show you cold cash reasons why RCA's commercial color TV is your best answer.

RCA Commercial Products

RCA Service Company
A Division of RCA
Commercial Products Sales, Bldg. 203-3
Camden, N. J. 08101

Dept. C-141

Please furnish further information about RCA commercial color sets for broadcast monitor purposes.

Name _____ Title _____

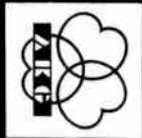
Station _____ Phone _____

Address _____

City _____ State _____ Zip _____

Circle Number 12 on Reader Reply Card

Put an AKG on the job.
It will sound better!



ANG CANADA • DIVISION OF DOUBLE DIAMOND ELECTRONICS • SCARBOROUGH, ONTARIO

MICROPHONES • HEADPHONES

DISTRIBUTED BY
NORTH AMERICAN PHILIPS CORPORATION
100 EAST 72ND STREET, NEW YORK, NEW YORK 10017

D-900E
Shotgun Dynamic
Microphone
\$149.00 Net



"Ineffective Utilization"

NAB Backs SRI Report

The National Association of Broadcasters has endorsed a report by the Stanford Research Institute which shows that any shortage in land mobile frequencies is the result of improper frequency allocations and mismanagement.

In a filing with the Federal Communications Commission, NAB said the Stanford study shows FCC has assigned frequencies "in blind reliance" on land mobile claims that more space is needed and that there's "little or no occupancy" on many channels reserved for use by police, fire departments and other land mobile users.

The Stanford report on spectrum space was commissioned by the FCC to explore the sharing of land mobile channels and to study frequency assignment principles.

The SRI report, NAB said, "has clearly demonstrated that land mobile congestion is attributable to improper frequency assignment principles rather than a lack of adequate frequency spectrum."

NAB's comments, filed by John B. Summers, chief counsel, urged the FCC strongly to weigh the report's findings.

"The report," NAB said, "bears out the long-standing contentions of NAB, the Association of Maximum Service Telecasters, the All-Channel Television Society, and other parties that relief could be provided to land mobile radio by implementation of frequency management policies designed to correct the wasteful practices which afflict those services."

The report, it said, further shows that since the inception of land mobile services, the FCC has managed those frequencies "in blind reliance on factors which are not necessarily relevant to actual frequency needs."

The Stanford study calls for direct measurement of spectrum utili-

zation as the only adequate means of measuring land mobile needs. It cites a lack of factual data on existing land mobile use and reports that the situation was so poorly defined that "virtually no claim of channel or spectrum saturation could be analytically assessed."

Other report findings: (1) In the three urban areas examined (New York City, Los Angeles, Detroit), the distribution of users among the land mobile channels was found to be seriously inequitable." (2) Land mobile groups and their frequency coordinators "do not have the resources, the capability, or the basic mission . . . to solve the radio spectrum problems . . . in large urban areas" or to engineer and manage effectively regional frequency problems. (3) A combined national and regional spectrum engineering and management approach is required to untangle existing land mobile assignments. NAB said the findings clearly show that "the congestion problems which plague many land mobile licenses do not stem from a shortage of frequency space but rather from ineffective utilization of the present land mobile spectrum."



"THEN HE SAYS, 'ALL I KNOW ABOUT BROADCASTING, HE COULD SHOW IN MY ZOE!'"

Circle Number 13 on Reader Reply Card

Program Exclusivity Subject Of FCC Rules Amendment

Amendment of Section 74.1103 of the Rules governing the processing of waiver requests for program exclusivity and carriage and distribution of TV signals to specify only CATV systems with 500 or more subscribers has been proposed by the Commission (Docket 18785).

The Commission, on March 7, 1968, issued a Public Notice "Temporary Modification of Processing Priorities in Section 74.1103 Waiver Cases" (FCC 68-259), in which it announced that processing of matters filed under Section 74.1103 would be deferred in cases involving CATV systems with fewer than 500 subscribers.

The Commission explained at the time that it is these small systems "which frequently can best make out persuasive hardship cases" and that processing of matters involving such small CATV systems can "engender difficulties out of proportion to their impact on broadcasting." At the same time, the Commission emphasized that broadcast station licensees could call its attention to unusual situations that might require early action. The Commission made it clear, however, that "a persuasive showing of hardship would have to be made before relief would be granted."

The Commission has found that, since this procedure has been in effect, it has worked very well, and there have been few adverse comments. The Commission suggested that, based on its experience with the temporary procedure, its adoption as a permanent policy would be desirable.

The Commission emphasized that requests for special relief can still be filed against systems with fewer than 500 subscribers if special hardship can be shown.

**Buying? Selling?
For Better Results
Use BE
1014 Wyandotte
Kansas City, Mo. 64105**

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

WANE
Ft. Wayne, Indiana
Corinthian Stns.

KARD
Wichita, Kansas
Kansas State Network Inc.

**EASTMAN KODAK
COMPANY**
Rochester, New York

KAUZ
Wichita Falls, Texas
Bass Bcstg. Stns.

**RAY-CHRIS
PRODUCTIONS**
Little Rock, Arkansas

CBS NEWS
New York, New York

CBS NEWS
Washington, D. C.

KCBD
Lubbock, Texas
Caprock Bcstg. Co.

WCTV
Tallahassee, Florida
J. H. Phipps Bcstg. Stn.

KOVT
Dallas, Texas
Doubleday Stns.

**GENERAL DYNAMICS
CORP.**
Ft. Worth, Texas

KFDA
Amarillo, Texas
Bass Bcstg. Stns.

KHOU
Houston, Texas
Corinthian Stns.

**CHRYSLER
CORPORATION**
Chelsea Proving Grounds
Chelsea, Michigan

WHTN
Huntington, W. Virginia
Reeves Bcstg. Stns.

KHVV
Honolulu, Hawaii
Western Telestations

WISH
Indianapolis, Indiana
Corinthian Stns.

KJAC
Port Arthur, Texas
Jefferson Amusement Co.

WJAR
Providence, Rhode Island
Outlet Company Stns.

WKY
Oklahoma City, Oklahoma
WKY-TV System Stns.

NEWS FILM LAB. INC.
Hollywood, California

WNDU
South Bend, Indiana
Notre Dame University

UNIVERSAL LAB.
Kowloon, Hong Kong

KNXT
Los Angeles, California
CBS Owned Stations

**ROJANASIL COLOR
PROCESSING LAB.**
Bangkok, Thailand

KOSA
Odessa, Texas
Doubleday Stns.

KOTV
Tulsa, Oklahoma
Corinthian Stns.

KRBC
Abilene, Texas
Abilene Radio & TV Stns.

WRDW
Augusta, Georgia
Rust Craft Bcstg. Stns.

KRGV
Weslaco, Texas
Manship Stns.

WSWO
Springfield, Ohio
South-Western Ohio TV Inc.

KTVT
Ft. Worth, Texas
WKY-TV System Stns.

KVII
Amarillo, Texas
Marsh Media Ltd.

KXTV
Sacramento, California
Corinthian Stns.

**RAI RADIO TELE-
VISIONE ITALIANA**
Rome, Italy
Italian National Network

WBRZ
Baton Rouge, Louisiana
Manship Stns.

KCST
San Diego, California
Bass Bcstg. Stns.

WLUC
Marquett, Michigan
Post Corp Stns.

KNTV
San Jose, California
Std. Radio & T.V. Co.

KTUL
Tulsa, Oklahoma
Griffin-Leake Stns.

SOUND PHOTO LAB.
Lubbock, Texas

WTVG
Chattanooga, Tennessee
Martin Theatres of
Georgia Stns.

KTVE
Monroe, Louisiana
Gray Communications Stns.

KATV
Little Rock, Arkansas
Griffin-Leake Stns.

WUSN
Charleston, South Carolina
Reeves Bcstg.

WTTV
Indianapolis, Indiana
Sarkes Tarzian Stns.

WPFA
Ft. Wayne, Indiana
Sarkes Tarzian Stns.

WTVM
Columbus, Georgia
Martin Theatres of
Georgia Stns.

WTOK
Meridian, Mississippi
Southern TV Corp.

KBMT
Beaumont, Texas
Liberty Corp.

KFYR
Bismark, North Dakota
Meyer Bcstg. Stns.

ABS-CBN
Manila, Philippines
Alto Bcstg. System

WPRI
Providence, Rhode Island
John B. Poole Stns.

**NHK-NIPPON HOSO
KYOKAI**
Tokyo, Japan
Japan National Network
J. OSAWA & CO., LTD.
Tokyo, Japan

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

Jamieson's low-cost Mark IV 30 FPM color processor is the easiest of all machines to operate. It is fully instrumented. Automatically controlled. It has a warm-up time of just 10 minutes. A put-through time of just 23 minutes. And the Jamieson Mark IV delivers processed film at a rate twice that of other machines of its size.

Write us for complete information on the Mark IV and our other processors.



Jamieson Film Company
EQUIPMENT DIVISION
2817 CANTON ST., DALLAS, TEXAS 75226
A/C (214) 747-5634

Circle Number 14 on Reader Reply Card

SMPTE AND NAFMB SET Chicago Convention Dates

An Equipment Exhibit will be held concurrently with the 107th Technical Conference of the Society of Motion Picture and Television Engineers, April 26—May 1, at the Drake Hotel in Chicago.

Exhibit Chairman Matt Herman, Geo. W. Colburn Labs., Chicago, recently announced that booths will go on sale beginning January 23. "So far," Herman said, "inquiries about Exhibit space have been encouraging. However, only 52 booths will be available and because of the limited space booths will be put on a first-come first-served basis."

The Exhibit will open on Monday afternoon, April 27, with official ribbon-cutting ceremonies and an open house for Conference registrants. Following the ceremony the Exhibit will be open for inspection. A full range of new equipment for television and motion pictures will be on display.

On Wednesday morning, April 29, an Equipment Papers Session will be held where exhibitors will present papers and demonstrations of new equipment and designs.

For more information on the Equipment Exhibit, contact: Matt Herman, Geo. W. Colburn Labs., 164 N. Wacker Dr., Chicago, Ill. 60606, or SMPTE Headquarters, 9 E. 41st St., New York, N.Y. 10017, At: 107th Equipment Exhibit.

NAFMB Meet April 3-5

"New Dimensions in a New Decade" will be the theme of the 1970 convention of the National Association of FM Broadcasters, to be held in Chicago April 3-5.

Convention Chairman John Richer (Station Manager of WFIL-FM, Philadelphia) announced this week that the NAFMB convention this year will concentrate on an exploration of trends in radio programming for the 70's.

Scheduled just prior to the annual meeting of the NAB, the FM broadcasters group will hold its meeting at the Palmer House in Chicago, with registration set for the after-

noon of Friday, April 3, followed by a full schedule of convention activity on Saturday and Sunday, April 4 and 5.

Presentation of the 1969 Major Armstrong Awards for excellence and originality in FM Broadcasting will be made at a luncheon scheduled during the convention and other sessions will spotlight successful programming innovations and concepts currently being used by radio broadcasters throughout the United States.

Richer, who is Vice-President of the NAFMB, has invited all radio broadcasters to attend the group's annual meeting, noting that the National Association of Broadcasters will not—as in previous years—include an "FM Day" in its convention schedule which gets underway in Chicago the same weekend.

Further information regarding the NAFMB convention will be sent to both commercial and educational broadcasters during the next few weeks, and inquiries concerning registration and convention space can be made by contacting the organization's Administrative Director, Karen Layland, at the NAFMB offices 665 Fifth Avenue, New York City.

GET COMPLETE DETAILS

**about the products
advertised or described
in this issue.**

Use Free Inquiry Card.

**Be sure to include your
name and address**



Nearly 1,400 feet above Chicago streets, on a TV broadcast tower atop the 100-story John Hancock Center, an ironworker checks one of the six television antennas installed there. Four of the six TV stations began broadcasting from the new site after Jonas Dovydenas, fearless Chicago photographer, climbed near the top of the 349-foot tower to get this dramatic picture.

Conrac Steps Up The Pace



With The Solid-State Color Standard

Well aware of industry demands for improved reliability, we brought out the high quality RHA series of stabilized monitors for rigid studio requirements. All solid-state. Controlled phosphor... for the first time, assured color match between all monitors in a series. Today, only a few months after introduction, the RHA models are the color standard of the broadcast industry.



A Color-Matching Display Monitor

At the same time, Conrac introduced a companion series of KHA utility displays for less stringent audience and client room use. Also solid state, broadcast quality, but at lower cost. And, the same controlled color-matching phosphor. For the first time, assured color matching between monitors of different model series became possible.



And a Color-Match Modernization Program

The Conrac CYA17 and CYB17 models, by far the most widely used color monitors in the field, will still out perform anything except the new RHA. But the kinescopes don't match the new ones. You could junk them and buy our new models. Maybe you should. But that might not necessarily serve you best. Conrac has a practical answer. Modernization. Now you can return your CYA17 or CYB17 to Conrac for a complete overhaul. Not only do you get a new 90-degree kinescope but it uses the same controlled color-matched phosphor as our RHA and KHA models. For only \$800 total, you also get extensive mechanical and electronic modifications and a full one year warranty. Ask for a return authorization today.

***Stick Around. After 21 Years,
We're Just Getting Started.***

CONRAC
CORPORATION

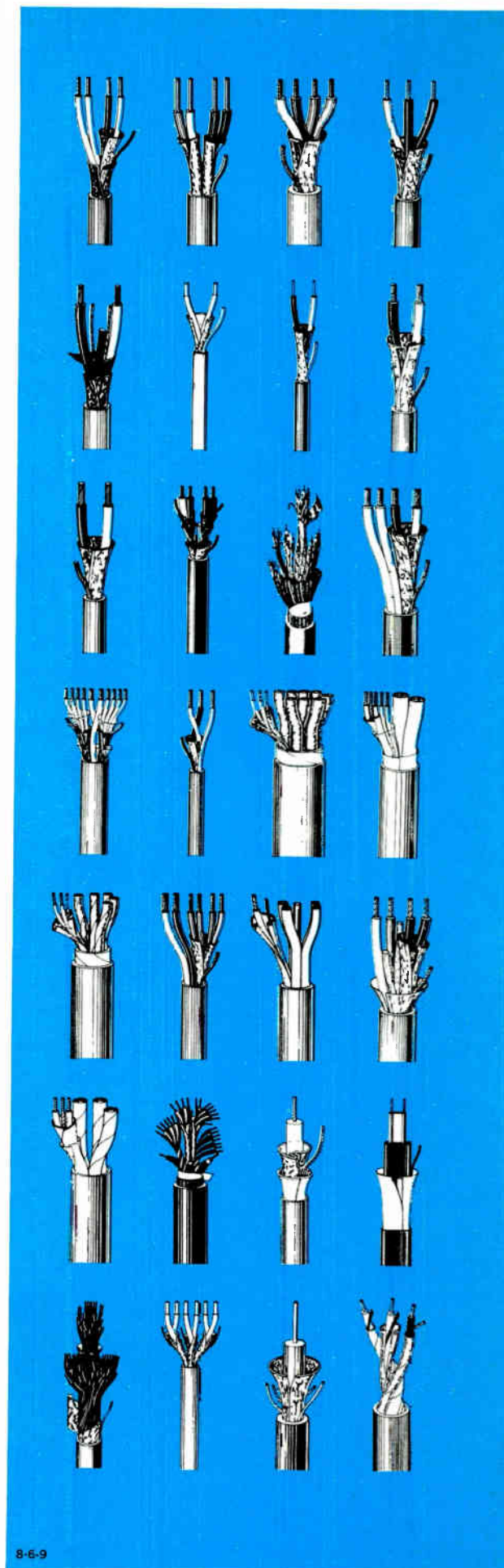
600 N. Rimsdale Avenue, Covina, California 91722 • (213) 966-3511

Circle Number 15 on Reader Reply Card

end your signal pollution problems

Beldfoil® ISO-Shielded™ Cable

It's the cable with virtually perfect shielding. □ It's a Belden exclusive. □ Beldfoil ISO-Shield is like a continuous metal tube enclosing each pair of conductors in a cable. □ It locks out crosstalk or interference . . . whether from outside sources or between shielded elements in the cable. □ Beldfoil is a layer of aluminum foil bonded to a tough polyester film (for insulation and added strength.) □ To form an ISO-Shield, we apply it in any one of several unique ways to meet the requirements of different applications. (See Figures 1 and 2, for example.) □ Each gives more physical shield coverage than braided wire or spiral wrapped (served) shields. □ And greater shield effectiveness . . . even after repeated flexing. □ Beldfoil ISO-Shielded Cables are small, lightweight. □ They terminate easily. □ They're modest in price. □ Your Belden Distributor stocks a wide variety of standard Beldfoil shielded cables as listed in the "Belden Electronic Wire and Cable Catalog" (ask him for the latest edition). □ And, should you have specifications no standard product can meet, ask him to quote on a specially engineered design. □ Or, if you choose, contact: Belden Corporation, P. O. Box 5070-A, Chicago, Illinois 60680. Phone (312) 378-1000.

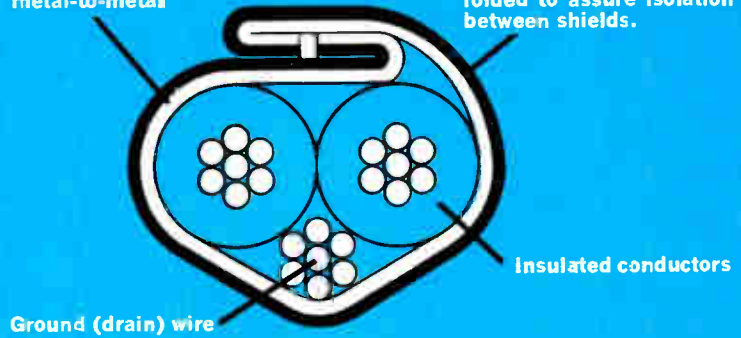


8-6-9

Metal (shield) foil, folded to assure metal-to-metal contact.

FIGURE 1

Polyester insulating layer folded to assure isolation between shields.



Beldfoil Multiple Pair Individually Shielded Cable

The Figure 1 cross-section shows Belden's exclusive Z-folded Beldfoil ISO-Shield. Note the metal-to-metal contact between the two edges of the aluminum foil. In essence, you have a continuous aluminum tube. And the polyester layer on the outside of the fold assures the isolation between shields so necessary for best performance in the field.

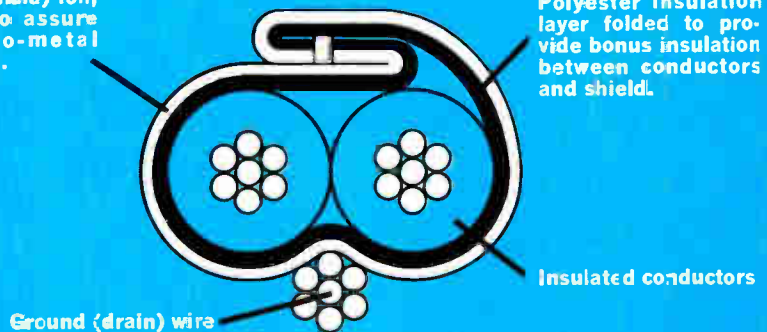
Technical Data

Nominal values for multiple pair individually shielded cables containing 3 to 27 pairs (including 8769 and 8773 through 8778 Series cables)
Suggested working voltage: 300 volts rms max.
Working voltage between adjacent shields: 50 volts rms max.
Capacitance between conductors in a pair: 30 pf per ft. nom.
Capacitance between one conductor and other conductor connected to shield: 55 pf per ft. nom.
Capacitance between shields on adjacent pairs: 115 pf per ft. nom.
Insulation resistance between shields on adjacent pairs: 100 megohms per 1000 ft. nom.

Metal (shield) foil, folded to assure metal-to-metal contact.

FIGURE 2

Polyester insulation layer folded to provide bonus insulation between conductors and shield.



Beldfoil Shielded Single Pair Cable

The Figure 2 cross-section shows the exclusive Belden Z-fold with the polyester insulating layer inward. This makes use of the high dielectric strength of the polyester film as bonus insulation between the conductors and the shield. (The cable jacket provides the primary insulation of the shield from outside objects or adjacent cables.)

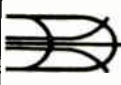
Technical Data

Nominal values for 8451 Shielded Pair Cable
Suggested working voltage: 200 volts rms max.
Capacitance between conductors: 34 pf per ft. nom.
Capacitance between one conductor and other conductor connected to shield: 67 pf per ft. nom.

BELDEN

new ideas for moving electrical energy

Circle Number 16 on Reader Reply Card

VHF |  | RF
 UHF

your best combination for optimum reception

EXAMPLES:

1.  RF

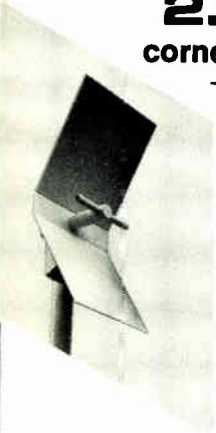
high gain parabolas

- UHF to 30' — to 35 db gain
- VHF to 60' — to 29 db gain



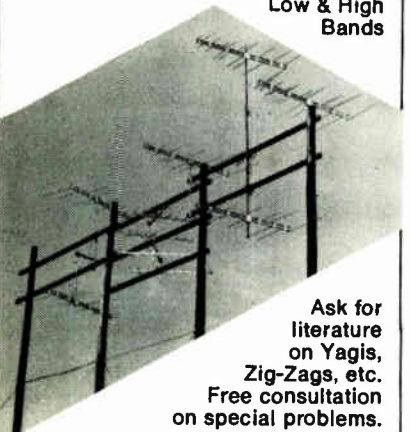
2.  RF
 corner reflectors

— single/stacked
 10 to 19 db gain



3.  RF
 log periodics

All-Band,
 Low & High Bands



Ask for literature on Yagis, Zig-Zags, etc. Free consultation on special problems.

 RF
 SYSTEMS,
 INC.

155 King Street
 Cohasset, Mass. 02025
 Telephone: (617) 383-1200

Circle Number 17 on Reader Reply Card

EDUCATIONAL BROADCASTING

Looking Inside Non-Commercial Broadcasting

FCC Waivers Aid Intercity Relay

Two educational television systems have been given the go ahead, in recent FCC waivers of Sections 74.631(a) and 74.631(e), for the development of intercity relay systems.

Applications by the South Dakota State Board of Directors for Educational Television for a television intercity relay system to be used in connection with the South Dakota Educational Television Network have been granted by the FCC (BMPTI-303-4; BPTI-1375-78). A request for waiver of Section 74.632 (a) of the Rules was also granted.

The rule section provides that a license for a television intercity relay station will be issued only to the licensee of a television broadcast station. The South Dakota Legislature in 1965 authorized the State Board of Directors for Educational Television to construct and operate all state-owned television facilities. The Board filed the applications in its own name because it must bear overall responsibility for intercon-

nection facilities in South Dakota, although it has delegated authority to the particular licensees to operate the stations.

The intercity relay system includes a three-hop northbound system from the University of South Dakota's Station KUSD-TV at Vermillion, to South Dakota State University's Station KESD-TV at Brookings, along with the southbound reverse system from Brookings to Vermillion.

Applications by the University of New Hampshire, licensee of non-commercial educational television station WENH (Channel 11), Durham, New Hampshire, for a three-hop television intercity relay system from Station WENH to Boston Station WGBH-TV, have been granted by the Commission. A request for waiver of Section 74.631(e) of the rules was also granted. The rule section requires that all program material transmitted over a TV broadcast intercity relay station must be intended for use by a television



On location . . . engineers carrying equipment to a remote program location. Such vans as RCA's can mean total system coverage and add interest through live coverage.

station owned or controlled by the TV intercity relay station licensee. WGBH-TV is licensed to the Massachusetts Educational Foundation. The University stated that the television intercity relay stations would deliver programming from the New Hampshire Educational Network, the Vermont State Educational Television Network to Station WGBH-TV. The interchange of program material is necessary, the applicant said, to further coordination of educational television within the northern New England States.

IBS Convention Set For April 3

The Intercollegiate Broadcasting System, Inc., (IBS) will hold their 31st annual convention in the La Salle Hotel in Chicago from April 3 to 5.

Several highly controversial speakers are scheduled to work over the convention theme: Freedom To Speak—or—How to be relevant without really saying anything. The convention will include an IBS forum, college radio exhibits, spe-

cialized small group workshops, and the National Association of Broadcasters' exhibits. The NAB will be holding their national convention in the Conrad Hilton Hotel from the 5th through the 8th of April.

For further information on housing and convention sessions, write to: Michael Kohlstrom, IBS Vice President, 825 Edgecomb Avenue, York, Pa., 17403.

for non-commercial educational broadcasting as a matter of vital public importance."

Federal Grants To Support Two CP's

Application by St. Lawrence Valley Educational Television Council, for construction permits for two educational television stations to serve Watertown, N.Y., on Channel 16, and to serve Norwood, N.Y., on Channel 18 have been granted by the Commission (BPET-335, 337).

These stations will be the first educational stations partially financed by a grant of federal funds. The grant was from the Economic Development Administration of the Department of Commerce. The remainder of the financing is available from state appropriations, donations and a bank loan. St. Lawrence Educational Television Council is a non-profit educational corporation chartered by the Board of Regents of the State of New York for the purpose of constructing, owning and operating noncommercial educational television broadcast stations.

Speak Up!

Open Invitation

Broadcast Engineering invites your comments on material covered in this column and other material appearing in this magazine. We also invite letters to the editor and news from your AM, FM or educational TV station. Keep in touch with BE by writing to: 1014 Wyandotte, Kansas City, Mo. 64105.

NAB Support

The National Association of Broadcasters announced that its Board of Directors has passed the following resolution:

"WHEREAS, the Corporation for Public Broadcasting has been organized, has attracted capable leadership, and is in its critical planning and development phase, and

"WHEREAS, the Corporation has the potential for a significant contribution to the future of non-commercial educational broadcasting to serve the public interest and needs, and

"WHEREAS, NAB and individual commercial broadcasters are supporting non-commercial educational broadcasting and NAB has heretofore officially supported the creation of the CPB,

"NOW, THEREFORE, be it resolved that NAB reemphasizes its endorsement of the goals of the CPB as set forth in the Public Broadcasting Act of 1967 and that NAB will continue to support adequate broad-based public financing

Spotmaster



Tape Cartridge Racks

- Free standing
- Table top
- Wall mounting

Enjoy real fingertip convenience with these Spotmaster tape cartridge racks. Three styles, holding up to 200 cartridges, meet every need. RM-100 wood rack stores 100 cartridges in minimum space, for wall or table top mounting, \$45.00. LS-100 lazy susan rack holds 100 cartridges on table top rotating stand, \$79.50. RS-200 revolving rack is on casters for floor storage and mobility, accepts 200 cartridges, \$145.50. RS-25 rack sections, used in rotating racks, hold 25 cartridges, may be wall mounted individually; rugged steel construction, \$12.50.

Order direct or write for details.

BROADCAST ELECTRONICS, INC.
A Filmways Company
8810 Brookville Rd., Silver Spring, Md. 20910

Why does **GBC** sell more replacement vidicons than all other suppliers combined?



Because GBC offers top quality, fully guaranteed, factory sealed vidicons for less than half the price you'd have to pay anywhere else!

HITACHI 7038H 29.50

HITACHI 7735A
High sensitivity 34.50

HITACHI 7262
(Replacement for Sony & Panasonic) 34.50

HITACHI 8507
(Separate mesh) 74.50

All vidicons sold in lots of five. Add 10% for lesser quantities.

GBC Closed Circuit TV Corp.
74 Fifth Avenue, N.Y., N.Y. 10011 / (212) 989-4433

Circle Number 18 on Reader Reply Card

Industry Gets New Leaders

Hilliard Re-elected

Dr. Robert L. Hilliard, Chief of the FCC's Educational Broadcasting Branch, was re-elected to a fourth term as Chairman of the Federal Interagency Media Committee (FIMC) at the Committee's December meeting.

NERN Manager

Michael C. Harris, program manager, WAMU-FM, Washington, has been appointed manager of the National Educational Radio Network, according to an announcement made today by Robert Mott, executive director of the National Association of Educational Broadcasters' National Educational Radio Division. Harris, who replaces Lucinda Landreth, has been with WAMU since 1961 serving as a producer and operations manager before assuming his present post in 1968.

He has taught courses in radio production and direction at The American University, licensee of the station, and is the recipient of several awards from the university including the C. C. Glover Award for outstanding undergraduate leadership in 1964.

Frederick Breitenfeld, Jr., Executive Director, Maryland Center for Public Broadcasting, Baltimore, and O. Leonard Press, Executive Director, Kentucky Authority for Educational Television, Lexington, have been elected to four-year terms on the Board of Directors of the Educational Television Stations division of the National Association of Educational Broadcasters, it was announced today by ETS Executive Director Chalmers H. Marquis. The addition of these two new directors increases the ETS Board to a total of eight directors, an increase voted by the membership at the November, 1969 NAEB Convention. Di-

rectors also serve half of their 4-year term on the NAEB Executive Board.

The six directors currently on the ETS Board are: Hartford N. Gunn, Jr., Chairman, General Manager, WGBH, Boston; Vice Chairman, Loren B. Stone, Station Manager, KCTS, Seattle; Warren A. Kraetzer, Executive Vice President and General Manager, WUHY, Philadelphia, and WHYI, Wilmington, Delaware, and Chairman of the NAEB Board of Directors; Howard D. Holst, Station Manager, WKNO, Memphis; Lloyd Kaiser, General Manager, WITF, Hershey, Pa., and William J. McCarter, Vice President and General Manager, WETA, Washington, D.C.

H. Rex Lee Named Education Chairman

Commissioner H. Rex Lee has been named Chairman of the FCC's Educational Communications Committee. The Committee, a new addition to the list of Commission working groups, will be responsible for coordinating educational communications activities and for developmental work in this area.

ANNOUNCING:

NEW ALL SOLID-STATE REMOTE PICKUP LINK — UNIQUE NEW CONCEPT!
30 watts — 160 MHz / 18 watts — 450 MHz — MODEL RPL-2

A THRIFTY STL FOR AM-FM-INTERCITY SERVICE
ALL SOLID STATE, OF COURSE — THE ALL NEW MODEL PCL-404

ADP-220 AUTOMATIC DATA PRINTER — AUTOMATIC LOGGING AT ITS BEST
A TOTALLY NEW DESIGN USING LATEST INTEGRATED CIRCUIT TECHNIQUES

See this all-new equipment . . . and more . . . at the 1970 NAB Convention . . . or write for details



MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK

111 CASTILIAN DRIVE
GOLETA, CALIFORNIA 93017
(805) 968-9621

Circle Number 19 on Reader Reply Card

if you need attenuators you need this catalog!

AUDIO AND RF ATTENUATORS TO MEET ANY REQUIREMENT

Here in one compact and informative 28 page booklet is all the data you need to select a Precision Audio and RF Attenuator for your individual application.

Reference Charts, Circuit Diagrams, Types and Uses, Current and Voltage Ratio Tables, Ratings, Etc., make this a handy and invaluable reference.

SEND FOR YOUR FREE COPY TODAY.



TECH LABORATORIES, INC.

Palisades Park, New Jersey • Tel.: (201) 944-2221 • TWX: (201) 947-0825

Circle Number 20 on Reader Reply Card

SCANNING THE CATV SCOPE

By Harry Etkin

How Much Is Exclusive?

Let us start with the matter of Exclusivity Protection as described in FCC Rules and Regulations Section 74.1103. Requirements Relating to Distribution of Television Signals by Community Antenna Television Systems and Sub-paragraphs 74.1103 (e) Station entitled to Program Exclusivity, 74.1103 (f) Program Exclusivity; Extent of Protection, and 74.1103 (g) Exceptions.

What is the dictionary basic definition of Exclusivity? In general, it is the process of "shutting out all others, or in which no others have any share". In response to this definition the Federal Communications Commission asserted its right to regulate CATV like it does Broadcasting and provided cable-TV systems with the regulatory rules.

In 74.1103 (e) it is stated that any cable TV system which operates, in whole or in part, within the Grade B or higher priority contour of any commercial or non-commercial educational television station or within the community of a fourth priority translator station (100 watt translators), and which carries the signal of such station shall, upon request of the station licensee or permittee, maintain the station's exclusivity as a program outlet against lower priority or more distant duplicating signals, but not against signals of equal priority, in the manner and to the extent specified in Paragraphs (f) and (g) of this section.

74.1103 (f) provides for same day non-duplication protection in the case of all CATV systems no matter where located. Upon the request of the TV station the CATV system operator must refrain from duplicating any program broadcast by the TV station, provided the re-

questing station has notified the CATV system of the date and time of its broadcast of its program and the date and time of the broadcast to be deleted. This notification is to be no later than 48 hours prior to the deleted broadcast.

Included in this Section is 74.1103 (g) which provides four exceptions related to Paragraph 74.1103 (f) which states the CATV system operator need not delete reception of a network program provided it adhered to the requirements specified in the exceptions.

Five Conditions

This exclusivity protection regulation applied on the basis of five priority conditions related to commercial and non-commercial educational stations, namely stations within principal community contours, stations within Grade A contours, stations within Grade B contours, translator stations with 100 watts or higher power, and four other exception requirements described in Section 74.1103 (a) (b). The CATV system operator will note that any TV station in a higher category was entitled upon request to same day non-duplication protection with respect to the same program being carried by a station of lower priority.

The required field intensities, F (50, 50), in decibels above one microvolt per meter (dBu) for the Grade A and Grade B contours are as follows:

Channels	Grade A (dBu)	Grade B (dBu)
2-6	68	47
7-13	71	56
14-83	74	64

These limits are presented for the benefit of CATV system operators involved with exclusivity problems. The cable TV system operators, broadcasters and law counselors will

notice that the regulatory control of the exclusivity rule is complicated. It is a thoroughly complex system and is probably one of the most difficult subjects facing the industry today. The exclusivity rules must surely disillusion many in the CATV industry. It has become one of the more frustrating aspects of the FCC-CATV Force.

As the FCC has yet to propose any revisions at the present time in the exclusivity protection rules, the NCTA-NAB proposed compromise actions present a distinction between cable TV systems located in the primary TV markets and those in the secondary markets. Some of the highlights of the compromise are that a CATV system located within 35 miles of a top 50 market is deemed to be located in a primary market. Other CATV systems that are located more than 35 miles from a top 50 market are within a secondary market.

The Compromise

The compromise also proposes that the priorities listed in Section 74.1103 should be deleted and only two priorities be listed in this Section. Therefore, local signals of Grade B or better and distant signals. It specifies that all local signals are equal and no local signals would be entitled to exclusivity protection as against other local signals. Some exclusivity would be required only where the CATV system would be within 35 miles of the top 50 market.

The compromise describes that where a television station is entitled to program exclusivity, the CATV system shall, upon request of the station, delete any first-run syndicated or copyrighted program on local signals from a distant top 50 market station which has broadcast the copyrighted program at least once in the market. No further exclusivity protection would be required for that program. For example, in the top 50 markets, a local TV station which has an exclusive contract to show a program can require a CATV system to black out identical programs from distant stations until the local TV station's exclusive contract for the program expires. If a TV station in the top 50 market is entitled under its contract to exclusivity rights to a motion picture for five years, the CATV system would be precluded

Spotmaster

Introduces the incomparable

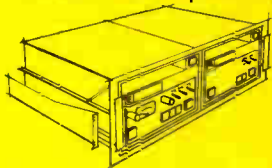
Ten/70



Your search is over. Here is the bold new standard in cartridge tape performance, versatility and ruggedness. Here is the equipment that has everything.

Five models of the magnificent Ten/70 are offered: mono record-play, mono play, mono delayed programming, stereo record-play, stereo play. All have identical dimensions. Any combination of two will fit in our sleek 19-inch roll-out rack panel, just 7 inches high.

And look at the "Human Engineered" versatility. Features and options include manual high-speed advance, exclusive Auto-Cue with automatic fast-forward, automatic self-cancelling record pre-set, front panel



test of cue and bias levels, built-in mike and line level mixer, automatic pressure roller engagement and electrical cartridge release, color-coded design for easiest possible operation.

No-nonsense SPOTMASTER engineering dictates the inside story: a massive U.S.-made hysteresis synchronous "Direct Drive" motor, solid state logic switching, modular construction throughout, premium components, separate heads allowing A-B monitoring, full bias cue recording, transformer input and output, flip-top access to heads and capstan.

This new generation of SPOTMASTER equipment takes its place alongside our classic 500C Series, still offered. Performance and specification are second only to the Ten/70.

Please call or write for complete information.



FREE

COMMEMORATIVE COIN

Saluting the Broadcast Industry on its 50th Anniversary

To honor the Golden Anniversary of broadcasting, Broadcast Electronics has commissioned the famed Franklin Mint to strike a special commemorative coin in limited edition.

A handsome collector's item, this cartwheel sized solid bronze coin is offered to NAB show participants on a first-come first-served basis. Each coin will be permanently registered in your name and is enclosed in an attractive presentation case.

It's just our way of thanking our friends in the broadcasting industry. Stop by, say hello, see the new SPOTMASTER Ten/70, and receive your commemorative coin souvenir.

NAB SHOW

Booth 307, Continental Room • Chicago, April 5-8

BROADCAST ELECTRONICS, INC.

A Filmways Company

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

(Continued from page 24)

from retransmission of that program from distant market signal during that five year period.

In television secondary markets a more relaxed system of exclusivity protection should be provided. There should be no protection applied on local signals. They should all be equal. Local TV stations would be entitled to exclusivity program protection for first run syndicated programs from distant signals.

In many cases the FCC may authorize the substitution of additional signals to replace blacked out signals. CATV systems are also required to black out sports events in areas in which TV broadcast stations are similarly required to black out the event.

The NCTA-NAB compromise has taken small steps towards simplifying the exclusivity problems. CATV systems, no matter where located, should be guaranteed the right to important distant signals as necessary to provide adequate television service.

The Outlook

Congress and FCC in the very

near future should provide the right of CATV systems to carry all local signals for the public interest of the people. Withholding of the TV program should be made an impossible factor either in a CATV statute or by FCC Rules and Regulations forbidding TV stations from being granted unreasonably long program exclusivity protection in the copyright licenses.

Even though the NCTA-NAB staff agreement and compromise could eliminate the unfair practice, the cable television industry is not completely out of the dark until the FCC has clarified its restrictive clauses on exclusivity. The FCC is presently in the process of analyzing this important matter even though the Commission's position is not yet definitive in this area.

Program exclusivity as required by Section 74.1103 of the Rules is interwoven with distant signal carriage and copyright exclusivity. There is also a close relationship with Sections 74.1105, 74.1107 and 74.1109 of the FCC Rules.

In providing details on exclusiv-

ity provisions directed by the Commission to show cause why the CATV system should not be ordered to cease and desist from any further violation of the FCC section of the Rules by failing to provide program exclusivity for any particular TV station, it is recommended that the cable TV system operator use the advice and services of a competent attorney, one who is knowledgeable and familiar with the FCC Rules and Regulations, when formulating a waiver request to the FCC regarding any specific factor of station program exclusivity. The evil of unreasonable delay must be eliminated by directing opposing requests to the Commission at an early date for FCC-CATV action.

Ed. Note: The CATV editor invites readers' comments on this and other issues of interest to CATV operators. Address your letters to: Harry Etkin, CATV Editor, Broadcast Engineering Magazine, 1014 Wyandotte, Kansas City, Mo., 64105.

METROTECH PROFESSIONAL RECORDERS

Meets or exceeds all NAB specifications, and offers substantial savings in either mono or stereo models. **Metrotech Recorders, Reproducers and Loggers** — in networks and major stations everywhere. Write for complete information.



Metrotech

670 National Avenue
Mountain View, California 94040
A Division Of Dictaphone

Circle Number 22 on Reader Reply Card



TRENCHING EQUIPMENT WITH PROFESSIONAL PERFORMANCE

Professionals? You bet! Professionals from Ditch Witch. Men with the technical know-how and machines with the design superiority to stay ahead of the needs of other professionals—the men who'll move the dirt for over a trillion dollars worth of progress in the '70's.

From the rugged and compact 7-horsepower handlebar models to the powerful, top-of-the-line 60-horsepower units . . . from dependable four-wheel-drive to the new track mounts, Ditch Witch brings professional performance to your job.

And from vibratory plows and backhoes to units that can bore under super highways, there's a full range of Ditch Witch attachments to stretch your equipment dollar even further.

Whatever your needs for the '70's, there's a Ditch Witch that offers the best buy for your trenching dollar. Let The Professionals prove it to you!



The Professionals

PROFESSIONAL TRENCHING EQUIPMENT FROM 7-HP to 60-HP...BUILT BY PROFESSIONALS FOR PROFESSIONALS

A Division of Charles Machine Works, Inc., 100 Ash Street, Perry, Oklahoma 73077

Circle Number 23 on Reader Reply Card

NAB News Special

Apollo 11 Crew To Be Honored At Convention

The Board of Directors of the National Association of Broadcasters has voted to honor the crew of Apollo 11 during one of the luncheons to be held during the NAB's annual convention in Chicago, April 5-8.

The recognition will be a new feature of the convention, as will the holding of early morning workshops on Monday, Tuesday and Wednesday of the annual sessions. The workshops will be conducted simultaneously each day and will be re-

peated each day. They will cover such subjects as license renewal, finding and training minority employees, local radio sales, use of computers in station operations, audience measurement, broadcast news freedom, and public relations.

The proposals were made by the NAB Convention Committee, co-chaired by James M. Caldwell, WAVE, Louisville, Ky., and Hamilton Shea, Gilmore Broadcasting Group, Harrisonburg, Va.

In discussing the convention workshops, Harold Niven, NAB vice president for planning and development, said they will provide programming of a practical nature for smaller groups. Since they will be repeated three times, individuals will be able to participate in up to three workshops.

Everett E. Revercomb, NAB secretary-treasurer and convention manager, reported that all exhibit space at the convention has been sold out and members are registering to attend in large numbers.

John M. Couric, NAB vice president for public relations, said the theme of the convention will be "Fifty Golden Years and the Best is Yet to Come" in reference to the year-long celebration of broadcasting's first half century. He reported that all promotional material for the convention will be tied in with the observance and that all exhibitors are being furnished information and suggestions to enable them to recognize the event in their booths and hospitality suites.

Shea said the Broadcast Pioneers will provide a special banquet on Tuesday night at the convention with a "heavily nostalgic" program.

George W. Bartlett, NAB vice president for engineering, told the committee that the engineering ses-

Whitney To Receive Engineering Award

Philip Whitney, general manager of radio station WINC, Winchester, Va., who developed many of the remote control systems in use by the radio industry, has been named by the National Association of Broadcasters to receive its annual Engineering Award.

Whitney, president of the Virginia Association of Broadcasters, is also the supervisory engineer for the R. F. Lewis Radio Stations, owners of WINC and seven other stations in Virginia, West Virginia, Pennsylvania and New Hampshire.

The award, NAB's top engineering honor, will be presented during the Association's 48th annual convention in Chicago at an engineering luncheon on Tuesday, April 7.

Whitney began his broadcasting career as an engineer at station WJEJ, Hagerstown, Md., after graduating from the New Hampshire Teacher's College and the First National Television School in Kansas City, Mo.

Listed among his accomplishments are development of the first complete broadcast microwave remote control systems upon which most systems are based today; development at WRFL, Winchester,

of one of the nation's first automated systems which permitted the station to operate totally automatically and by remote control. He also developed a subaudible activation system for network control of a group of stations in emergencies and designed and constructed such broadcast aids as remote transistor amplifiers, portable console tables for remote broadcasts, and mobile broadcasting units.

Whitney is a senior member of the Institute of Electrical and Elec-

tronic Engineers and a consulting editor for **Broadcast Engineering** magazine. He is the author of more than 25 technical articles in seven publications.

He recently was named chairman of a broadcasting committee which advises the Federal Communications Commission on the Emergency Broadcast Service for the state of Virginia.

Whitney also is a member of NAB's Engineering Conference Committee which is charged with planning the program for the annual Conference to be held as part of NAB's 48th Annual Convention in Chicago next April 5-8.

In addition to Wallenhaupt and Whitney, other committee members are Albin R. Hillstrom KOOL, Phoenix, Ariz.; Eldon Kanago, KICD, Spencer, Ia.; Leslie S. Learned, MBS, New York; Richard T. Monroe, Westinghouse Broadcasting, New York; James D. Parker, CBS-TV, New York; Royce L. Pointer, ABC, New York; Russell B. Pope, Golden Empire Broadcasting, Chico, Calif.; Roland R. Richardt, WSAU, Wausau, Wis., and William H. Trevarthen, NBC, New York.



Phil Whitney

sions are shaping up and that the Broadcast Engineering Conference Committee is working on procurement of the technical papers which will be presented.

The radio sessions, under the planning of Charles M. Stone, NAB vice president for radio, will feature sessions on advertising, programming, black Americans in radio, and a special presentation on records.

The television sessions will include advertising, a conference on major industry problems, and on television information, William Carlisle, NAB vice president for television, said. A secondary market television session also will be held.

On Monday afternoon, separate radio, television and engineering sessions are scheduled.

Tuesday morning, April 7, a radio conference is planned along with engineering sessions for both radio and television. A television session and an engineering conference is scheduled for Wednesday, to be followed by a general assembly meeting.

Radio programming for the 1970's will be the topic of one of the radio sessions. Also, on Tuesday, April 7, NAB radio chairman Richard Chapin will make his annual report.

FCC Chairman Dean Burch will join the speakers lineup for the convention. He is scheduled to address the management session on Wednesday.

Separate luncheons for management and engineering will be held on Monday and Tuesday, with a joint management-engineering luncheon set for Wednesday.

Exhibits by associate member equipment manufacturers will be on display Sunday, 10 AM to 7 PM; Tuesday, 9 AM to 7 PM; and on Wednesday from 9 AM until 5 PM. Over 100 manufacturers will be displaying new and revised equipment in booth areas that went for \$6 per square foot.

Designed to cover many different aspects of the broadcast industry, the workshop topics will include audience measurement, small markets, acquiring and retaining station personnel, fair employment practices and standardization of paperwork.

Distinguished Service Award Goes To Rosel H. Hyde

NAB president Vince Wasilewski will officially open the annual NAB convention on Monday, April 6 with a keynote address before a general assembly of delegates. A ceremony will follow in which Wasilewski will present the NAB's Distinguished Service Award, the broadcast industry's highest honor.

The National Association of Broadcasters announced that Rosel H. Hyde, retired Federal Communi-

ernment leader to receive the award since its origination in 1953. The first was former president Herbert Hoover, who was honored in 1957 for his work in helping develop commercial broadcasting while Secretary of Commerce in the 1920's.

In addition to industry management leaders, the award has been given to a wide range of individuals, including Bob Hope, commentators Lowell Thomas, David Brinkley and Chet Huntley, and two former NAB presidents Judge Justin Miller and Mark Ethridge.

Hyde was selected yesterday by the NAB Convention Committee which met as one of the activities of the NAB Board of Directors meeting here. The award will be presented on Monday, April 6.

Hope received the NAB award in 1963; Thomas in 1968; Huntley and Brinkley in 1967; Judge Miller in 1961, and Ethridge in 1955.

Others who received the NAB award are David Sarnoff (1953); William S. Paley (1954); Ribert E. Kintner (1956); Frank Stanton (1958); Robert W. Sarnoff (1959); Clair R. McCollough (1960); Edward R. Murrow (1962); Donald H. McGannon (1964); Leonard H. Goldenson (1965), and Sol Taishoff (1966).



Rosel Hyde

cations Commission Chairman and career government employee, will receive the NAB's Distinguished Service Award this spring in recognition of his "40 years of unique, continuing service in developing broadcasting in the public interest."

Hyde is the second retired gov-

NAB Membership Total Now Set At 4,240

The National Association of Broadcasters announced recently that the association entered the new year with 4,240 members, 48 more than on January 1, 1969.

Alvin M. King, NAB's director of station relations, issued the new membership figures for radio and TV stations and networks and associate members. AM radio station members now total 2,214, an increase of 2 over a year ago. FM station members now total 1,209, an increase of 30.

NAB gained six TV station members, bringing the total to 544. All seven major radio and TV networks are NAB members. Associate membership gained by 10, with associates now numbering 266.



"THAT N.A.B. CONVENTION UPSTAIRS DON'T MESS AROUND WITH LONG-WINDED SPEAKERS."

Engineers Set To Tackle Ice

The Engineering Advisory Committee of the National Association of Broadcasters has ordered a special study of a problem causing a good deal of concern—ice forming on transmitter towers.

Appointment of a subcommittee was authorized to investigate the availability of ice-resistant towers or of mechanical or chemical means to prevent icing. The group also could recommend a research project for the development of such towers or de-icing devices.

Albert H. Chismark, director of engineering, Meredith Broadcasting Co., Syracuse, N.Y., chairman of the Advisory Committee, will also serve as chairman of the special subcommittee. Also named to the subcommittee were Robert W. Flanders, director of engineering, the WFBM Stations, Indianapolis, Ind.; Royce L. Pointer, director of broadcasting engineering, ABC, New York, and Benjamin Wolfe, vice president for engineering, Post-Newsweek Stations, Washington, D. C.

The Advisory Committee also approved plans to develop standards for cassette tape recorders, latest in NAB efforts to assure the interchangeability of broadcast equipment. George W. Bartlett, NAB vice president for engineering, told the committee that broadcasters are now using cassette recorders quite extensively, particularly in gathering news for later presentation on radio.

NAB some years ago adopted standards for disc and tape recordings to assure maximum fidelity in broadcasts and they now are industry standards throughout the United States and in most of the world.

The Association later developed a test record to permit station engineers to evaluate the performance of their audio equipment, including turntables, and since has distributed 6,000 copies here and abroad.

Distribution of a cartridge test tape has just begun and a second test tape, reel-to-reel, is about ready for distribution.

NAB New Product Special Begins On Page 32

NAB Election Results In

The NAB has released the winners in the recent election. Here are the names of the winners in each district:

Dist. 2, Phil Spencer

Dist. 4, J. R. Marlowe

Dist. 6, Ken Marston

Dist. 8, George Foulkes

Dist. 10, Donald Dailey

Dist. 12, Allan Page

Dist. 14, William Merrick

Dist. 16, Dan McKinnon

For AM stations in the class A market, Perry S. Samuels; class B market, Ben Laird; class C market, Clint Founley; and FM, Ed Allen, Jr.

Upon recommendation of Vincent T. Wasilewski, the Review Board has approved the appointments of Charles Batson, Cosmos Broadcasting Co., Columbia, S. C., and Morton S. Cohn, WLOS-TV, Asheville, N.C., to the Television Code Review Board. They will succeed Willard Michaels, Storer Broadcasting, Miami Beach, Fla., and R. Reeve Owen, WTVC, Chattanooga, Tenn.

'Inconceivable...'

NAB Hits AM Proposal

The National Association of Broadcasters asked the Federal Communications Commission recently to drop proposed rules which would prevent existing AM facilities from improving their service to areas they already are licensed to serve.

The proposed FCC rule would deny AM applicants any major change in existing facilities unless they would provide a "first service" to 25% of the proposed service area or to 25% of the population within that area. Thus, only stations providing "first service" in remote areas which lack adequate radio service would be permitted to expand their facilities. Existing highpower FM service (with one millivolt per meter or greater) would be taken into account in determining whether a particular area or population is without

service.

NAB believes the proposed rule as it relates to major AM changes is "ill-founded and will not assist in conserving spectrum space, but rather will result in a diminishment of the AM licensee's ability to operate in the public interest by serving listeners in his area."

Under the proposed rule, existing AM facilities will be prevented from improving their service to areas they are already licensed to serve, even though these improvements would not violate FCC's technical requirements.

"It is inconceivable," NAB filing said, "to think that existing AM stations will be unable to continue broadcasting in the areas which they are licensed to serve without eventually having a need to undertake major changes."

NAB's comments, filed by Chief Counsel John B. Summers, said:

"No station would be able to request even a minimal power increase nor would it be able to effect any improvements in service which involve 'major changes.'"

Even requests for new transmitter locations might be denied or drastically limited, he said.

NAB said the Commission should not apply its proposed rule to "major changes in existing facilities which meet applicable technical requirements," especially since many existing AM stations were established with power levels and facilities which are rapidly becoming inadequate to serve the enormous population growth.

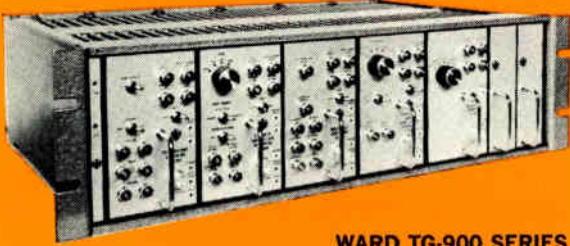
Improvements in AM service could be allowed by the FCC, NAB said, "without its resulting in the injuries it fears will arise in a limited spectrum simply by requiring that any improvement requested be able to meet the well-established technical requirements applicable to such a request for change."

Testing?

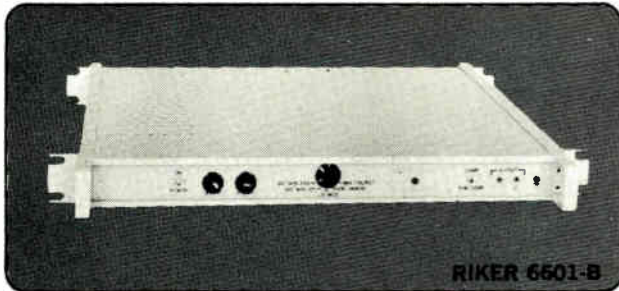
why settle for less!

CHOOSE FROM THE WIDEST LINE OF VIDEO TEST INSTRUMENTATION IN THE INDUSTRY

- PORTABLE TEST SETS
- TEST MODULES
- STUDIO TEST EQUIPMENT
- TELEPHONE CO. TEST SETS



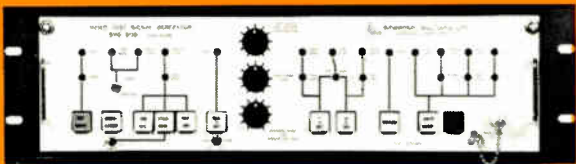
WARD TG-900 SERIES



RIKER 6501-B



RIKER 1551



RICHMOND HILL LABS STG-500

*Multi-Burst . . . Sin²Window . . . Linearity Modulated/
Unmodulated . . . 20T . . . Ramp Modulated/Unmodu-
lated . . . Black and White Reference . . . Bar and Dot
. . . Encoded Bars . . . and many others.*

Ward offers the most extensive and most flexible line of test equipment in the industry . . . proven by years of reliable use in all the major networks, government agencies, and long line carriers. Call or write for detailed information.



WARD ELECTRONIC INDUSTRIES

142 CENTRAL AVE., CLARK, N. J. 07066 • (201) 382-3700

A Subsidiary of **RIKER-MAXSON**

Circle Number 24 on Reader Reply Card

NAB New Equipment Special

No matter how you look at it, the annual NAB convention is the place to send up new equipment balloons. Engineers, managers, owners, engineering firms and a host of other interested people will make their way through the amazing array of new equipment and old equipment with new paint.

Working their way through the NAB exhibit area this year should prove to be a time consuming, awe inspiring effort. It is with this in mind that **Broadcast Engineering** brings you in this pre-convention issue a look at some of the new equipment that will be on display for the first time.

As usual, some manufacturers want to spring their latest at the convention, preferring not to tip their hand until show time. For this reason, this section of the March issue does not include every new piece being readied for the convention.

The technical advances that climbed the hill of the 1960's should now begin to snowball their way down through the 1970's. And unless we miss our bet, nothing should escape change. Even the RCA video cart machine that got so much attention last year will get

a face lifting for this show. In fact, there will be new cameras, tape carts, switchers, microphones, mixers, modular lighting units, transmitters and a host of other new products.

Last year there was an apparent trend toward solid state and PC boards that can be lifted for quick replacement. This year the trend will continue, but the major direction will be to explain that nearly all units can be, in one way or another, tied into the automation cycle that is now beginning in the industry. Schaffer, Gates, International Good Music and others will show convention delegates what will be leading the way in the 1970's.

With all this in mind let's take a look at key products that will be exhibited and, doubtless, will be the topic of conversations long after the hospitality suites have shut down on the last of the convention. And notice that following each new product there is a product identification number. For further product details, circle the matching numbers on the reader service card at the back of this issue. If you can't make it to the convention, you can still keep up on what was on exhibit at the show.

Color Corrector

An electronic color television broadcasting device that corrects color variations in programs beamed to home television will be shown by **CBS Labs**.

The new device was developed for the CBS Television Network by CBS Laboratories in a joint effort with the network's engineering department. The network has a field test program underway and the unit—first of its kind for American television—will soon be available to all broadcasters.



The Color Corrector permits television engineers to adjust color variations in a television program after it has been encoded and at any point during its transmission to the home. In the past, color balance adjustments were made at the camera source, with no practical method of modifying this balance at subsequent program transmission stages.

The device also makes it possible to adjust color program balance during a videotape playback. In addition, program segments and television commercials shot at different times under varying light conditions can be previewed with the compact unit and their color tones balanced to match the overall program. Consequently, corrections are made in near real time without the viewer sensing any variation.

The problem of maintaining consistent color in television broadcasts was explained by Renville H. McMann, Jr., CBS Laboratories Vice President for Engineering, who said: "Color television in the United States is delivered as an NTSC (National Television Standards Committee) encoded signal, thus requiring only one video channel rather than three. But once the NTSC signal is encoded it is diffi-

cult to modify it in a simple fashion without producing objectionable color and luminance errors on the pictures received. If signal sources are to be matched colorimetrically, they must be matched by controls at the originating cameras."

Circle Number 130 on Reader Reply Card

Disc Recorder

Ampex Corporation, which not too long ago developed the slow-motion disc playback machine, now have a new low cost recorder called the DR-10. Readers may recall that Ampex's Lee Stratton predicted last February in an article written for **Broadcast Engineering** that the company would produce smaller more economical disc recording units.

The new Model DR-10 Series of video disc recorders is designed for a wide range of applications in education, industry, medicine, research and sports, wherever "stop motion" is required for close study of recorded television pictures.

The basic DR-10 is the first disc recording system which can be upgraded to provide longer recording capacity and higher picture resolution, according to Lawrence Weiland, vice president-general man-

ager, video products division.

"The DR-10 brings the advantages of disc recording to the fast growing closed circuit television market," Weiland said. "Most valuable of these benefits are instant access to pictures and the continuous still-frame or slow-motion capability for detailed study.

Circle Number 131 on Reader Reply Card

Cameras

Phillips will spring a new set of cameras for the NAB convention. Among the four cameras that will be demonstrated is the newer version of the PC-70. The PC-70S is basically the same unit that caught on so well at last year's convention.

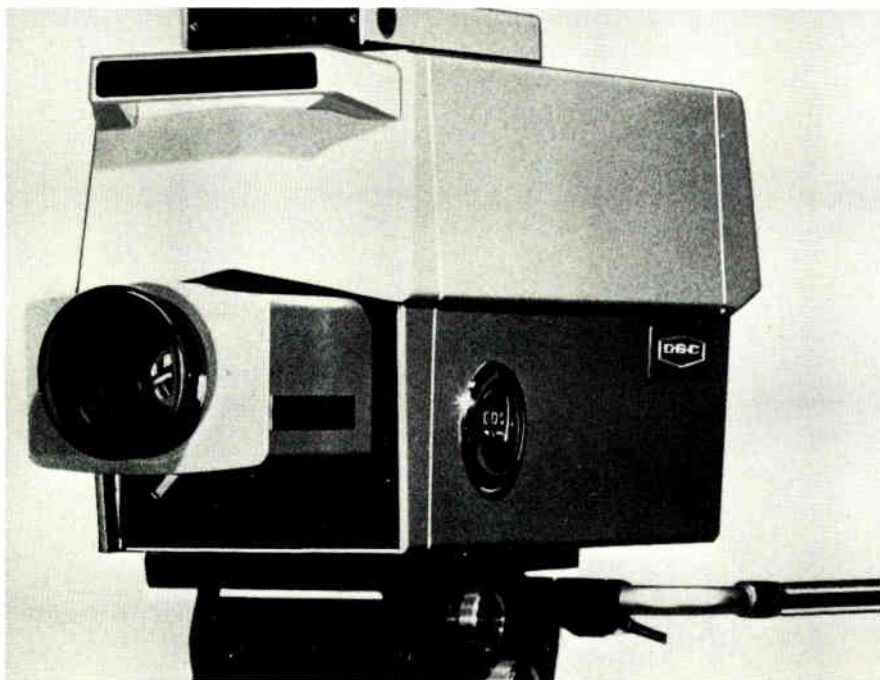
The PC-100 digital controlled camera will be demonstrated along with the "Minicam" portable digital plumbicon color camera—the PCP-90.

A last word from Phillips was that there might be a new transmitter on display for the TV market.

Circle Number 132 on Reader Reply Card

GBC will show their new 3-vision color camera that has only one operating control—the zoom lens. And this zoom is a 16.5 mm to 95 mm at f2.

By using a separate mesh electrostatic focus instead of magnetic, the camera sets up between 10 to 15 minutes. This method eliminates the heat problem of other systems so that readjustment is not necessary. The camera also includes a full NTSC studio viewfinder.



GBC VF 7001 Camera

Currently in the under \$8,000 camera bracket, this camera uses FET's in the preamp circuit, and it includes built-in sync generator and encoder. It also will accept external sync.

A unique feature in versatility is the camera's sweep reversal switch. The camera can be used in the film chain simply by flipping this switch.

Circle Number 133 on Reader Reply Card

Commercial Electronics will show their new color camera. Using an SEC camera tube built by Westinghouse and designed for military surveillance usage, this camera is especially effective in studio or remote locations at under 5 footcandles with an f4 setting. The camera also employs an iris override switch that can be controlled at the camera or from the deck. Stable registration and an extremely wide spectral response are two of the camera's features that make it usable for studio or remote location production. The control deck for the camera occupies only 20 inches of rack space.

Circle Number 134 on Reader Reply Card

General Electric will exhibit two new color cameras, the PE-400 and the TE-201, in addition to a new color encoder. Also new from GE will be a broadcast automation system using the TS-400 video program switcher. In addition, the company will show new staging (front projection) using the PJ-400 color video projector.

Circle Number 135 on Reader Reply Card

Cart Machine

Broadcast Electronics is introducing its revolutionary SPOT-MASTER TEN-70 line of tape cartridge machines featuring latest state-of-the-art concepts and backed by the company's decade of cartridge equipment specialization. Standard TEN-70 features will include manual fast-forward, built-in mike/line mixer, plug-in deck module, die cast front panel with illuminated color-coordinated controls.



All units are designed as table top units and offer the convenience of instant rack mounting. An exclusive option will be Auto-Cue providing auxiliary tone activation of both fast-forward and sequential start modes. Five models covering record/play and play only in both mono and stereo and a delay unit will be offered.

Circle Number 136 on Reader Reply Card

Cartridges

Stanton Magnetics will introduce a new elliptical phonograph pickup cartridge, the Model 681SE. It is intended to fill the intermediate range for which the standard ellipticals are too sensitive and the spherical configurations give less performance than the elliptical.

Historically, most broadcasters have used the most rugged stylus assemblies available which nearly always meant a spherical stylus tip. The trade-off for the ruggedness of the assembly was somewhat less performance at high velocities, notably at inner diameters, than the performance available from the elliptical stylus. The quality-conscious broadcaster was aware of the advantages provided by the elliptical but the lighter mechanism was frequently overshadowed by his requirement for dependability. With the development of the 681SE, according to Stanton, it is no longer necessary to compromise performance for dependability—for the broadcaster this represents the best of two worlds.

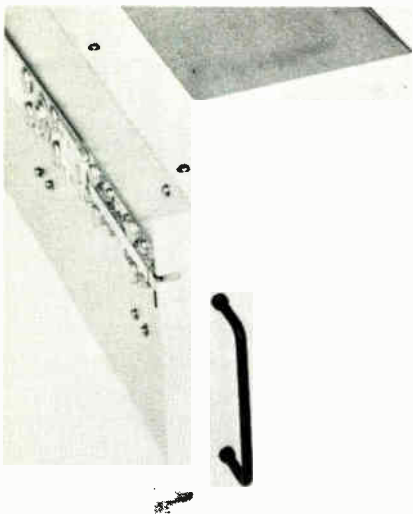
Circle Number 137 on Reader Reply Card

New Product Special

(Continued from page 33)

Character Generator

Visual Electronics will display their Data Vision V-1000 character generator and a new studio intercom system.



The V-1000 leads off with credentials like the introduction of character letters that do not look so mechanical as those used in the past, and these more modern looking letters will be available in color.

Other features include a height of 28 TV scan lines, roll, crawl, ad-

justable aspect ratio, automatic horizontal centering, preset title space area, flash proportional spacing, separate keying output for edg-

ing, and adjustable delay.

The model 77 intercom system is especially designed to give multiples of 14 stations for maximum communications for special and/or varying requirements of programmers.

Circle Number 138 on Reader Reply Card

Format Machine

A format machine containing three tape magazines has been announced by MacKenzie Laboratories, Inc. Designed to permit instant access to any one of three different recorded programs for tightly timed time, weather and

traffic intros and other special effects and idents, it uses the MacKenzie tape magazine with the driven tape hub. The Model 300 is solid-state, all silicon design. It is built to broadcast standards and uses circuitry and tape handling techniques field proven since 1958.

Circle Number 139 on Reader Reply Card



MacKenzie Model 300

Portable Power

The Terado Corp. of St. Paul, Minn. announces the production of a new inverter/battery charger/power supply combination unit, the Mark I Model 50-131. Mark I is the ideal universal electrical conversion unit for it produces up to 500 watts 117 volt AC power from 12 volt DC battery input or up to 40 amp 12 volts DC from 117 volt AC input (power supply feature). Mark I is also a convenient three-position battery charger and will charge at 20 amps, 10 amps or a trickle charge, determined by simply rotating the selector dial.

The unit will operate most 117 volt appliances, lights, radios, small hand tools, test equipment, television, etc. The power supply feature allows those using 12 volt DC equipment such as that which is commonly installed in recreational vehicles to operate this equipment from the power supply when parked in regular 117 VAC power-serviced camp sites, eliminating the need to run off battery power which so often is inadequate. Batteries can also be brought back up to total charge at the same time.

Circle Number 140 on Reader Reply Card

Light Measuring

Engineers specifying or installing CCTV surveillance equipment and other low-light level television systems will be interested in this new light measuring device from Photo Research of Burbank, California. Designated the Spectra TV Snopper it measures scene illumination, through any given lens, (C. Mount), at the image plane of the TV vidicon faceplate before the actual installation is made. Another function, which requires the use of a 100 Footlambert extended reference source, is for relative T-stop calibration of lenses.

Circle Number 141 on Reader Reply Card

Editing System

Vidicue opens up on the commercial line for the first time with an automatic editing and control system using a cut tone system for VTR's that will control the transport and edit three machines. Four modes are selectable for scene isolation and it offers sequential program construction. Edit point display aids its operation.

Circle Number 142 on Reader Reply Card

JOBS is breaking up that old gang of mine

The old gang, guys who dropped out, got strung out, guys who hung out with no place to go but trouble. They went to work, thanks to JOBS.

JOBS, that's Job Opportunities in the Business Sector. A program of the National Alliance of Businessmen. The gangs have started to die, the guys have started to live.

JOBS has turned over 300,000 hard core unemployables into manpower. Given guys their first good break. Of course it isn't perfect. Of course it could be better. But it's working.

The National Alliance of Businessmen was formed by American business communities to help solve the critical problem of hard core unemployment. Business provides the jobs and does the hiring and training. Government finds the people and pays the extraordinary training costs through special contracts.

Funds for the new JOBS '70 contracts are available right now. So, if you're an employer for a business or nonprofit organization, do yourself a favor. Call your local National Alliance of Businessmen.

JOBS
WORKS
National Alliance of Businessmen



advertising contributed for the public good

New Product Special

(Continued from page 34)

Automation Systems

The modular approach allows the broadcaster to select a system to suit his particular requirements. **Sparta** will illustrate a medium-sized automation system, the SS-232. The heart of the system is the automatic programmer which may be purchased separately and will work with standard broadcast equipment. This building block concept allows for future expansion without large commitments of capital funds. The complete system may be seen at NAB along with a new dual-channel rack-mounted audio console, also to be introduced.

Circle Number 143 on Reader Reply Card

The new AR-1000 Automation System from **Broadcast Products, Inc.** is an all solid-state, modular

designed, total automation system that provides simplified operation and unlimited program flexibility to meet any format requirements.

As a completely self-contained system that has been time and operationally proven in many stations around the country, the AR-1000 permits individualized programming up to 24 hours in advance, from up to 12 audio sources. With all controls and inputs front panel mounted, format changes are made quickly and easily.

The AR-1000 features all plug-in circuit elements, independent power supplies, photocell audio switching with full overlap, and built-in facilities for network joining. For real-time program logging, an all solid-state digital logger is also available.

Circle Number 144 on Reader Reply Card

Lighting

Bardwell & McAlister, Inc., will show a whole new line of the latest in compact, portable, backdrop, strip and flood lights. These lights feature the Tungsten-Halogen "Quartz" lamps. The smallest unit, the Mini-1000 is available with four-way barndoors and clear or frosted versions.

For limited space operations, the company will show a mini-cyclo-rama one light strip light with two-way barndoors for lighting backdrops and set pieces. Lamp range is 500, 750, and 1000 watts.

Circle Number 145 on Reader Reply Card

Modular Lighting

Skirpan Lighting Control Corporation will unveil a new modular approach to the design and assembly of studio lighting control systems. The company now manufactures a total of 40 different control panels and solid state dimmer modules which mount in standard enclosure systems based on EIA Standard RS-310. Using this equipment, stations may assemble their own lighting systems with unlimited system expandability. A completely operative modular system will be displayed as well as a new audio-visual systems controlling a sound, slide and light show.

Circle Number 146 on Reader Reply Card

Coaxial Load System

For optimum coverage, broadcast transmitters are frequently located in high terrain where cooling water is an expensive luxury. The new **Bird 8636** self-cooling Moduload™ RF Load Resistor Module is the first in series of compact line terminating systems that eliminate the need for supply of the usual 4-8 gallons per minute required to dissipate the heat from 10kw transmitter output.

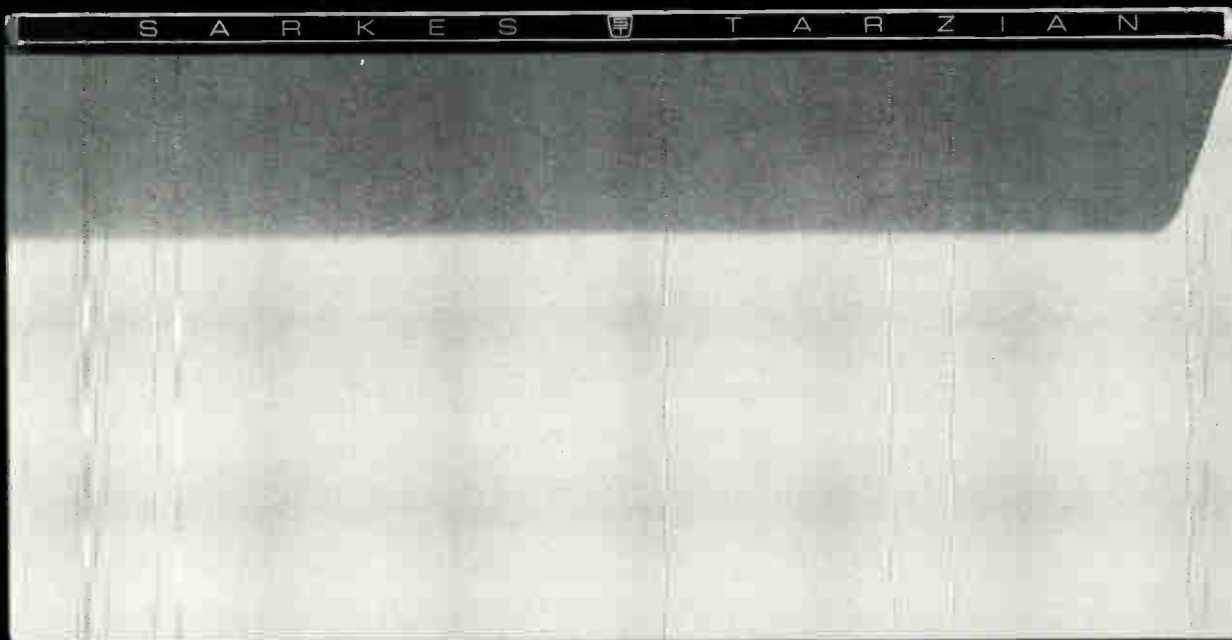
In a scant three cubic feet of space, the new coaxial load system operates continuously under full 10kw power in 5°C to 45°C ambient (-20°C to +20°C with anti-freeze) with its integral heat exchanger. Model 8636 terminates a 50-ohm line with a low VSWR of only 1.1 from DC to 1000 MHz and 1.15 to 1400 MHz. 1-5/8" EIA is accommodated with Model 8636. Other units cover 3-1/8" lines and 51-5 ohm unflanged installations.

Circle Number 147 on Reader Reply Card



Sparta Automation System

Behind this simple panel lies a revolutionary concept in television switching



Selectec III is not just another Nth generation improvement of old switching designs.

It's a totally new approach.

A switching system that handles all your requirements. Studio production. Effects. Video processing. Master control. Distribution. Machine delegation.

Integrated into one amazingly flexible, compact package.

With a whole new set of superior transmission specs.

Your Tarzian sales engineer is ready when you are. Write, or call collect:
AC 812/332-7251, Broadcast Equipment Division, Sarkes Tarzian, Inc.,
Bloomington, Ind. 47401



See for yourself at NAB.

New Product Special

(Continued from page 36)

Couplers

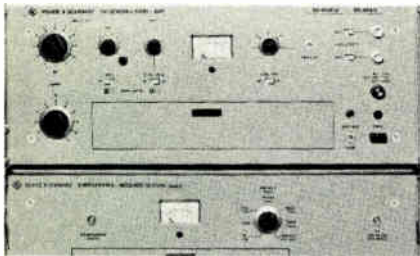
Jampro Antenna Company, Sacramento, California, announces the introduction of 3 dB couplers in its line of filterplexers, vestigial side band filters, and notch diplexers for VHF and UHF Television. The 3 dB couplers have inherently higher isolation values than the conventional quarterwave hybrid ring diplexers.

This high isolation value makes antenna reflections look at least 20 dB better, since antenna system reflections are absorbed by this amount in the output circuit of these devices.

Circle Number 148 on Reader Reply Card

Demodulator

The new **Rohde and Schwarz** Nyquist-Slope TV Demodulator can be used both at the transmitter and for off-the-air-operation with the addition of a receiver section. The demodulator has both RF and IF inputs, a switchable sound trap, two decoupled video outputs and an aural output. The receiver has an RF input-sensitivity of 2000 μ V and has an output of 200 mV at IF which is fed into the IF input of the demodulator.



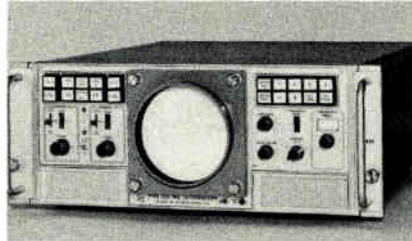
The new Rohde and Schwarz Video Distribution Amplifier with five or ten decoupled outputs also will be shown at NAB. It is fully transistorized, has a frequency range of 1 Hz to 20 MHz, differential phase of 0.1° for output voltages up to 1 V.

Circle Number 149 on Reader Reply Card

PAL Vectorscope

Tektronix, Inc., will present their new Type 522 PAL Vectorscope, designed to measure luminance, hue and saturation of 525 line 60 field PAL Colour TV signals utilizing a colour subcarrier frequency of 3.575611 MHz.

Dual inputs are provided permitting time-shared comparison of input-output signal phase and gain distortion. A chrominance channel is provided which demodulates the chrominance signal to obtain colour information from the composite video signal for use in Vector PAL, Vector NTSC, R, G, B, U, V, Dif-



ferential Gain and Differential Phase displays. A luminance channel separates and displays the luminance (Y) component of the composite colour signal. The Y component is combined with the output of the chrominance demodulators for R, G and B displays at a line rate.

Circle Number 150 on Reader Reply Card

Speaker Line Test

McMartin Industries has developed a new test set for testing commercial sound. The TX-700 is the company's answer to the need for a device that will accurately measure the impedance of constant voltage speaker lines. With this instrument, the technician can quickly measure the speaker line impedance and calculate the wattage requirement of any 25 to 70 volt balanced speaker line. The simple three step operation also will perform continuity checks.

Circle Number 151 on Reader Reply Card

FM RF Amplifier

Belar Electronics Lab, Inc. is now producing a new all solid state FM RF Amplifier Model RFA-1 for remote FM monitoring. The compact unit features 100 dB gain



Belar RF Amp

with a 70 dB dynamic range and 1 watt output level. The 600 kHz phase linear bandwidth will not degrade a stereo multiplex transmission while the zero axis limiters and good selectivity characteristics (50 dB down at 800 kHz-removed) insure that adjacent channel interferences are suppressed. The RFA-1 effectively turns an FM monitor into a wide-band receiver with full monitor specifications.

Circle Number 152 on Reader Reply Card

Background Music

Seeburg Music Library, Inc. will introduce for the first time a background music tape library. This service will offer those background music operators an opportunity to avail themselves of Seeburg Background Music. The series will be recorded at 3.75 ips and reels will be of eight hour duration. An Ampex 450/2000A will be used for demonstration of this new service.

Circle Number 153 on Reader Reply Card

Switching System

New at the **Rust Corporation** exhibit area will be a low cost, push-button remote access video/audio switching system. Two pushbutton consoles will be unveiled—the PBS-1 for ten (10) input systems, and the PBS-2 capable of selecting up to 100 inputs. Either unit can be located up to twenty (20) miles distant from the Video/Audio Switcher main frame.

A new concept in Remote Control systems and an improved model Remote Modulation Panel will also be demonstrated.

Circle Number 154 on Reader Reply Card

Tape Recorder

The first in a new series of **Tandberg** tape recorders for the 70's has been made available with the 3 speed, solid state 6000X stereo deck—a 57 transistor instrument representing "a dynamic new thrust in recording capability".

The 6000X incorporates a fresh styling concept that departs from previous Tandberg efforts, and is said to challenge the performance of the most precise professional equipment. According to Robert Bowman, the company's marketing V.P., the unit includes many features which make it possible for the user to easily obtain "professional quality recordings even at slower speeds".

Circle Number 155 on Reader Reply Card

Revolutionary Film Processor

A new company ABTO, Inc., with President Frank Marx of ABC and vice-president H. Charles Riker, formerly of Riker Video, will introduce a new color film process that uses standard Plus X black and white to produce color film.

In order to achieve color with the ABTO process, only a slight modification is needed on the present station motion picture camera and on the projector. These modifications, however, will not affect the use of this equipment with other black and white or color films. Other features of the new process include non-color fading and the ability to duplicate ABTO film to standard film stock or to duplicate from standard stock to ABTO film.

The company will demonstrate their process in the lobby of the Essex Inn, across the street from the Conrad Hilton.

Circle Number 156 on Reader Reply Card

Microwave Links

A new series of fully self contained solid state portable microwave relay links featuring output powers to 4 watts will be displayed at the NAB Show by RHG Electronics Laboratory, Inc.

Known as the "MRS-AP" series, these portable links are available from 0.7 to 13.25 GHz with typical outputs from 0.25 to 4.0 watts. Receivers and transmitters are complete with tripod, pan head and antenna. Built into a cast aluminum housing, the receiver or transmitter is easily attached to the antenna RFI protected.

These RHG Microwave relay link systems provide high fidelity transmission capability for color or monochrome TV, wideband video data, or multi-channel telephony.

Circle Number 157 on Reader Reply Card

NAB Special

News — Page 28

Equipment — Page 32

Exhibits — Page 49

Use Our Reader Service
Card For More Information
On New Products

Impulse Sound Meter

Model 2204 Impulse Precision Sound Level Meter, new from B&K Instruments, Inc., Cleveland, Ohio meets the proposed international standard for measuring impulsive sounds as brief in duration as 200 microseconds.

A "Hold" circuit freezes maximum meter deflection after the noise burst has passed. The instrument as A, B, C and the new D weighting networks for precise sound level measurements. Interchangeable meter scales and linear response permit use of an accelerometer for direct reading of vibration levels.

When fitted with the Model 1613 Filter Set, octave band analysis is performed. AC and DC outputs accommodate a wide range of recording devices. A plug-in FET input stage allows transducers to be mounted over 100 yards from the meter.

The 2204 meter is suitable for all

Modulation Monitor

A solid-state AM modulation monitor for broadcast and short-wave service in the frequency range from 540 kHz to 30 MHz will be introduced by Gates Radio Company, a division of Harris-Intertype Corporation. Type-accepted by the FCC, the monitor will meet or exceed all requirements for measuring modulation percentages, and is suitable for proof-of-performance measurements.

Gates' new monitors are factory calibrated by precision instruments and need no further adjustment. The monitor's solid-state circuits are not affected by aging and the resulting

noise investigations, vibration measurements, audiometer calibration, and acoustic measurements over a frequency range from 2 Hz to 70 kHz.

Circle Number 158 on Reader Reply Card

Camera Pedestals

Listec will announce the availability of two new TV camera pedestals. The 419 features advanced hydraulic design with a full 30 inches of column displacement. Model 556 utilizes an improved pneumatic design with long life between recharging. They will also show a new TV test generator for testing VTR's, amps, and distribution systems.

Circle Number 180 on Reader Reply Card

Sweep Generator

Texscan will show their new 0.5 to 1200 MHz ruggedized VS-80DH sweep generator. The unit has a birdy-bypass marker system with provisions for up to eight single frequency or harmonic markers.

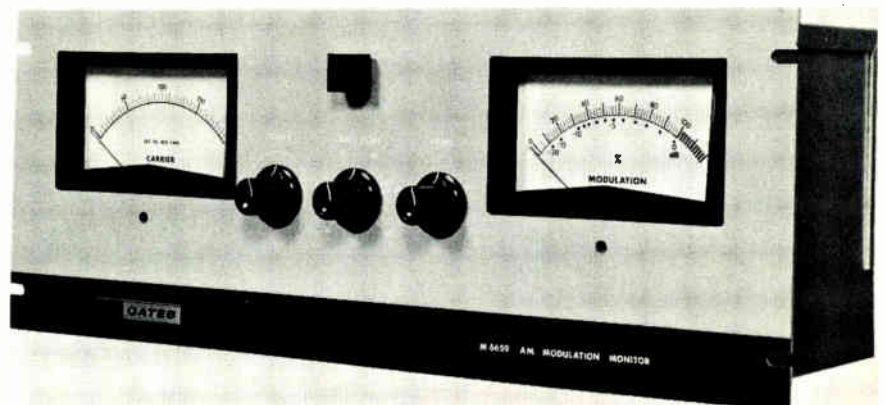
Circle Number 159 on Reader Reply Card

change in circuit constants that normally affect calibration accuracy. Thus, monitor measurement accuracy will be retained indefinitely after installation.

Correct positive or negative peak indications given by the monitor assure true peak measurement, even on program bursts as short as 40 to 90 milliseconds. The over-modulation flasher light also has the same superior accuracy as the meter. For aural monitoring the monitor has a 600-ohm output.

Of course, Gates is expected also to show for the first time before commercial broadcasters their new color TV transmitter.

Circle Number 160 on Reader Reply Card



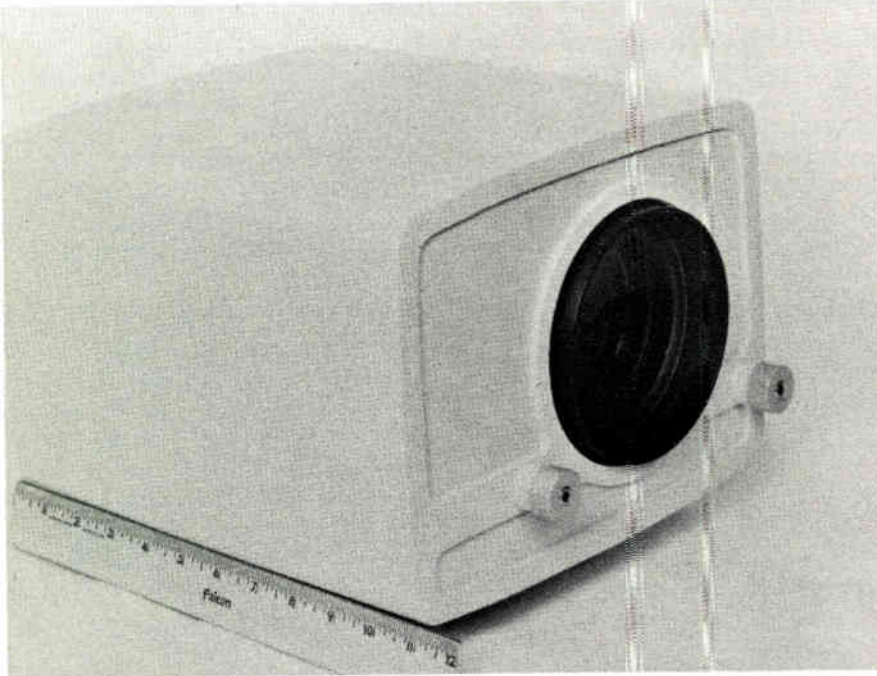
New Product Special

(Continued from page 39)

Zoom Lens

A new high resolution zoom lens for the color television broadcast

industry will be shown by **Rank Precision Industries, Inc.**, recently organized American subsidiary of the



Rank Precision 10:1 Zoom Lens



Metrotech will exhibit New Recorders and Slow-Speed Loggers. Circle Number 181.

Rank Organization.

The RTH (Rank Taylor-Hobson) 10:1 zoom lens, designated F-22, has a focal length range of from 20-200 mm with maximum aperture at $f/2.8$. It is a critically sharp lens which focuses down to 4 feet. Fitting all cameras' plug-in servo iris, it is equipped with a two speed zoom control, control cables and an all-in-one pan focus handle. The new RTH lens weighs 25 pounds and measures 11 inches in length.

Circle Number 161 on Reader Reply Card

Multiplexer

Computer Labs, Greensboro, North Carolina has introduced the Model MUX-810 Multiplexer for use in high-speed digitizing of analog inputs. Eight analog signals can be connected to a single output at a rate of 6.6 million connections per second. The connections can be made sequentially, with any number of channels in the sequence; or on a random access basis. A front panel push button and digital read-out tube can also be used for stepping the connections one channel at a time. The equivalent "ON" resistance of the unit is 0.2 ohm, making the Model MUX-810 an ideal choice for switching 100-ohm lines. It is completely equipped with internal power supplies and will operate on 120, 208, or 220 volts AC, over a frequency range of 47 Hz through 420 Hz.

Circle Number 162 on Reader Reply Card

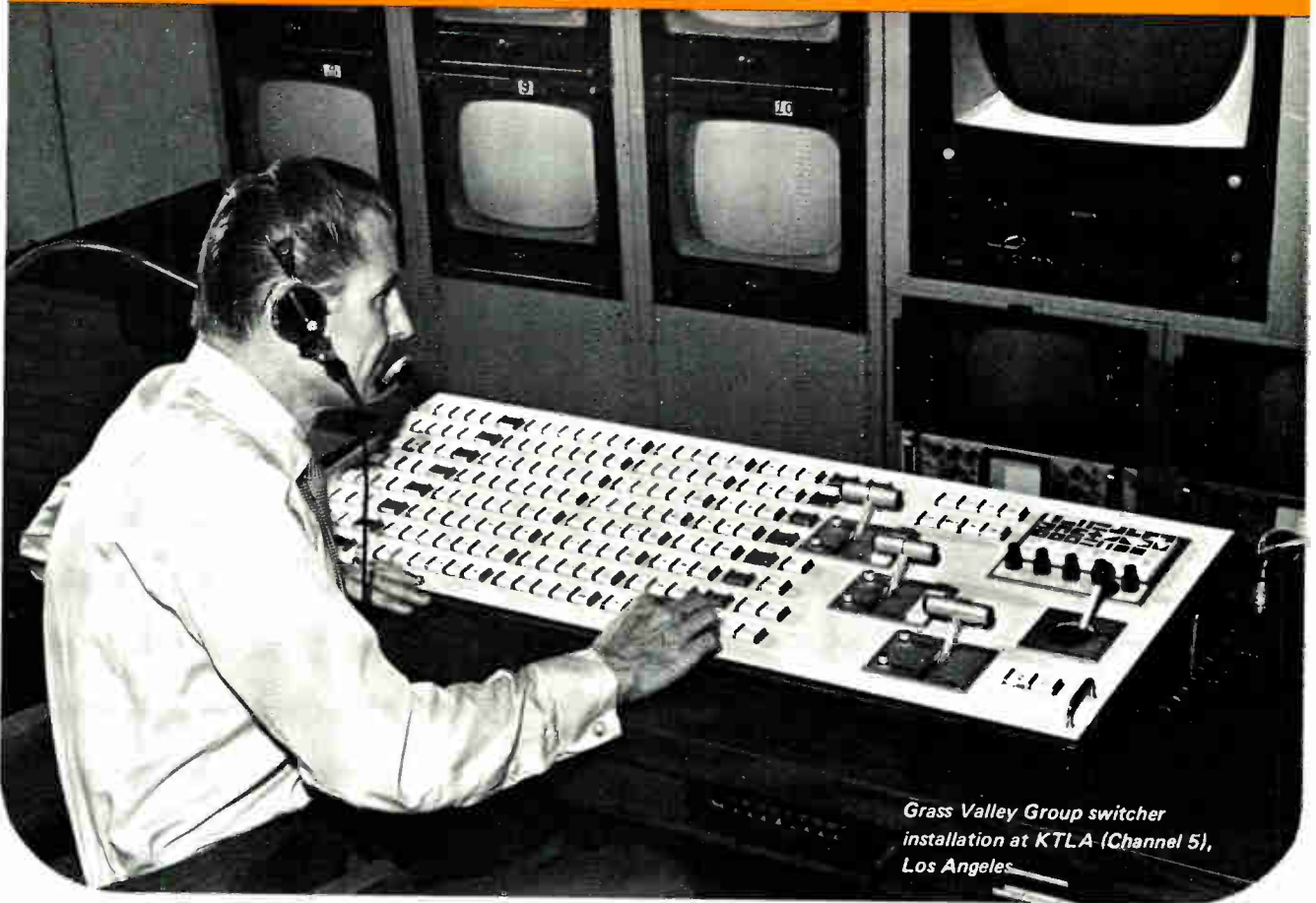
Solid State FM Aural STL

A new aural studio-transmitter link operating in the 890 to 960 MHz spectrum, for AM-FM-TV-tercity service is available from **Moseley Associates, Inc.** The firm's new Model PCL-404 features all solid-state circuitry and direct frequency modulation. Direct frequency modulation should give flat frequency response and low distortion. The PCL-404 will accept multiplexed subcarriers for auxiliary program or SCA feeds, remote control, automatic logging systems, or other ancillary uses. The link operates from 120/240 V, 50-60 Hz, AC with DC supply operation optional. This new model will supplement the firm's existing aural STL equipment.

Circle Number 163 on Reader Reply Card

Our best advertisements... are our satisfied customers!*

*COMPLETE LIST ON REQUEST



*Grass Valley Group switcher
installation at KTLA (Channel 5),
Los Angeles*

We could spend a lot of money telling you that the Grass Valley Group manufactures the finest production and routing switching systems in the world. We know it's true. But why take our word for it? Ask the people who have them.

On request, we will be happy to send you a complete user list. Not a select few but a total user list. To receive this information, just contact your nearest Gravco Sales office.

Sold exclusively by GRAVCO SALES, INC. Regional Offices:

6515 Sunset Blvd.
Los Angeles, Calif. 90028
(213) 462-6618

2626 W. Mockingbird Lane
Dallas, Texas 75235
(214) 352-2475

1314 W. Northwest Highway
Arlington Heights, Ill. 60004
(312) 394-1344

Station Plaza East
Great Neck, N.Y. 11021
(516) 487-1311



THE GRASS VALLEY GROUP, INC.

P.O. Box 1114 • GRASS VALLEY, CALIFORNIA 95945

Circle Number 25 on Reader Reply Card

New Product Special

(Continued from page 40)

FM Transmitter

Granger/Bauer has developed a new 2.5KW FM transmitter for Class A FM broadcasters. The Bauer 602 (with 2500 watts output) together with a Bauer 3-bay CP antenna gives an ideal economical Class A package. Output stage of the 602 uses the new stripline technique with only three operating parts. There are no moving contacts, no cavities, and it is virtually drift free for superb stereo. The solid state FM exciter provides stereo, mono, and SCA with plug-in modules. Remote capability is built in with no extras needed. See it at Booth 221, NAB.

Bauer will also have its new 20

KW FM transmitter on display. A second amplifier can be added for a total of 40 KW.

Circle Number 164 on Reader Reply Card

Transmitters

CCA Electronics will display its most powerful AM and FM broadcast transmitters. One is an air cooled, high level 50 KW AM transmitter that is completely self-contained in three units that occupy a total floor space of 48 square feet.

The new FM transmitter will hit 25 KW and consists of an independent 3 KW transmitter driving a 25 KW amplifier, thus allowing emergency cutback to 3 KW. The final stages in both the driver and the amplifier utilize zero bias, grounded grid triodes. In addition, CCA will show a new 1 KW AM transmitter capable of 125% modulation.

Circle Number 165 on Reader Reply Card

Film Processor

Jamieson Film Company's Equipment Division will exhibit at the Chicago NAB Convention its new-

est model Mark V Color Film Processor.

The Mark V processes Ektachrome film at 65 FPM and incorporates the same tube-tank configuration proven so successful in the smaller Mark IV model.

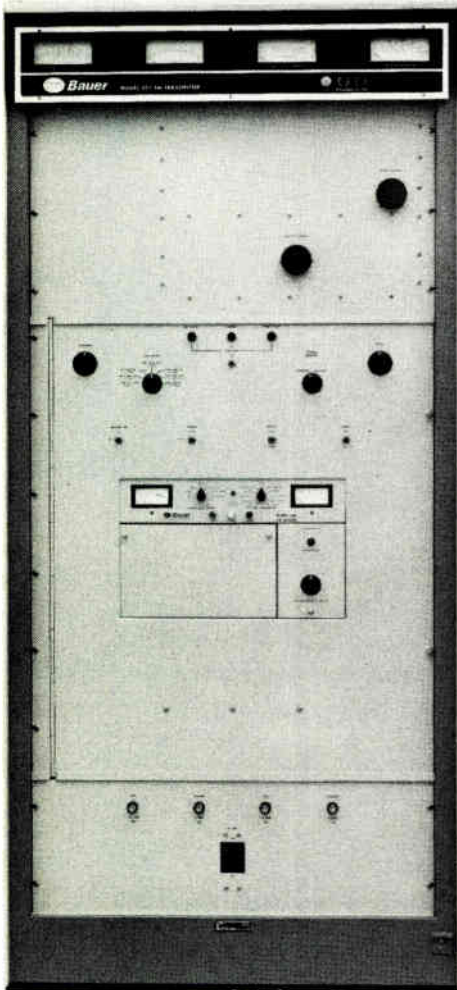
The Mark V offers among many new features forced processing to one or two stops by switch selection on the control panel and a digital display of speed and temperature parameters.

Circle Number 166 on Reader Reply Card

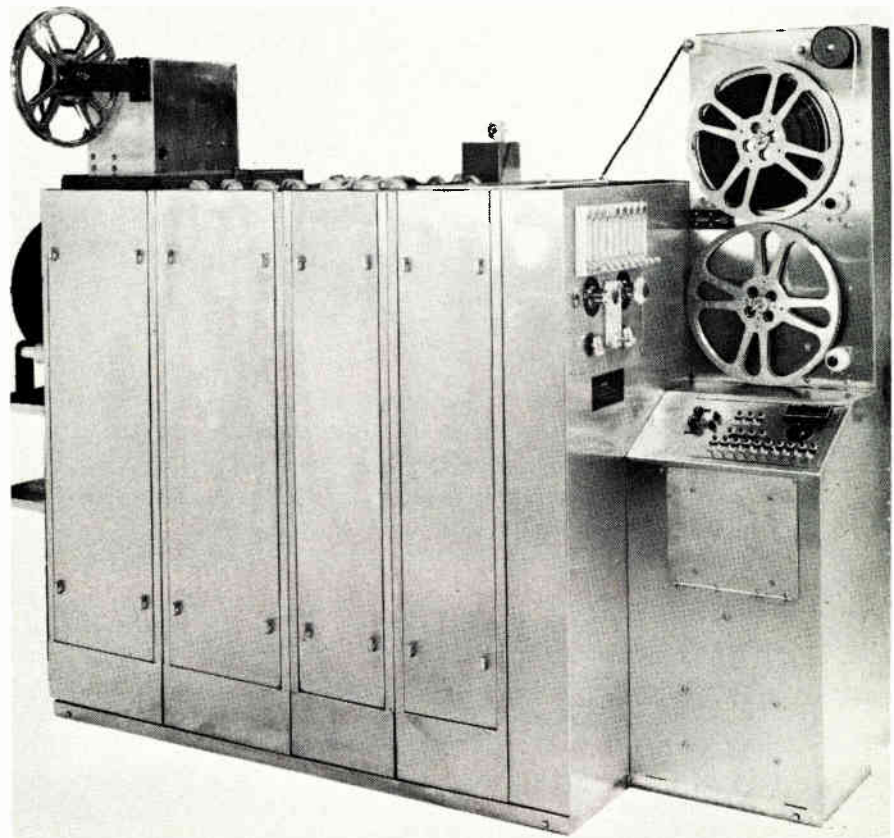
Audio Console

McCurdy Radio will announce the SS4388 Eight-Mixer Single-Channel Audio Console designed for desk-mounting in news booths, DJ areas, or educational facilities. One HL and one LL input to each mixer. Monitor, PA feeds, self-contained power supply, and cue system. Also featuring space below the attenuators for optional pushbuttons for remote control of turntables, and tape recorders.

McCurdy Radio also will show a new TV Intercom System utilizing a high-reliability reed-relay switching matrix. One type of input amplifier accommodates carbon mic, dynamic mic, or line input. Optional compressor available with input am-



Bauer 2.5 KW



Jamieson Color Processor

NO. 400

**"Scotch" Brand
Color Video Tape guards
itself against damage.**

Guards against cinching. "Scotch" Brand No. 400 now solves your video tape handling and shipping problems. A new, matte-finish back treatment virtually eliminates cinching, windowing and creasing. Capstan slippage is a thing of the past.

Guards against scratching. The exclusive treatment on "Scotch" Brand No. 400 resists scratching, eliminates polyester redeposits on the oxide surface. Prevents the increase of dropouts and effectively extends tape life.

Guards against dust damage. This highly conductive treatment reduces static attraction of contaminants that can damage tape and VTR heads. New No. 400 gives you built-in protection, plus performance — the finest value in color video tape.

3M
COMPANY

SCOTCH IS A REGISTERED TRADEMARK OF 3M CO.



SEE US AT THE 1970 NAB SHOW. BOOTH 246.

Circle Number 28 on Reader Reply Card

(Continued from page 42)

plifier. The output amplifier is 2 watts at 8,150, or 600 ohms. Standard intercom configurations are 10 x 10, 18 x 20, and 36 x 40.

Circle Number 167 on Reader Reply Card

Generators

Ward Electronics will display three new sync generators, one monochrome and two color. All units are of digital design, using integrated circuits. Other new units will include two new video test sets, a video processing amplifier, a chroma keyer, and an all new color background generator.

Circle Number 168 on Reader Reply Card

Video Switcher

For television systems who require broadcast switching facilities at budget prices, TeleMation, Inc. has developed a broadcast video switcher which provides a preview output without the expense and complexity of a separate preview bus. In the TPCS-8X2, the preview output is automatically switched to whichever of the two mixer busses is not in use. The video switch is effected by electronic crosspoints controlled by the fader arm position.

Designed for color or monochrome use, the TPS-8X2 employs vertical interval switching. Crosspoints are all solid-state and are controlled by integrated circuit logic, assuring precise timing of switching transitions. It includes an integral video processor with average picture level compensation to eliminate switching transients and bounce.

The unit is equipped with eight video inputs, either synchronous or non-synchronous, composite or non-composite video. In all respects the TPS-8X2 performance is equal to that of professional broadcast switchers. With the added cost-saving feature of automatic preview, it is ideal for instructional and cable television studios which must produce quality programming on a limited budget.

Circle Number 169 on Reader Reply Card

Portable Console

Fairchild Sound Equipment Corp. will display a new portable recording console, the FPC-50. This por-

table mixing console has 16 inputs and 8 outputs, designed primarily for on-location recording. It will operate from built-in flashlight batteries or from a standard AC outlet.

Along with the FPC-50 is a new 12 input 2 output portable console, the FPC-30. This unit is especially designed for broadcast use. Fairchild also will show their console components and a new reverb unit.

Circle Number 170 on Reader Reply Card

Unisphere Mic

A new unidirectional microphone, which combines numerous professional features will be exhibited by Shure Brothers Inc.

Called the Unisphere B Model 588, the new microphone is ideal for use with high quality sound systems and tape recorders. Its performance features include a true cardioid pickup pattern that suppresses feedback, and allows the speaker or vocalist greater freedom of movement around the microphone without unnatural voice coloration. The cartridge of the microphone is shock-mounted to sharply reduce handling noise. The built-in filter reduces wind and breath noises ("pop").

The new "ball-type" microphone is extremely rugged. It features a chrome-plated, all-metal case, and can be used indoors or outdoors, either on a stand or detached for hand-held use.

Frequency response of the Model 588 is 80 to 13,000 Hz. It comes with a built-in locking On-Off switch, a 20-foot detachable cable with a Cannon-type connector, and a swivel adapter. It is available in a choice of three models: the Model 588SA (high impedance), the Model 588AC (high impedance with "C" series type connector) and the Model 588SB (low impedance).

Circle Number 171 on Reader Reply Card

TV Test Receiver

Jerrold Electronics will introduce their new Commander Demodulator model CCD, a solid state, industrial-type, television broadcast receiver. The unit accepts any standard VHF TV channel 2 to 13 and

provides audio and video signals of broadcast quality. TACO will exhibit in the same booth a new logarithmic antenna.

Circle Number 172 on Reader Reply Card

Cart Tapes

Marathon Broadcast Equipment will introduce a new 20 minute cartridge that will provide double the playing time at 7½ IPS over conventional cartridges. It will fit in all automation machines as well as single-deck cart machines.

Among other new tapes, Marathon will demonstrate stroboscopic and torque test tapes along with a delay cartridge capable of extremely long life and available in delay times from 5 to 50 seconds.

Circle Number 173 on Reader Reply Card

Tape Recorder

Magnetic Recording Systems, Inc., will introduce their new M.R.S. Model A-700 magnetic tape recorder. The unit includes an automatic tape lifter with a manual override, and features digital logic integrated circuit memory controls with interlocked momentary contact . . . and even illuminated push buttons.

The reels are independently driven under proportional bi-directional closed loop servo control to maintain constant tension regardless of load conditions.

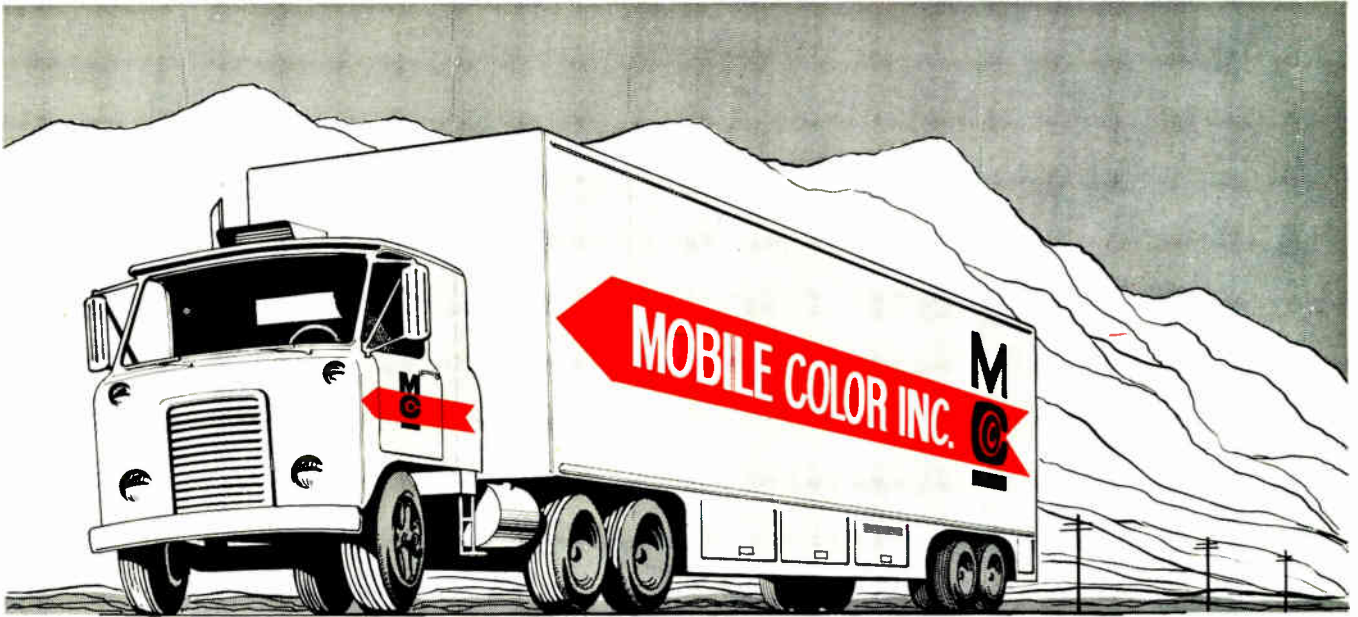
Circle Number 174 on Reader Reply Card

Signal Conditioner

Telemet, a Geotel Company, announces the introduction of a new video signal conditioner, Model 4600, to be shown at the NAB Convention. The new unit is designed to correct mid frequency phase disturbances that account for most conditions of "soft" color or monochrome picture quality. Model 4600 is said to eliminate both negative and positive smearing.

All corrections of disturbances in the 15 KHz to 500 KHz band, such as streaking and exponential under and overshoots, which occur in the most active portion of a picture, can be corrected at base band by Model 4600, says Telemet.

Another salient feature, says the company, is that four separate time constants are available by a front panel selection switch for the most common situations encountered.



mobile color on the move.

Mobile Color, Inc. offers the most complete spectrum of remote color television services available . . . equipment permanently based in Houston, Omaha, Austin and San Juan, P.R.

We now have five complete units, with a total of 23 cameras, to handle any assignment throughout the United States, Canada, Mexico and Puerto Rico.

Units of 2, 3, 4, 5, or 6 cameras are available for lease and production work on local, regional, and national live and tape production, sports and special events, commercials, etc.

If you are a network, an agency, a local station, a production company, an ETV or CATV, contact MCI.

See our new Mobile Color unit at the Phillips Broadcast Engineering display at the N.A.B. convention.



Facilities:

Five complete mobile vans - with 3 to 6 PC70's and PCP Norelco cameras; Ampex VTR's including HS200. Central Dynamics and Visual switching; Phillips and Sparta audio, and more.

For additional information, call collect MOBILE COLOR, INC.

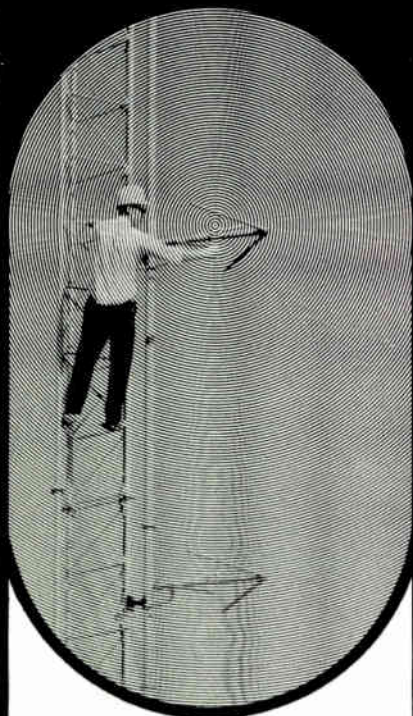
(Austin-San Juan)
512-477-5611
P. O. Box 490
Austin, Texas 78767

(Omaha)
402-733-7166
P. O. Box 7171
Omaha, Nebraska 68107

Circle Number 29 on Reader Reply Card

THE PENETRATOR

THE ONLY CIRCULARIZED
FM ANTENNA
WITH VARIABLE HORIZONTAL - TO -
VERTICAL GAIN RATIOS!



- JAMPRO'S new PENETRATOR FM antenna allows you to reach every listener in your signal area... even on the fringes. Penetrates more auto sets, and small portables, too.
- What's the secret? JAMPRO'S NEW PATENTED DESIGN offers you true circular polarization (not just a modified ring), and a greater VSWR band width for better stereo and SCA operation.
- EXCLUSIVE FIELD TRIMMING STUBS guarantee lower VSWR — on your tower, where it counts — of 1.08 to 1 (that's the lowest in the industry). Incidentally, so are our prices!

CALL US NOW!
LET'S TRADE ANTENNAS
(916) 383-1177

J A M P R O

ANTENNA COMPANY
A DIVISION OF COMPUTER EQUIPMENT CORP.
6939 Power Inn Road
Sacramento, California 95828

Circle Number 30 on Reader Reply Card

New Product Special

(Continued from page 44)

Separate HF or "chroma" boost for low color information is available by "locked" screwdriver adjustment on the front panel.

Circle Number 175 on Reader Reply Card

Titling Generator

The Telemation TCG-225 provides the benefits of electronic titling at about one-third the cost of a full-page character generator. The unit displays one or two lines of 25 characters each, in a static or dynamic (crawl) mode. Vertical positioning on the page is variable and controlled from the keyboard. Other keyboard-controlled functions include selection of alternate video/drive sources and control of paper tape punch and reader.

A unique feature is an optional non-additive mixer for selection of black, white or any gray level to obtain optimum contrast range.

Circle Number 176 on Reader Reply Card

Compressor/Limiter

Gotham Audio Corporation has introduced the EMT-156 Stereo Pulse Duration Modulation Limiter, Compressor and Expander. The characteristics of the three functions can be varied to suit the program material. In the automatic mode, a built-in analog computer controls the release time of all three functions. It is programmed to minimize the perception of gain changes. A separate input is available to accept external programming of the gain function.

Circle Number 177 on Reader Reply Card

Microphones

AKG Microphones will show a new dynamic shotgun with a high degree of directivity achieved by gradient and interference principles. It performs with smooth frequency response and full range off-axis rejection. Complete with two-position bass roll-off switch. The AKG condenser microphone modular system C-451 with field effect transistors will be shown with newest additions to this add-on microphone concept.

Circle Number 178 on Reader Reply Card

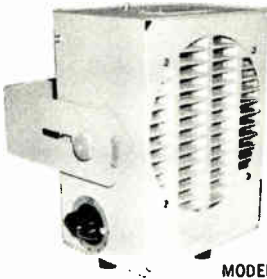
CATV Converter

The AEL Suburbanite Converter makes it possible to add seven additional Super-Band channels to your 12 channel system. The Suburbanite has been designed for use in CATV systems where the ambient signal levels from off-the-air channels are not too strong. With a system using the new AEL Super-Band® amplifiers with expanded bandwidth out to 270 MHz, additional channels can be carried without distortion and beat problems.

The AEL Suburbanite converter is designed to deliver to a conventional TV receiver signals on the regular 12 channel broadcast assignments (channels 2 through 13) and, in its alternate mode, the Suburbanite will block convert all seven of the Super-Band channels into the tuning range of standard VHF tuner. The Super-Band channels are converted to Channels 7 to 13, thus adding seven additional channels.

Circle Number 179 on Reader Reply Card

COMPACT VAN & STATION HEATER, C-300



MODEL C300
Forced Air Heater

AVAILABLE FROM 12VDC to 230VAC VOLTAGE RANGES & IN 300W to 1500 WATT RANGES.

Specifically designed to fit into mobile vans & in broadcast station areas where floor or storage space is at a premium.

Cast Aluminum heating elements, & 16 ga. steel outer case built for rugged field performance.

Options allow a wide range of applications.

Write for our full line of electric heating equipment.

VALAD ELECTRIC HEATING CO.

71 Courtlandt St., Tarrytown, N. Y. 10591
914-631-4927

Circle Number 31 on Reader Reply Card

SUPER MARKET FOR STATION ENGINEERS



**Model 303 MICRO-TRAK
tone arm**

The light tracking sensation of the industry, combining high stereo compliance with rugged dependability.



**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.

NEW!



**The Model 1012 A Professional
Turn Table**

Offering the superior performance and reliability demanded by the professional user. A unique combination of new materials and proven techniques producing a Turntable which sets a new standard in the industry.



**The Model 206 "viscous damped"
Tone Arm**

Probably the most widely used Transcription Arm in the Industry. Rugged and Dependable.



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.

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-

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.



GRAY RESEARCH DIVISION
ONE FIFTY PARK AVENUE, EAST HARTFORD, CONN. 06108

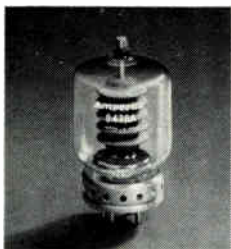
Circle Number 33 on Reader Reply Card

THE 6076 IS A FINE TETRODE, WASN'T IT?

NOW MEET THE 6076A.



Amperex announces a new metal-ceramic plug-in replacement for the all-glass 6076. It's proven to be so superior to the 6076 that we've doubled the warranty to 2000 hours without increasing the price. We pump the ceramic tube at higher temperatures, achieving a better vacuum to give you longer tube-life. The use of ceramic permits us to hold much tighter dimensional tolerances, resulting in greater uniformity, tube-to-tube. This will reduce to an absolute minimum, any need for tuning or readjustment of your transmitter when you change tubes. The 6076A, like the 6076 is a 4 KW external anode tetrode designed for use as a power amplifier in FM and VHF TV transmitters.



...AND SEE WHAT WE'VE DONE WITH THE OLD 4-400!

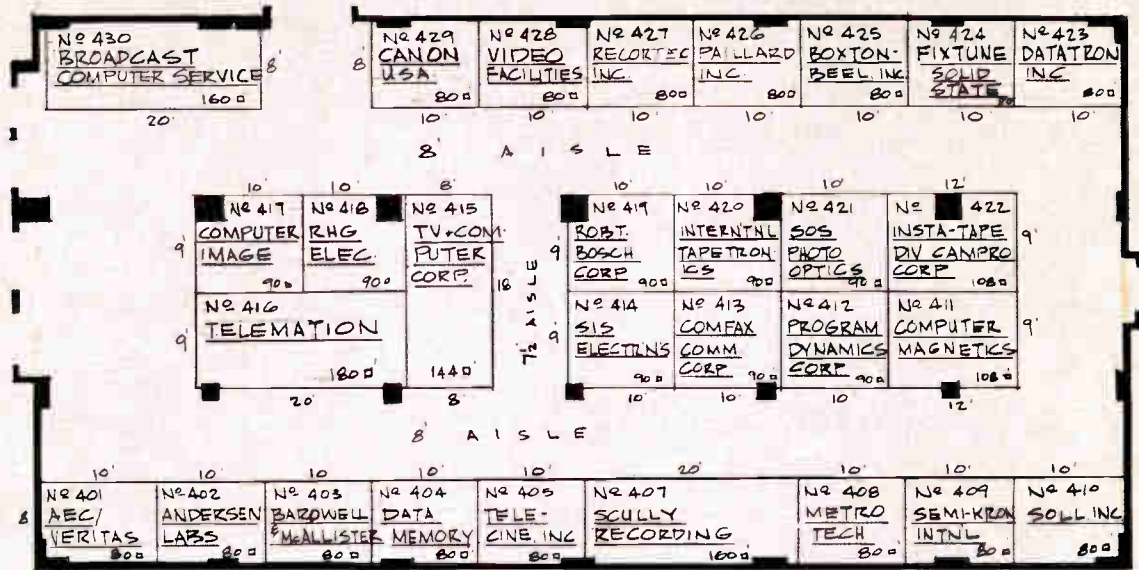
We switched from the industry's conventional "double helix" cathode to a new MESH cathode and we've come up with a better plug-in replacement for the 4-400. The new 8438A gives you a guaranteed hum level of better than -60 db, is more rugged than the 4-400 and has greater reserve emission. The high thermal capacity of the 8438A's graphite anode virtually eliminates any danger from temporary overload. Like the 4-400 it replaces, the 8438A is an all-glass power tetrode designed for VHF amplifier, oscillator and modulator service in broadcast and communications systems. Both new tubes are immediately available from your Amperex distributor. For data, write or phone: Amperex Electronic Corporation, Professional Tube Division, Hicksville, New York 11802. Telephone: (516) 931-6200.

Amperex®

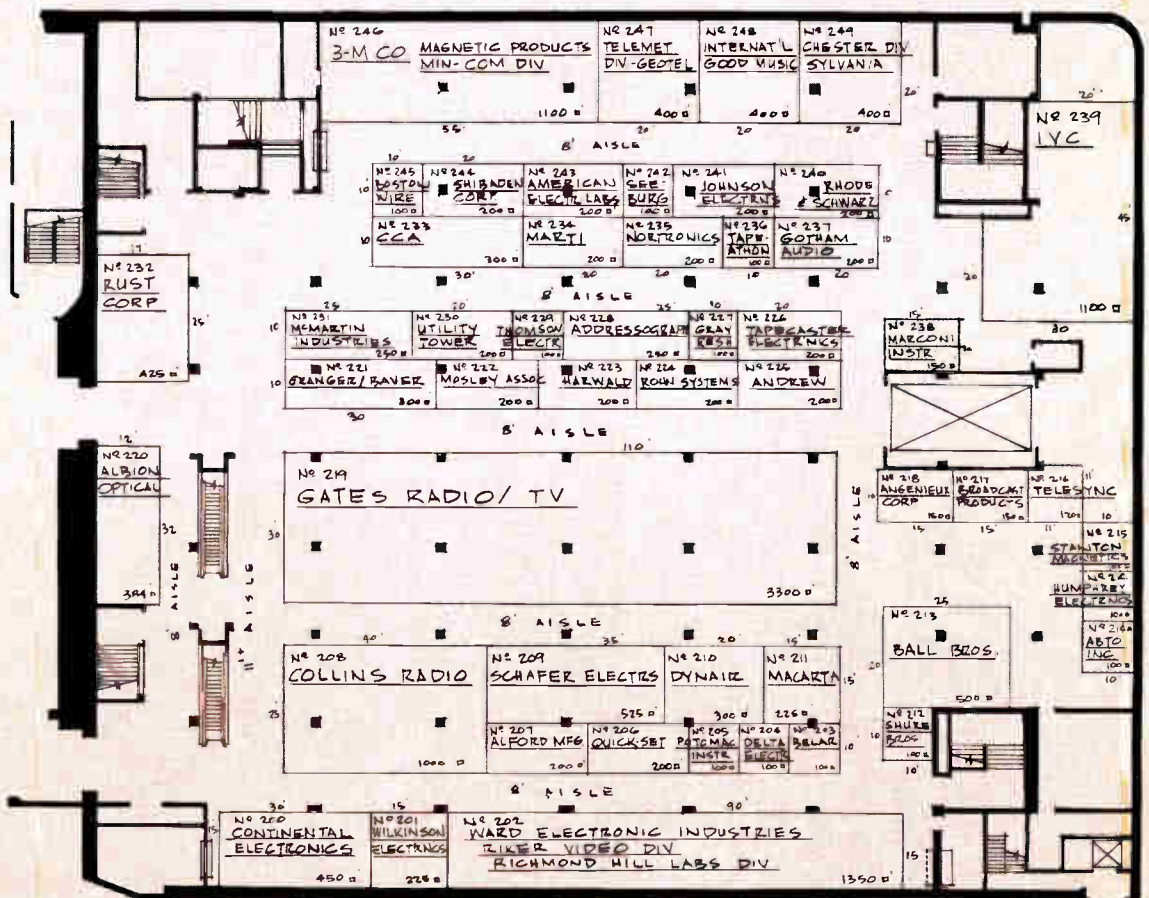
TOMORROW'S THINKING IN TODAY'S PRODUCTS
A NORTH AMERICAN PHILIPS COMPANY

NAB Exhibitors Official Floor Plan

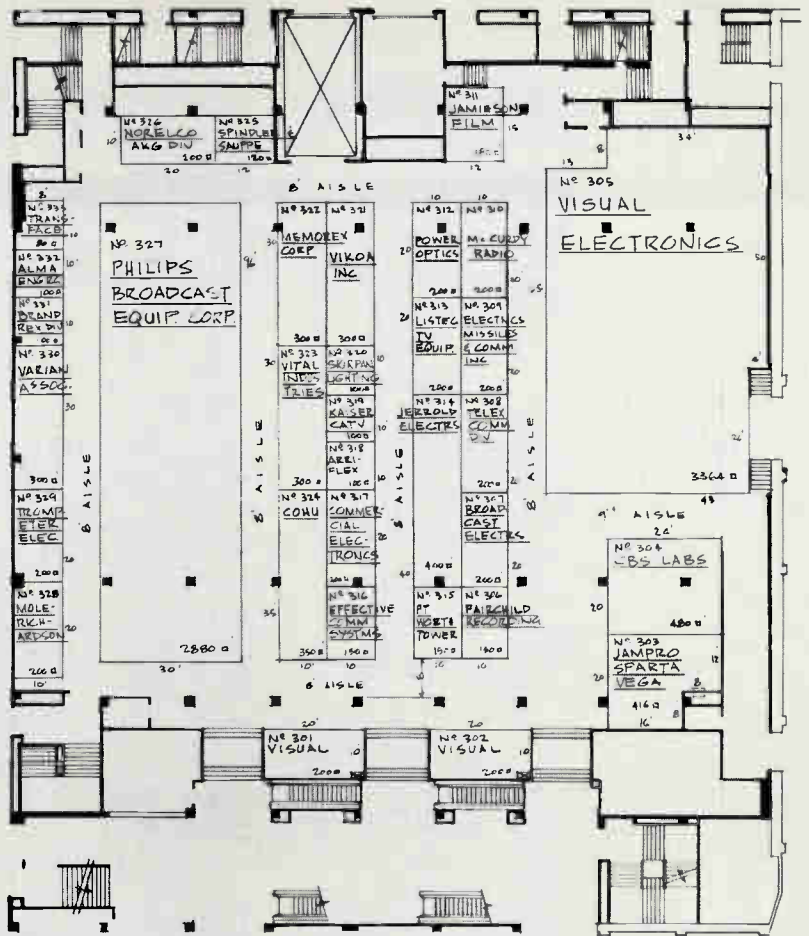
NORTH HALL



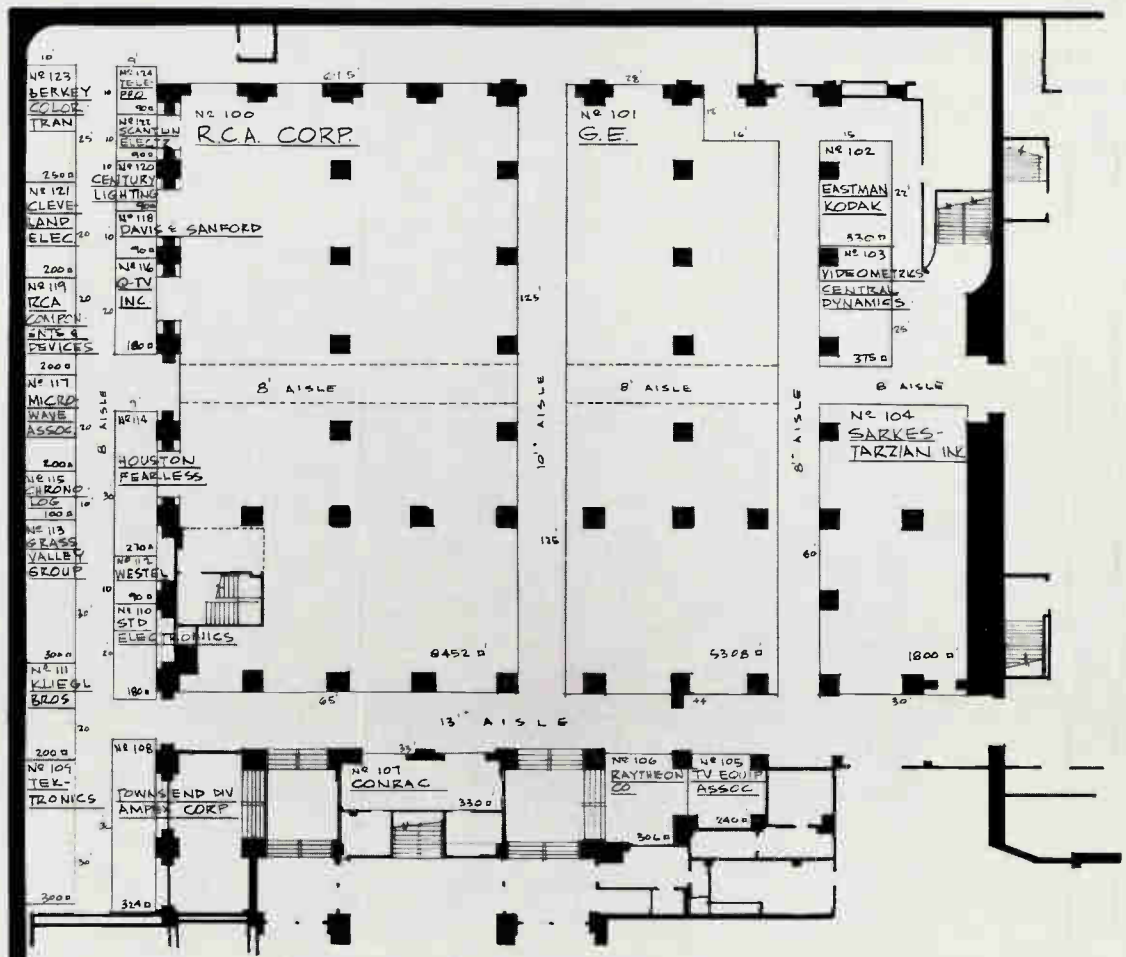
WEST HALL



CONTINENTAL ROOM



EAST HALL





Here's a new switch

...an extended-frequency vacuum coaxial relay for lower power applications.

For the first time — a four port vacuum coaxial relay specifically designed (and priced) for use at 2 kw and under. The new model RC52 offers all the advantages of vacuum plus a low .1 db insertion loss at operational frequencies up to 1700 MHz.

RC52 is the newest and smallest of our 2-pole, 2-position crossover transfer relays. The others offer power ratings of 4 kw and 7.5 kw. All of these relays give you the lowest life/cycle cost of any coaxial relay and each can function as a crosspoint for matrix networks. Due to the vacuum dielectric they all provide: no contact maintenance, stable contact resistance, smallest size in power class. They also feature manual override in case of power failure, plus auxiliary circuit indication and interlocking contacts.

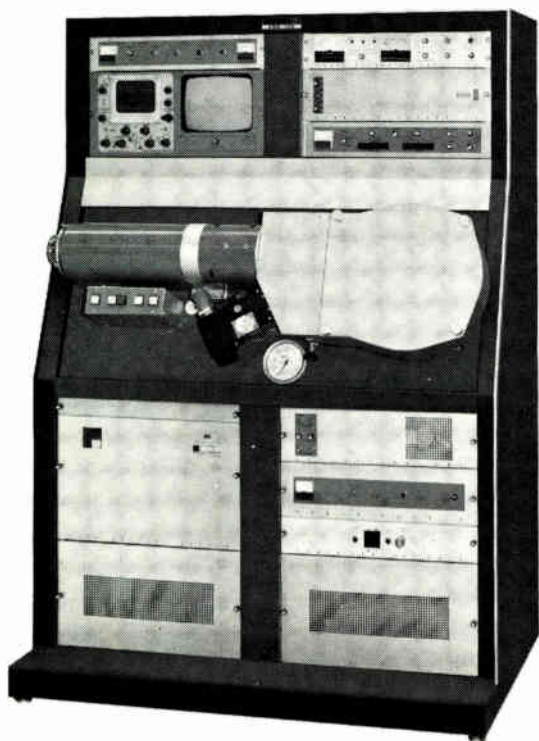
The four port series of relays permit pretuning of backup transmitters and rapid changeover (15 millisecs typical) in the event of transmitter failure. They are also useful for rapid by-passing and the interchanging of amplifiers, antennas, drivers, or dummy loads. Reliability and long life have been amply demonstrated in the Apollo program, as well as in many critical long-haul hf communications systems.

We will welcome the opportunity to send you more details about these relays. Write to ITT Jennings, a division of International Telephone and Telegraph Corporation, 970 McLaughlin Avenue, San Jose, California 95108.

JENNINGS **ITT**

Circle Number 34 on Reader Reply Card

Get a better picture of what's happening.



EBR-100 Electron Beam Recorder

— the better way to transfer tape to film.

Here's why:

- Sharper, low-noise picture on standard 16mm film.
- Complete gamma control.
- Full electronic control of exposure.
- Fast start-up—30 seconds from load to record.
- Full contrast to 1000 line resolution.
- Electronic shutter.
- Fine-grain, economical film stock for quality image.

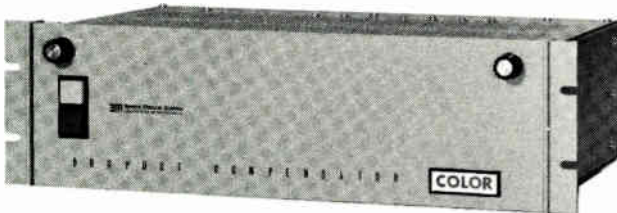
Most advanced tape to film transfer system in the world.



Color Video Encoder has (2) one-of-a-kind unique features. First, the color bar generator is completely digital. You get a signal that's accurate. It needs no adjustments. And it's easier to use and maintain. Second, input clamping of video signals eliminates low frequency hum, noise and other unwanted effects on the matrix. Works with smaller, less expensive cameras as well as large ones. The SMPTE color test will give you the proof. It meets all FCC and EIA specs. And features special monochrome switching.

Look to 3M for specialized products for high quality video performance.

The Bridging Video Switcher is a 10 input switching video distribution amplifier with extremely high quality video performance specifications. Audio-follow switching is included as standard equipment. Loop inputs and stacks can make routing switchers up to 10 x 20. Input and output grounds are isolated. The video ground as well as the coax center conductor is switched through to the output. One switching does not cause a visible disturbance to other switchers looped to the same input line. For maximum signal handling performance at minimum cost, rely on the 3M Brand Bridging Video Switcher.



Dropout Compensator (DOC) replaces color dropout on your VTR reproduction with correct color video—all within the signal itself. In fact, the DOC detects dropouts as they occur and replaces the “lost” signal with stored information from the previous scan line of the same field. It provides precise color match and complete freedom from switching transients. The self balancing video switch prevents white flashes. Dropout disturbance to the time correction unit is eliminated.



Dropout Profile Recorder (DPR) is the perfect companion to the DOC. DPR produces a permanent strip chart of dropout rate during normal on-line video tape playback. It performs this evaluation electronically while the 3M DOC is compensating dropouts. DPR indicates when a tape is too degraded to use for valuable new recordings. Built-in precision calibrator. Five inches of chart reads one hour. Chart can be torn off and stored with the video tape.

If you're interested in one video product or all, simply phone (805) 482-1911 or write for our brochures.

Mincom Division **3M**
COMPANY

300 SOUTH LEWIS ROAD • CAMARILLO, CALIFORNIA 93010
Circle Number 35 on Reader Reply Card

Peaking the Color Transmitter

By Patrick Finnegan*

How well a transmitter will pass color without distortion will depend somewhat upon its vintage and also upon its operation. An old monochrome transmitter will not pass

*BE Maintenance Editor and Engineering VP at WLBC, Muncie, Ind.

color without severe distortion. There are many of these old transmitters around today, and many of them have been successfully converted to color. The new transmitters have been designed for color so they should pass color well, but transmitter parameter familiarization is still necessary in order to understand how and where distortion

can occur even in new color TV transmitters.

There are five basic conditions that must be met in order that color may be transmitted successfully. They include the following:

Monochrome. A transmitter must be able to pass an excellent monochrome signal. If it cannot pass a good monochrome signal, it cannot

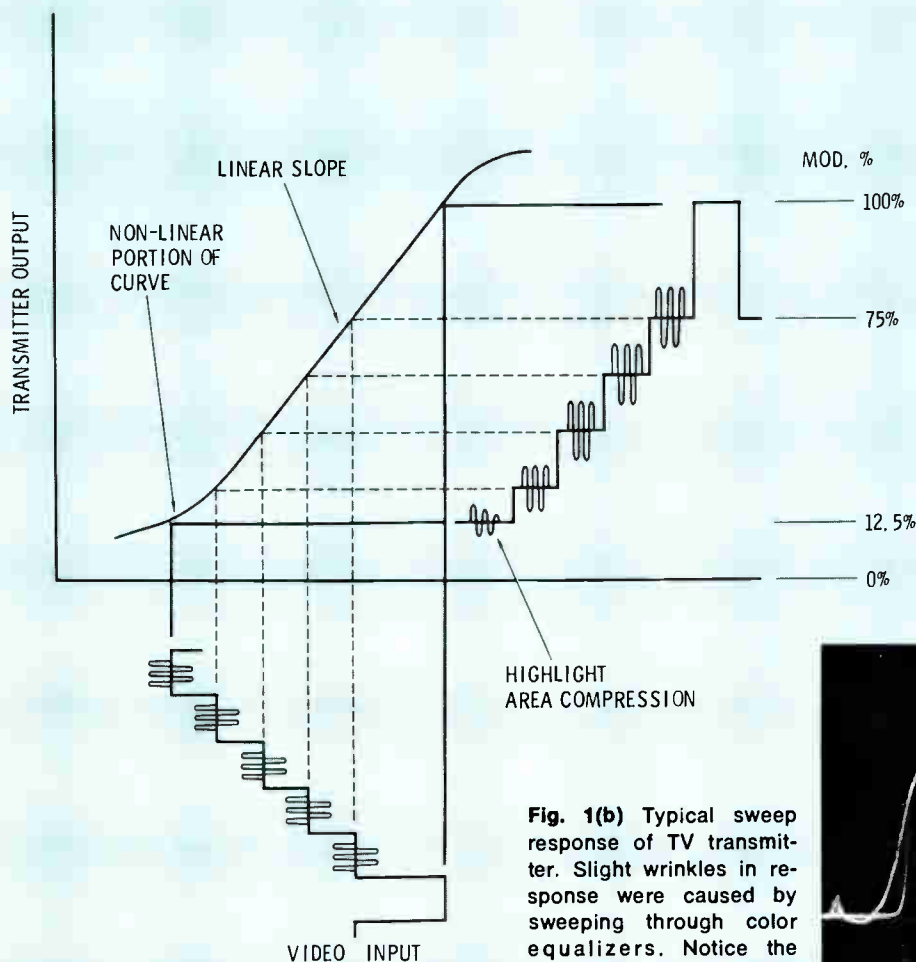
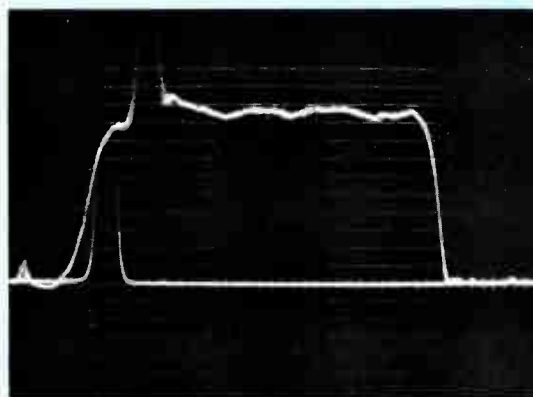


Fig. 1(a) Transfer characteristic of tube. Tube here has been operated into the non-linear portion of the curve, causing compression of the whites and highlights.

Fig. 1(b) Typical sweep response of TV transmitter. Slight wrinkles in response were caused by sweeping through color equalizers. Notice the rounded edge where response drops into the sound notch.



possibly handle color.

Bandwidth/response. Color requires a somewhat greater bandwidth than monochrome and the response throughout this bandwidth should be as uniform as possible. The region between 2.1 MHz and 4.18 MHz above carrier should be especially uniform as this is the region where the color is carried.

Differential gain. Also called linearity. Transitions in brightness from black to white should be uniform or corrected to do so. The term linearity as used with transmitters refers to the transfer characteristic of input to output, and has no relationship to the linearity of a picture tube display.

Differential phase. There should be no change in phase during brightness transitions from black to white. Poor linearity often causes differential phase shifts, but other conditions can also cause it.

Envelope Delay. A phase change that can occur when all the frequencies of the modulating signal do not pass through the transmitter at the same time intervals.

Where Trouble Begins

Many areas of the total system, such as terminal equipment, microwave relays, etc. can distort the color signal. This article is concerned only with the distortions that can occur within the transmitter itself.

Video stages can be overpeaked while trying to make up for RF circuit losses. Such peaking can cause noise problems, phase problems, ringing, clipping and phase changes.

The modulator is a critical stage and it can be operated improperly. The tube itself may be aging or going bad. A tube that is operated improperly or which can no longer maintain its parameters will effect all areas of color.

The modulated amplifier is another critical stage. It is also an RF stage. In some transmitters, the circuits of this stage also contribute to the bandwidth shaping. The operating parameters of this stage must be maintained as close as possible or color deterioration will occur.

Linear amplifiers, whether they be traveling wave tubes, tetrodes or klystrons, must be operated as a

linear amplifier. They can be easily misadjusted so that they no longer operate as linear amplifiers.

Bandwidth shaping filters although passive elements, do contribute to color deterioration.

Response

Video stages in new style modulators are designed without adjustable video peakers. More care is taken in the design so that a uniform amplitude and good bandwidth to 8 MHz is obtained.

Older style modulators that are modified to meet color standards often add video peaking to extend the bandwidth. This is often "stagger-tuned", that is, different stages peak at a different mid-frequency so that the overall result is an extended bandwidth. Regardless of the age of the modulator, if these peakers are misadjusted or if a component fails which may give the same effect, other stages may become overpeaked.

When checking the transmitter video response, it is well to view the video out of the modulator. It

should be reasonably flat and without "lumps" or sharp transitions. If the stages are adjustable, make certain that the required correction is distributed throughout all the stages. The practice of observing only the transmitter output while making all corrections can result in overpeaking of video stages to make up for deficiencies in RF stages. The overpeaked stages can become overloaded during normal programming, resulting in clipping of the peaked frequencies (usually in the color range) causing phase and amplitude changes in the color signals.

Correction Filters

Color correction filters are placed ahead of the transmitter video input. These are passive units but they do cause loss of amplitude of the higher video frequencies. While amplitude equalizers are added to overcome this, they do not correct it entirely. If such is the case, the remaining amplitude loss can be made up by the video peakers of the modulator video stages or the RF stages may be "tilted" somewhat.

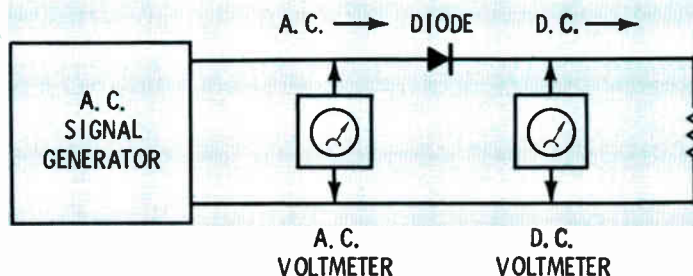


Fig. 2(a) Test set up to check linearity of a diode. AC input may be any frequency that you can accurately check.

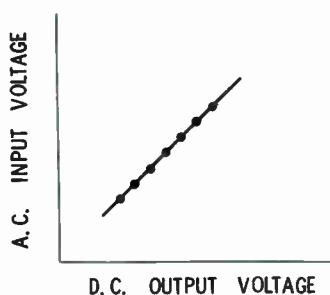


Fig. 2(b) Graph of results of the test on the diode. It describes a straight line.

From a response viewpoint, the author has always considered these color correctors as part of the transmitter and the input to these as the input to the transmitter. Any loss of high video frequencies here is then made up in the transmitter. Generally, the transmitter instruction manuals say to feed the sweep into the transmitter itself. This makes it a little easier for the transmitter to meet specs. Any loss here is a fixed loss and must be made up somewhere. The author prefers to do it in the transmitter.

RF stages should be broadbanded to 8 MHz, if possible, and no less than 6 MHz. Broadbanding of an RF stage will cause it to lose power output which will have to be made up through increased drive by the preceding stages. The station engineer may be trying to nurse a few more hours out of an old tube. In this case, he may be able to reduce the bandwidth somewhat to make up for the poorer efficiency of the old tube. If reducing the bandwidth causes loss of response, however, he

should discard the tube.

Coupling and Matching

Coupling and matching between stages is very important and can have effects upon response as well as other problems, which is more the case when the coupling link is coaxial cable. The load end of the cable should be matched as nearly as possible to the impedance of the cable by the next stage input matching circuit. Mismatched cables can cause standing waves on the line, reflections, instability, and possible cable damage when high power is present.

Matching of cable can best be done with a "thru-line" wattmeter. Such a wattmeter contains a directional coupler so that the reflected power can be observed. The matching adjustments should be made so that reflected power is zero, not just a minimum, but zero. It takes some adjusting, but it can be done. Since the carrier itself is the predominant power element here, this matching is taking place at carrier.

The cable length physically can become critical, especially at UHF where the wavelength is so short. Most often a "line stretcher" is inserted in the line. This is an adjustable device that electrically changes the length of the line to optimize the impedance match across the band pass in question.

Matching is first done at carrier using the thru-line wattmeter. The meter is removed and the cable restored to normal. While observing the video sweep response on the transmitter output, the line stretcher is adjusted to improve the frequency response at the high end of the sweep. What happens is this: the cable is actually matched at two places. First at carrier, but at 4.5 MHz above carrier, there is not a perfect match as some reactance is becoming prevalent. The line stretcher causes the line to resonate with the reactance, cancels it out and thus causes a broader match across the bandpass.

Normally the line stretcher adjustments are only made in small

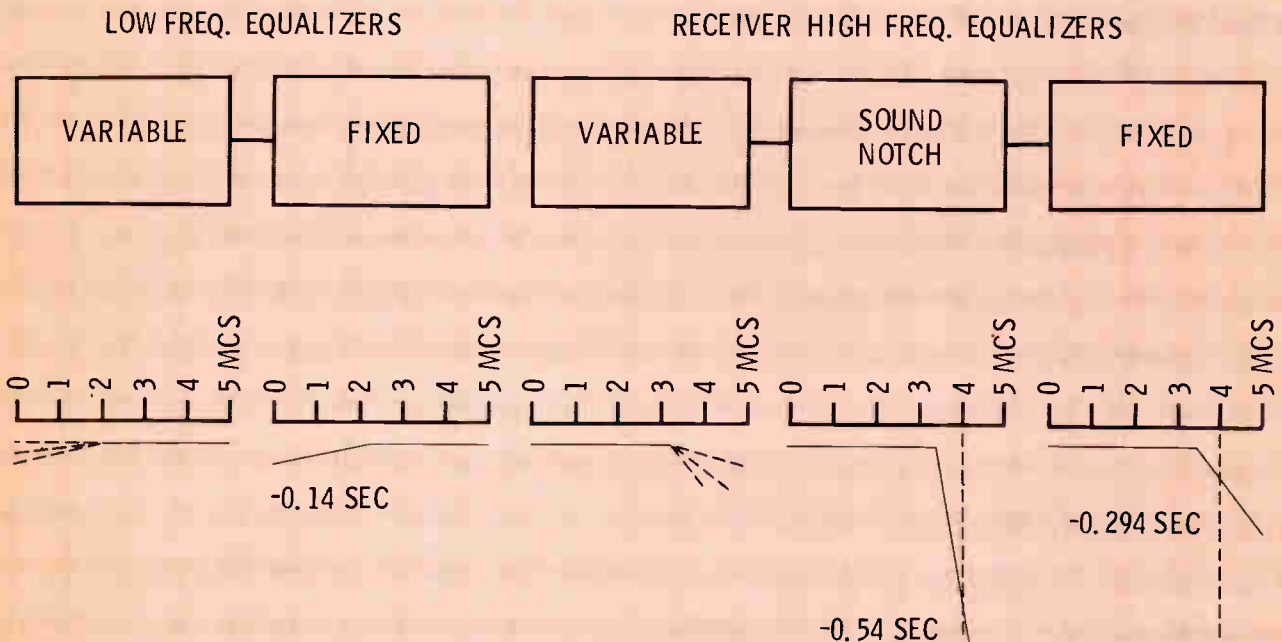


Fig. 3 One set of commercial envelope delay equalizers. Note the pass band area and the amount of both fixed and variable correction available.

Help celebrate the introduction of the Fernseh 3-tube color camera.

Buy one.



The Fernseh KCU 40 is the camera that revolutionized the European television production technique. It's the first lightweight model for both studio and field use with all the performance you'd expect from a 3-tube camera. High light sensitivity. High signal-to-noise ratio.

True color reproduction with optimum focus. A few of the more special features include 7mm or 11mm camera cables, and a tiltable viewer. We'll be in Booth 419 at the NAB Convention in April in Chicago. See you there. Brochures available from
Circle Number 36 on Reader Reply Card

Mr. Lothar Amanda,
Robert Bosch Corporation,
2800 S. 25th Ave.,
Broadview, Ill. 60153.

Robert Bosch Corporation

New York Chicago San Francisco

increments, a touch-up adjustment. Should the line stretchers be associated with diplexed pairs of tubes, they must be adjusted equally in small amounts so that the stages remain balanced. If all adjustment is made on one line, the stages will become unbalanced.

Shaping Filters

Band shaping filters will not ordinarily effect the desired overall response, unless of course, they have become damaged or tuned inadvertently. These are very high Q circuits and can be easily effected by temperature changes, damage from dents, or loss of pressure if they are pressurized. If any of these changes occur, the notches will be at different places and these may be within the desired bandpass. In that event it may not be possible to get the desired response curve. Needless to say, the overall bandwidth will not be what is required either. Retuning of these units is not recommended for the station engineer unless he has the knowledge, patience, and required specialized equipment necessary. He should get a consulting firm to do it.

The ideal response curve is that which is shown in the FCC Rules. It shows the upper and lower sidebands, and gives the limits in dB.

Response measurements may be made in several different ways, but the preferable manner is through the use of a video sweeper and a side-band analyzer. The analyzer will permit both the upper and lower sidebands to be displayed on an oscilloscope at the same time. Usually, when adjustments are made to one section of the bandpass it upsets other sections. The analyzer display will permit this to be observed immediately.

While the objective is an overall response as near the ideal FCC curves as possible, it is a good practice for all the stages, both video and RF, to do their share. If only the output is observed, it is possible for one or two stages to be severely overworked during programing. Thus, it is well to observe the response at different places in the transmitter where a sample can be obtained. This can be video out of the modulator and at the output of intermediate driver RF stages which carry the modulation. Such observa-

tions will quickly show which stages are not doing their share. When losses must be made up, the adjustment should be distributed as much as possible throughout all the stages of the transmitter.

Linearity

Changes of picture brightness from black to white should be uniform. If it is not, there will be a change in the gray scale of the picture as well as hue and saturation changes in the color signal. Poor linearity is a characteristic of grid modulation and many TV transmitters use grid modulation. Poor linearity can also occur in video stages, traveling wave RF tubes, tetrodes and klystrons.

The station engineer ordinarily has little to do with the actual circuit design of the stages in his transmitter. His main objective is to maintain the operating parameters established by the manufacturer. If the original just barely makes the grade, he may have many problems. Parameters can deteriorate in service by voltage misadjustments, aging tubes and circuit modifications. For example, the modulated stage may have its bias misadjusted, permitting it to operate on the non-linear portion of its input-output curve.

Non-linearity can take place on either end of the gray scale; that is, toward black and the sync region or toward white and the highlight region. Some tubes have an inherent tendency to compress one or the other regions. Klystrons, for example, prefer to compress the blacks, while traveling wave tubes prefer the whites. Tetrodes usually compress in the whites, while linear stages can go to either end if they are operated improperly, as can small triode modulated stages.

Before making linearity measurements, all the response measurements and corrections should have been made and tube parameters adjusted to the correct values. A stair-step signal with 3.58 MHz bursts superimposed on each step should be fed to the transmitter input and transmitter operated at full power, full modulation.

The output of the transmitter should be observed on a diode that is fed through a high pass filter.

Fig. 4(a) Stairstep signal modulating the transmitter with 3.58 MHz bursts on each step, after being fed through high pass filter to remove steps. This shows transmitter without linearity correction. Also, note the compression of blacks at left.

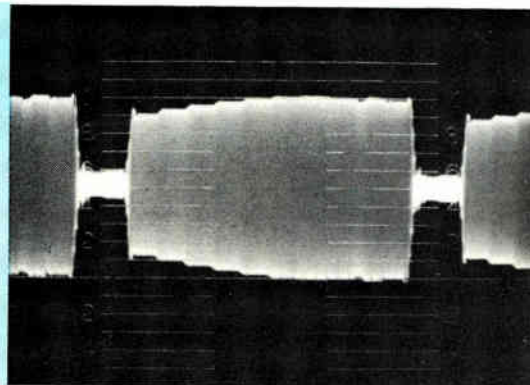
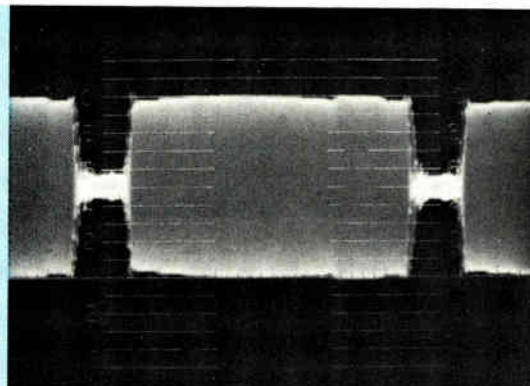


Fig. 4(b) Same modulating signal as in Fig. 2a, but after linearity correction. Notice that the blacks have been corrected. While correction is not perfect, it is entirely acceptable.



Effective now!



Alma's new 7600SE-8 special effects generator: high in quality — low in price — great in color!

For the *first time*, a color special effects generator with eight distinct wipes is available at a price you can afford. ALMA's new 7600SE-8 includes extensive use of integrated circuits, all modular construction, remote control panel, and requires only 1¾" rack space for electronics. Three operational selections provide internal key, external key, and matte — all with level controls. *Effective now* from ALMA. You're in good company with ALMA, where engineering excellence is your guarantee of reliability. Write or call: ALMA Engineering, Inc., 7990 Dagget Street, San Diego, California 92111 — (714) 278-9330.



Visit us at NAB: Booth #332,
Continental Room, Lobby Floor, Conrad Hilton Hotel, Chicago.

Circle Number 37 on Reader Reply Card

This filter will remove the steps and leave the 3.58 MHz bursts on the same axis. The output should be chopped to insure correct modulation. Any non-linearity will be quickly evident.

The coupler into the diode should be adjusted so the diode itself is operating linearly. The RF input level should be adjusted to different levels to that portion where the display remains the same display except for a change in amplitude. Try another diode and the conditions should be identical. If there is still doubt as to the diode's linearity, it can be checked in another manner. Feed a lower frequency AC signal to the diode at approximately the same level as the coupler. This can be a signal generator with some accurate device to measure its output. Then the amplitude of the AC signal should be increased in increments and the DC output measured at each increment. This AC input and DC output can be plotted on a graph. The graph should be a

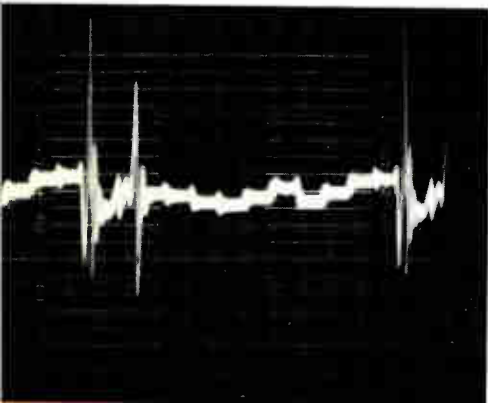


Fig. 5 The same staircase and burst signal as used for linearity fed through phase analyzer. The large spikes represent the horizontal sync areas, while the small steps are the remainder of the staircase. Black is at left, white at right. If all were on the same horizontal axis, the phase shift would be zero. This figure shows phase through the entire transmitter, color, and sideband filters and represents a +3 degree shift.

straight diagonal line if the diode is linear.

Transmitter linearity correction calls for pre-distorting the input signal to overcome the system non-linearity. During adjustments, the output should be checked often for correct modulation, as changing the linearity correction circuits will also change the system gain. The objective is a linear output at full modulation.

Any gain controls between the linearity correction circuits and the transmitter should not be adjusted after these corrections have been made. It should be locked in place and any level changes required during program operation should be made ahead of the correction circuits.

Differential Phase

As the picture changes in brightness from black to white, there may be a change in the phase. Those factors mentioned earlier that can cause a stage to be non-linear can also cause a change in phase. Other causes can affect differential phase, such as, overloading, clipping, tube internal impedance changing with load changes, feedback circuits, and neutralization problems. The change may cause a shift in hue or color saturation, or both.

Again, correct operating parameters are important. One must guard against overloaded stages and excessive clipping. When replacing components, such as screen by-pass capacitors, correct value replacements should be used. During modifications, care should be taken in the routing of the wiring, always with phase problems in mind.

Differential phase can be observed and measured with the same set up as for linearity, with the exception the output signal is fed to a phase analyzer or a vectorscope. Phase correction circuits should be adjusted so that the scope display shows a flat display, or as nearly as possible. Ordinarily, the only phase correction circuits provided are those associated with the linearity correctors.

Envelope Delay

When all the modulating frequencies do not pass through the

transmitter in the same time interval, there are envelope delay problems which is actually a phase problem. When the color frequencies, for example, do not pass through in the same time interval as the monochrome, the color can be displaced to the right of the monochrome picture. If delay is severe enough, it can cause edgings and appear as camera misregistration.

The sideband shaping filters at the transmitter as well as the sound notch and filters in the receiver can cause phase shifts at the sharp transitions. At the same time, ringing will be evident, when color amplitude changes in these regions. These filters are passive units and do not change. Thus, fixed correction can be added to predistort the signal to overcome them. These correction filters are added at the input of the transmitter video.

A rather expensive instrument is available that can measure and draw a tracing of the system envelope delay. A simpler method that the station engineer can use to check the system is the use of a 100 KHz square wave pulse. The transmitter is modulated with this pulse and operated in midcharacteristic as with the video sweep. Low frequency correction out to about 2 MHz above carrier is provided for the transmitter. The signal is pre-distorted at the transmitter to overcome the delay caused in the sound notch and filters of the home receivers.

When adjusting the receiver equalizers, it is best to recover the signal with a demodulator which closely resembles the circuitry of a receiver. A diode cannot do this. The recovered square wave is displaced on an oscilloscope and the equalizers adjusted to minimize the ringing that occurs at both leading and trailing edges of the pulse, and also for tilt in the pulse.

When adjusting the system response, it is well to avoid sharp transitions in the signal and especially on the high end towards the sound notch. At the sound notch, it is better to "roll the edge" slightly, rather than have a peak or abrupt change. Such a roll off goes a long way to reducing or minimizing ringing and phase changes at the notch.

Attention TV Stations:

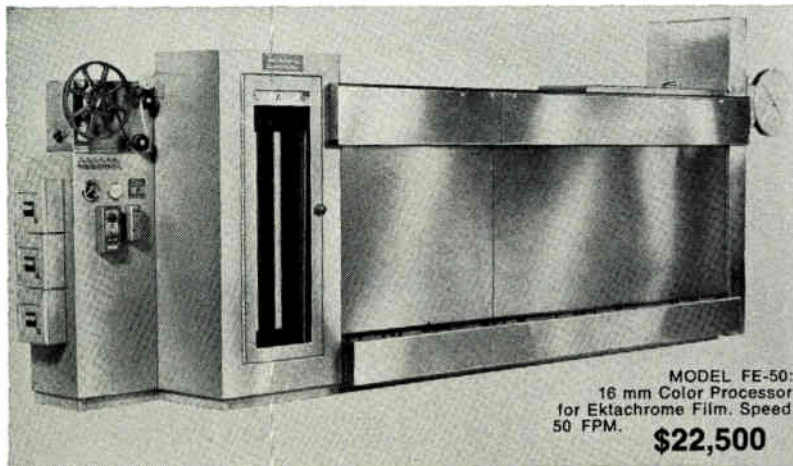
We've got news for you!

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

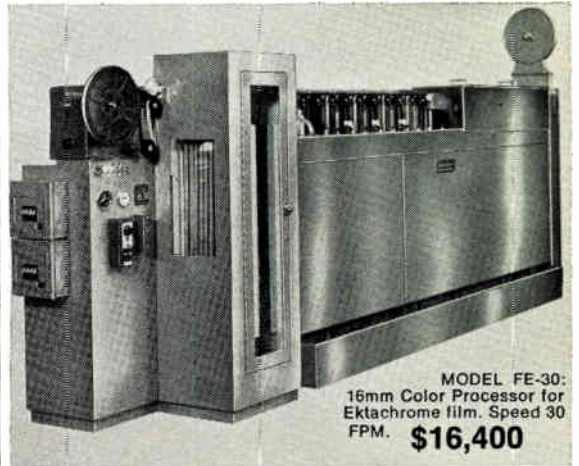
The FILMLINE Models FE-30 and FE-50 are exciting new color film processors designed specifically for use in television station news departments. The design is backed by Filmline's reputation as the world's leading manufacturer of professional film processors for the commercial motion picture laboratory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

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

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



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



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

- **"FILMLINE OVERDRIVE FILM TRANSPORT SYSTEM"**
This marvel of engineering completely eliminates film breakage, pulled perforations, scratches and operator error. The film can be deliberately stalled in the machine without film breakage or significant change of film footage in solutions. The heart of any film processor is the drive system. No other film drive system such as sprocket drive, bottom drive or simple clutch drives with floating lower assemblies can give you the performance capability of the unique Filmline Overdrive Film Transport System.
- **"TORQUE MOTOR TAKE-UP"** gives you constant film take-up and does not impose any stress or strain on the film itself. Completely independent of the film transport system. This FILMLINE feature is usually found in professional commercial processors but is incorporated on the FE-30 and

FE-50 models as standard equipment. Don't settle for less!

- **"TEMP-GUARD"** positive temperature control system. Completely transistorized circuitry insures temperature control to well within processing tolerances. Temp-Guard controls temperatures accurately and without the problems of other systems of lesser sophistication.
- **"TURBO-FLOW"** impingement dryer. Shortens dry-to-dry time, improves film results, and carefully controls humidity content of your valuable (and sometimes rare) originals. Immediate projection capability is assured because the film dries flat without the usual curl associated with other film processors.
- **"ZERO DOWN TIME"** The reputation of any film processor is only as good as its reliability. The

combination of the exclusive and special added Filmline features guarantees trouble-free operation with absolute minimum down-time and without continual operator adjustments. Recapture your original investment in 2 years on maintenance savings alone. Filmline's "Push the button and walk-away processing" allows inexperienced operators to turn out highest quality film.

- **"MATERIALS, CONSTRUCTION AND DESIGN"** All Filmline machines are constructed entirely of metal and tanks are type 316 stainless steel, heliarc welded to government specifications. The finest components available are used and rigid quality control standards are maintained. Compare Filmline features to other processors costing more money. Feature-by-feature, a careful evaluation will convince you that Filmline offers you more for your investment.

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

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

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

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

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

All prices F.O.B.
MILFORD, CONN.



Dept. BE-70

Send for Literature.

Time & Lease
Plans Available.

"When you buy quality Filmline Costs Less"

Circle Number 38 on Reader Reply Card



Fig. 1 The 462.55 MHz CB antennas for communications between AM-FM-TV studios and the AM transmitter site.

Setting up for emergencies on the Gulf Coast

By Lindsey G. Riddle*

On Sunday August 17, 1969, Hurricane Camille, which has been called the worst hurricane ever to be experienced in the Western Hemisphere, struck the Gulf Coast. Since New Orleans was on the perimeter of this killer-hurricane, we received the force of hurricane level winds. New Orleans has experienced some severe hurricanes in the past, and there have been many that have come close to our area. Each summer there are a number of hurricane scares when a hurricane enters the Gulf of Mexico. With each warning we must make preparations as if we were actually going to be hit. By the time the storm is actually in our area, the effects of the bad weather which precede a hurricane are such that it is impossible to complete the necessary preparations.

In 1965 another violent hurricane, Betsy, hit New Orleans directly and forced all TV, Radio, and FM stations off the air except

*Engineering VP, WDSU-TV, New Orleans.

WDSU-TV and WDSU-AM. WDSU-AM operated continuously, except for slight interruptions, and WDSU-TV operated throughout the hurricane and into the following day. Rising water got in the fuel system for the 125 kw auxiliary generator at the TV transmitter and the engine threw a connecting rod, which shut down WDSU-TV until a spare 25 kw generator could be brought in over five miles of flood water. It was then necessary to operate at reduced power until power was restored a few days later.

Our experiences with Betsy gave us the background against which we could judge the need for improvements to our emergency communication system that should be put into effect before the next hurricane season. As a result of these improvements, we were prepared and able to do a better job for the public when disastrous Camille struck last year.

Our combined radio, television, and FM studios are located in a ground floor building in the heart of the French Quarter, which simplifies the requirements for emergency power. At this location we

have a 75 kw, diesel powered, trailer mounted generator plant to furnish stand-by power to all three studios and control rooms. At our TV transmitter location, seven miles east of the studio, we have a large, 70 pound tower especially constructed to withstand hurricane force winds. Each year we make a complete check of the tower before the hurricane season begins. Any necessary repairs may be made at that time to insure that the tower will be in top condition in the unhappy event that we do have a hurricane.

We learned from our experience with the generator at the TV transmitter during Betsy, and we decided at that time it would be better to replace the one large generator with two smaller 75 kw generators. This way it would be possible to operate at slightly reduced power if one generator was lost. One generator will power TV at full power and the other, FM at full power.

The FM station is a key station in the FM Defense Network that would be used in case of national disaster. The combining network was purchased so it would be possible to parallel the two generators

When Stanton engineers get together, they draw the line.

The frequency response curve of the new Stanton 681 Calibration Standard is virtually a straight line from 10-20,000 Hz.

That's a guarantee.

In addition, channel separation must be 35 dB or greater at 1,000 Hz. Output must be 0.8 mv/cm/sec minimum.

If a 681 doesn't match these specifications when first tested, it's meticulously adjusted until it does.

Each 681 includes hand-entered specifications that verify that your 681 matches the original laboratory standard in every respect.

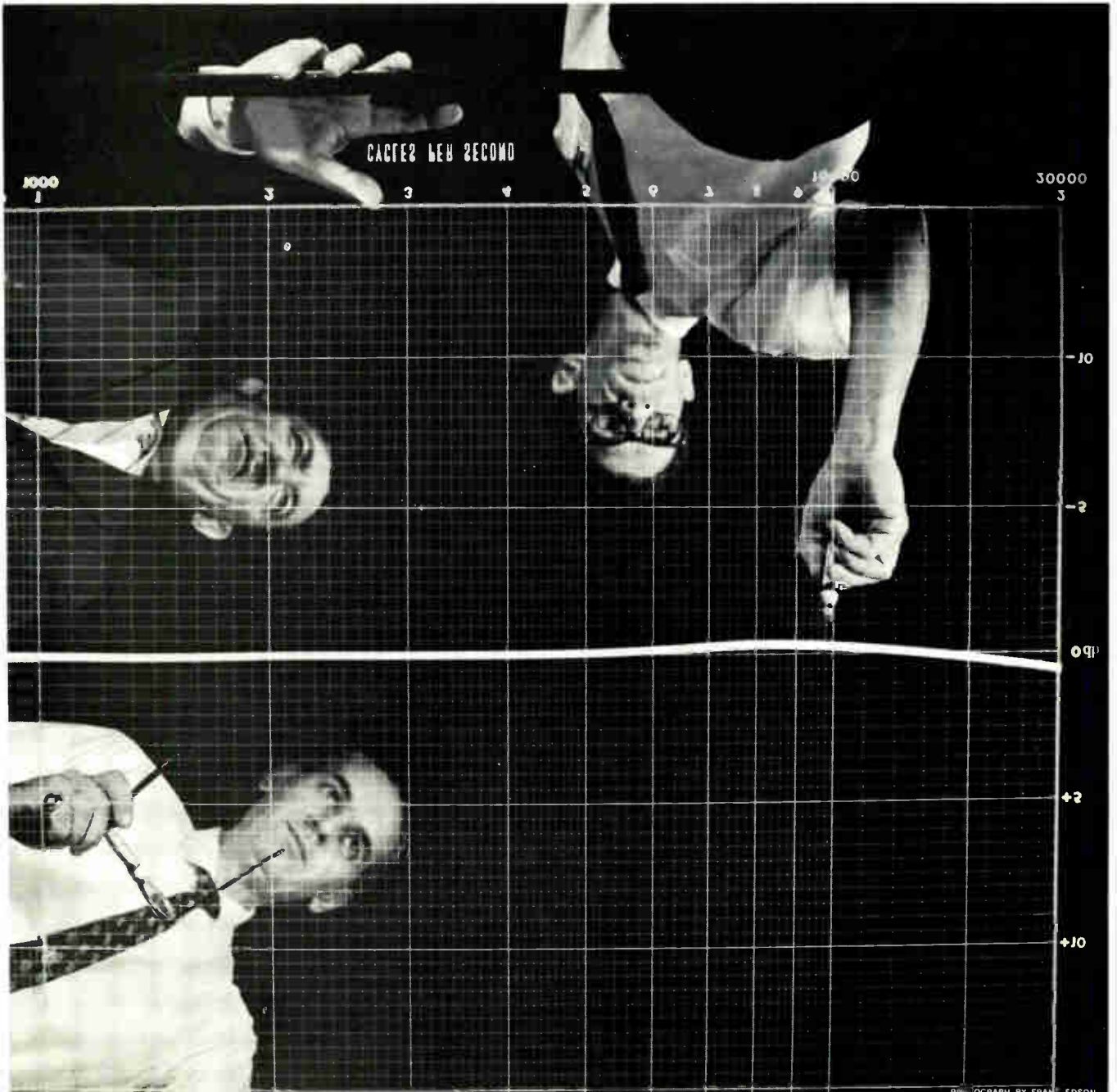
Nothing less would meet the needs of the professional studio engineers who use Stanton cartridges as their ref-

erence to approve test pressings. They must hear exactly what has been cut into the grooves. No more. No less.

But you don't have to be a professional to hear the difference a Stanton 681 Calibration Standard will make, especially with the "Longhair" brush which provides the clean grooves so essential for clear reproduction. The improvement in performance is immediately audible, even to the unpracticed ear.

The 681 is completely new, from its slim-line configuration to the incredibly low-mass moving system. The 681A with conical stylus is \$55.00, the 681EE with elliptical stylus, \$60.00.

For free literature, write to Stanton Magnetics, Inc., Plainview, L. I., N. Y.



Circle Number 39 on Reader Reply Card

if needed. A 28 kw gasoline engine powered generator equipped with automatic start and changeover is located at the radio transmitter site about three miles south of the studio. This unit powered the transmitter for ten hours continuously during and after Hurricane Camille.

So that we will know when this generator comes into operation and have an idea of its remaining fuel supply, even when the transmitter is being operated from its remote point, we have a light at the AM studio which goes on when the generator starts. This equipment is de-

signed to automatically change back to normal power when it has been restored. In addition, we have another 28 kw engine generator mounted on a truck that could serve our broadcast operations during a storm. It was loaned to the badly damaged Gulfport, Mississippi, area the day after Camille.

During Betsy in 1965 the WDSU-TV transmitter was completely surrounded by water and operated for days without communications or telephone lines. Communication with the transmitter engineer was accomplished by holding a written

note in front of a camera, and he would answer by using a note and a Vidicon camera at his location. The only telephone line which remained in operation in our whole system was one to the AM transmitter. These factors led to the present installation to provide complete programming, communication, and power stand-by to make all areas completely operative on their own. Emergency intercommunication and STL program facilities between the two transmitter sites and the studio complex are important facets of our system.

Intercommunication is provided by three Class A Citizens Band transceivers operating on 462.55 MHz, and this works out quite well since in our area the 400 MHz Citizens Band frequencies are not too crowded. We also have Class D Citizens Band equipment normally used for maintenance duties on the radio antenna system.

The two program lines to our radio transmitter are backed up by the remote broadcast relay transmitter normally used for our daily air traffic program, which can be pressed into service as an emergency STL when needed. The radio transmitter also has two additional sources of program feed during emergency conditions. It can take the off-air FM program since FM is usually simulcast with radio at these times. An FM receiver, fixed crystal tuned, is installed for this purpose.

The other source is a Telco line between the control point (television transmitter) and the radio transmitter. Although the radio transmitter is normally remotely controlled from the TV transmitter, we have a policy of manning this site during hurricanes since situations which are not within the capabilities of the remote/automatic devices installed always seem to pop up.

The Airwatch (traffic reports program) airplane proved very useful the morning immediately after Camille, giving our listeners an eyewitness survey of the damage done in the Gulfport/Biloxi area sixty miles east of New Orleans and hardest hit by the killer hurricane.

The FM backup STL is achieved by using another of our 450 MHz

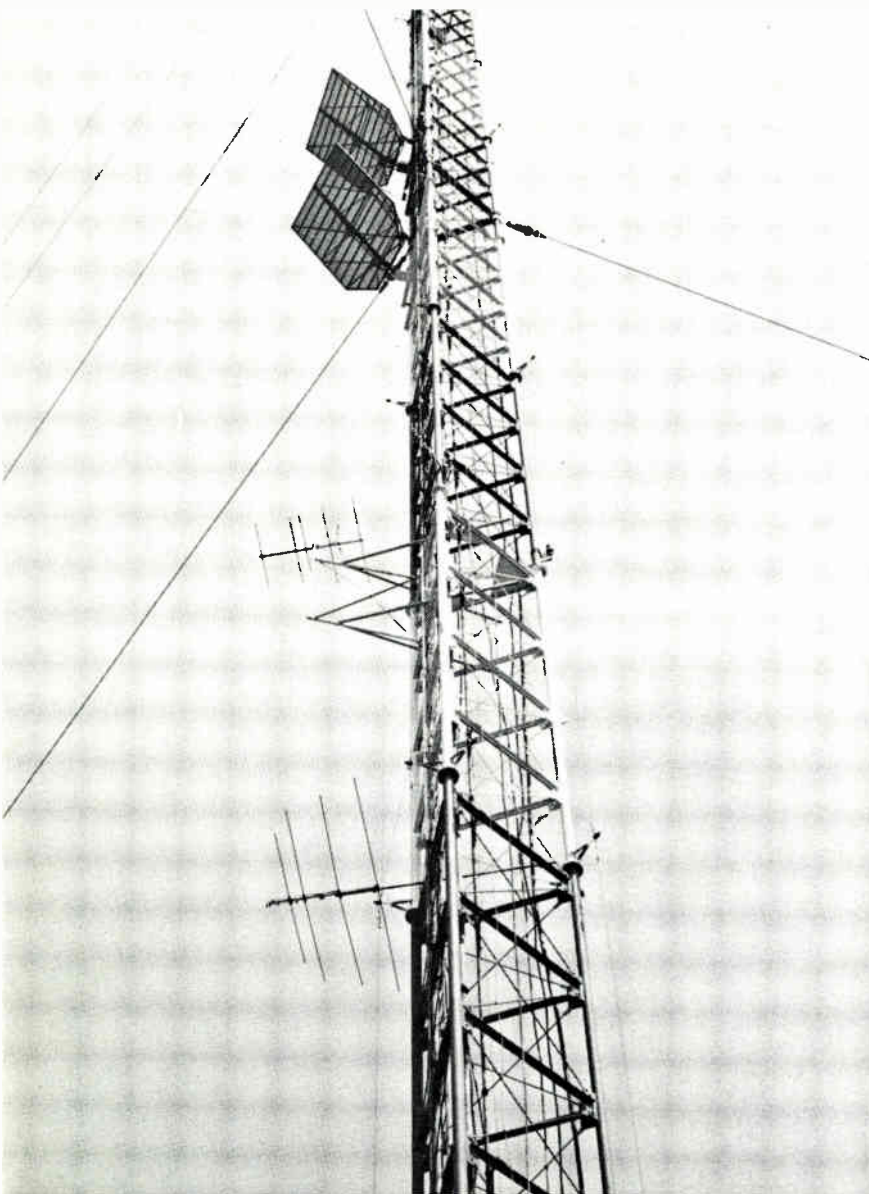


Fig. 2 FM antennas for receiving out of town FM stations that are part of the state FM emergency network.



Fig. 3 The 450 MHz transmit and receive antennas for Civil Defense communications. Baseball bat type antenna is used on 455.85 MHz for AM programming.

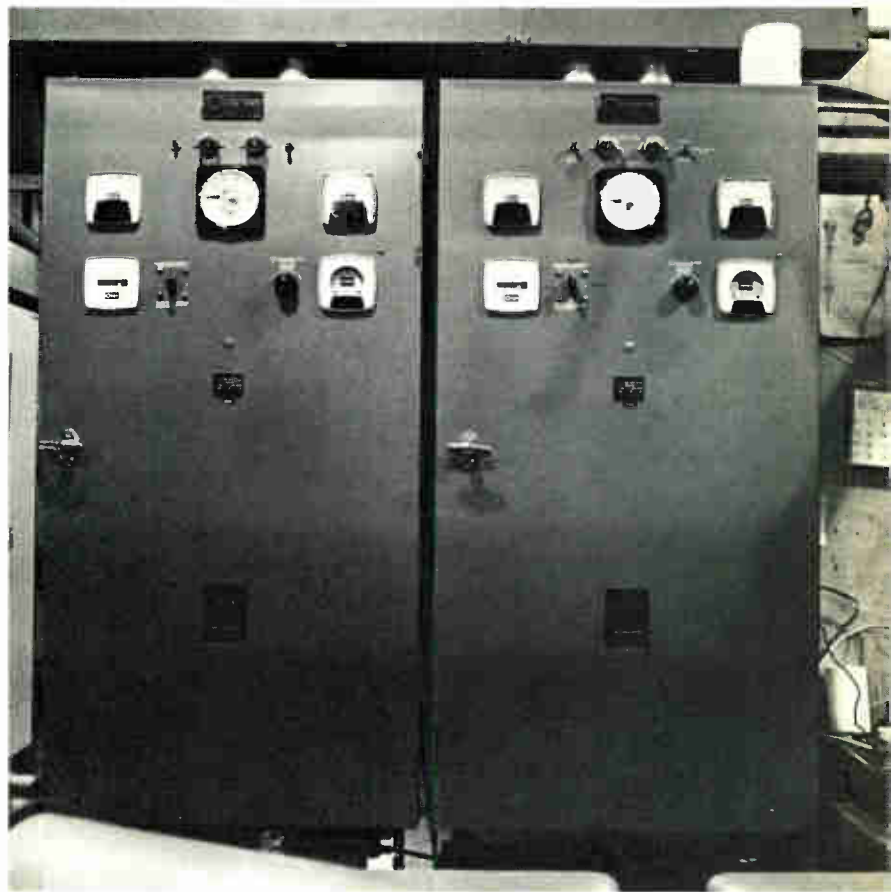


Fig. 4 WDSU power panels for FM and TV standby generators. For details on generator placement and care, see the articles written by Loren Mages in the August and December, 1970 issues of Broadcast Engineering.

remote pickup broadcast units, used for this service only during emergencies. In case of failure of this unit, the FM transmitter can then be fed the output of a tuner picking up our radio signal.

Our television STL microwave consists of two completely separate equipments, one of which is battery operated. The paths are completely separate, there being two transmit dishes, two separate wavebenders midpath, two reflectors on the tower, and two separate receive dishes and receivers. Both of these links are equipped with diplexed audio. We have a 12 bay, channel six, batwing antenna, the top six bays of which operate as our main TV antenna, while the lower six bays serve as the radiator for our FM transmitter and auxiliary TV driver/transmitter through the use of a diplexer. Both antennas are fed by separate sets of transmission

lines. Power in the main TV transmission lines is monitored, and when a certain drop level is detected the main transmitter is automatically turned off and plate power is applied to the auxiliary transmitter. Changeover is almost instantaneous.

We also have an amateur radio club at WDSU which usually keeps its ham equipment at our studios. Since communications were almost nonexistent between the hardest-hit Gulf Coast area and the "outside world," the morning after Camille we sent the ham equipment into that area with several of our technicians (who are also ham operators) to help get messages in and out for the people of that area.

A number of years ago, with the help of WSM-TV, Nashville, we constructed a weather satellite receiver out of parts we had on hand. This has proven to be most effective for regular weather programming

and in actually following the hurricane during an emergency. We also have a radar installation which adds to the accuracy of our weather information.

Of course, there are many other non-technical preparations which must be made in case of a hurricane. Fourteen day's gasoline supply for the generators is always kept on hand, as well as enough water and provisions to last a number of days for the crews stationed at both transmitters and at the studio. Boats are on hand at the low-lying transmitter areas to provide a means of transportation or escape in case of danger from rising waters.

Operation during an emergency is so important we at WDSU are constantly trying to improve our setup and eliminate any weak points in the system that might cause us to lose time on the air when it is so badly needed.



Fig. 1 The field set was placed on the floor of the helicopter and oriented toward the glass front. Readings were relayed to the ground unit via a two-way mobile radio.

Intensity Readings by Helicopter

By Alvin H. Andrus; Jansky & Bailey, Communications Div., Wash. D.C.

Section 73.186 of the Federal Communication Commission's Rules and Regulations outlines a procedure for making field intensity measurements to establish the effective field at one mile radiated from a vertical antenna.

A portion of the prescribed procedure requires measurements on eight or more radials, at intervals of approximately one-tenth of a mile up to two miles from the antenna, one-half mile intervals from two miles to six miles, and two mile intervals from six miles to fifteen or twenty miles.

This article will deal with the field intensity measurements required within two miles of the antenna, but made from a new approach.

The "Walk-In"

The normal technique for taking field intensity measurements within two miles of the antenna is to select a reference point on the desired radial approximately two miles from the antenna using a topographic map. From the selected starting point, it is necessary to pace the distance in 0.1 mile intervals towards the antenna and obtain field intensity readings at each of the 0.1 mile points. The accuracy of the paced distance is always questionable until an obvious landmark shown on the map is passed. These measurements are sometimes affectionately referred to as "walk-ins."

Memorable hazards often block

the "walk-ins," such as unpassable creeks causing lengthy walks around the creek, ponds or lakes which usually are by-passed eliminating some of the important measurements, fenced-in or cultivated fields requiring either permission from the farmer resulting in long delays before crossing each field or else a bold walk across the field hoping that the field can be crossed before anyone notices the trespasser. Of course, animal life such as bulls, steers, snakes, dogs, mosquitoes, etc., always add to the excitement of obtaining the "walk-in" measurements.

It is estimated that under average conditions, one man can average two or three radials per day within two miles of the antenna system and obtain perhaps 70% to 80% of the total measurements possible. Since the average non-directional or directional proof of performance includes 10 to 15 radials, it is obvious that to perform such "walk-ins" requires four to five days.

A recent project involved the necessity of obtaining accurate measurements on fifteen radials from two miles to within one-half mile of the array. The array was located in the relatively flat section of Oklahoma with numerous fenced-in fields for cultivation and cattle grazing. The presence of rattlesnakes was more than a possibility.

Helicopter Method

A Hughes "300" helicopter was

rented from the local airport to obtain the measurements (Figure 1). In lieu of taking the time to install a permanent mounting of the field set, DC amplifier, and chart recorder in the aircraft and to bypass the problem of space limitations in the copter, it was decided to mount the field set on the floor of the copter oriented towards the glass front and to relay the readings to a ground unit via a two-way mobile radio.

Approximately six hours flight time was utilized in obtaining an accurate calibration factor to convert from the field intensity reading in the copter to the ground reading. Two methods were used to arrive at the final conversion factor.

Calibration Procedure

Prior to renting the helicopter, conventional field intensity measurements were obtained on the ground at accessible locations from one to three miles on several radials.

On the following day the helicopter hovered over each of the locations at 100 feet, 150 feet, 200 feet and 300 feet to obtain field intensity readings for each elevation. In calibrating the field set before each measurement, it was a simple matter to hover the copter at right-angles to the antenna for the purpose of checking the calibrating oscillator frequency and setting the gain control.

Examination of all the measurements indicated that at the 100,

SHURE

SM53

UNIDIRECTIONAL
DYNAMIC
MICROPHONE



one or all of these provable advantages can make this your most effective and reliable microphone!

1. WIDER FRONT WORKING ANGLE

The SM53 allows *greater freedom of performer movement*—tonal quality is *unaffected by movement throughout* the broad effective pickup area. *Eliminates "holes" and "hot spots"* when using multiple microphones. These valuable attributes stem from a broad, true cardioid frontal pattern *at all frequencies, in all planes*—freeing the user from the restrictions of overly tight angular sensitivity.

2. MORE EFFECTIVE REJECTION OF UNWANTED SOUNDS

The SM53 prevents sound coloration due to off-axis reflections or reverberation—and, in addition, unwanted sounds (even air conditioner rumble) are effectively controlled. These properties are achieved through the polar pattern which is singularly uniform with frequency (even at the extreme low end) and is symmetrical about its axis.

3. MECHANICAL NOISE ISOLATION

Built-in effective shock mount significantly reduces the objectionable stand, cable, and handling noises associated with many unidirectional microphones. The SM53 can be used in many applications where conventional units have proved marginal or unusable.

4. EXTRAORDINARY RUGGEDNESS

You can even drop the SM53 directly on its nose without damaging the microphone element—and it will maintain its excellent performance characteristics.

5. SUPERIOR HUM REJECTION

Built-in hum-rejection system reduces magnetic hum susceptibility by as much as 20 db compared to other units! Makes it far more usable in distant pickup applications and in areas with extremely high magnetic fields.

6. LESS SUSCEPTIBILITY TO "POP"

Integral "pop" filter minimizes explosive breath noise without external screening. Works well where other microphones are marginal or unusable.

7. MINIMIZED PROXIMITY EFFECT

Uniform tonal quality is maintained (without objectionable low-end build-up) regardless of whether the microphone is worked close up or from a distance.

8. FIELD SERVICEABILITY

Element (cartridge), connector, front screen, roll-off switch can be replaced in minutes.

SHURE BROTHERS INC., 222 Hartrey Avenue, Evanston, Illinois 60204

© 1969 SHURE BROTHERS INC.

Circle Number 40 on Reader Reply Card

150 and 200 foot levels, the helicopter field intensity values times 2.6 gave the corresponding ground reading.

It was noticed that the 300 foot

level readings tended to decrease by 5% as compared to the 100 feet, 150 feet and 200 feet level readings which were constant. It was decided, therefore, that the measure-

ments would be obtained at the 150 foot level which was still at a relatively low angle from the 450 foot high towers but high enough to clear all the obstructions in the area.

Since reliance of the above calibration method was upon the previous day's measurements on the ground, it was decided that simultaneous measurements would be obtained on the ground and in the copter while the copter hovered 150 feet over the location. Several locations were visited in this manner and it was found that excellent correlation was obtained with the previous calibrating method.

It was ultimately decided that either calibrating method was acceptable and produced identical results. Once the calibrating factor was determined, the actual measurements along each radial were obtained in a matter of two or three minutes.

Measurement Procedure

A convenient landmark such as a road located two to three miles from the array on the radial was selected for the course starting point. The copter hovered over the starting point while the field set was calibrated. The copter then made a wide circle to obtain an approximate ground speed of 35 mph which the pilot maintained for the entire course run. At the instant of passing over the starting point the "mark" was relayed to the ground team along with the first reading.

The ground team started the stop watch and recorded the first reading. To free the man in the copter of reading a watch or writing, it was decided that the ground crew would relay a count to the copter at 10 second intervals by sending the count of 7, 8, and 9. The man reading the meter in the copter would then relay the reading that was obtained to the ground at the count of ten. In this manner, readings were obtained at exactly 10 second intervals while the copter flew at 35 mph and 150 feet above ground toward the tower. The previous agreed upon course finishing point was flown over at approximately 0.5 mile from the array—with a simultaneous reading and course ending "mark" relayed to the ground crew which then stopped the stop watch.

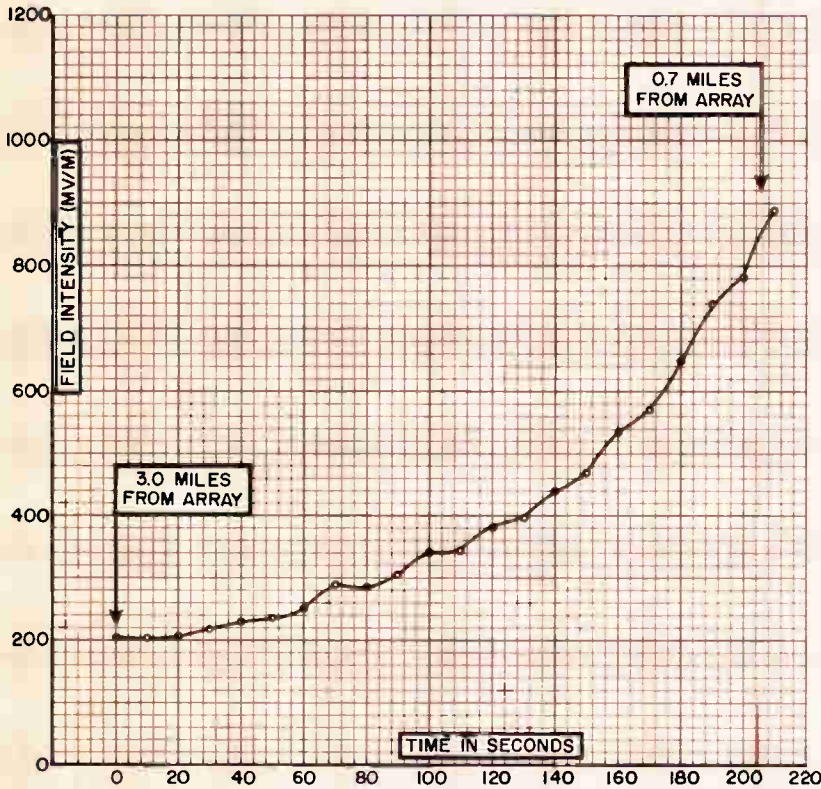


Fig. 2 This chart shows plotting of the curve in Mv/M vs. time over a distance of 2.3 miles, starting at 3.0 miles from the array.

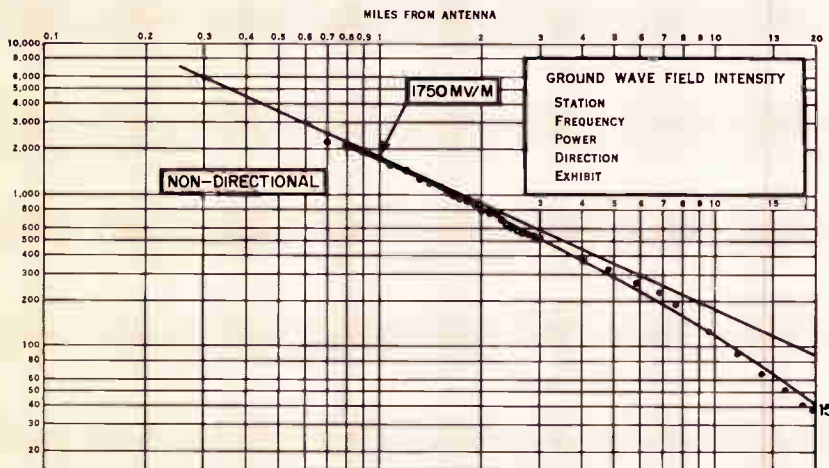


Fig. 3 Typical groundwave graph of measurements taken within three miles using the helicopter method.

Reading Conversion

Since the total distance of the course was known and the total time to fly the course was known, the average ground speed could be computed as follows:

$$\frac{\text{ground speed in MPH.} = \text{total distance in miles} \times 3600}{\text{time in seconds}}$$

At a later time the actual helicopter field intensity readings were plotted on linear graph paper versus time in seconds. The time scale can then be converted to a distance scale since the length of the course is known. A smooth curve can be drawn through the readings as shown in Figure 2. Values can then be taken from the curve for 0.1 mile intervals, multiplied by the established correction factor (in this case 2.6) and the resulting field intensity values can then be plotted on standard groundwave field intensity paper and analyzed as normal standards of good engineering practice dictate. A typical ground-

wave graph is shown in Figure 3 and the measurements within 3 miles of the antenna were obtained by the use of the helicopter.

It was found, in this case, that the 15 radials were obtained in approximately eight hours of flying time. It is believed that this method of obtaining the measurements is at least as accurate as the typical "walk-in" procedure and 100% of the desired measurements were accomplished.

It should be mentioned that there are some limitations to the use of the helicopter such as:

(1) A near-by airport is required for re-fueling as the typical copter only carries 1½ to 2 hours of fuel.

(2) Difficulty is experienced in holding the copter directly towards the tower if the tail or broadside wind is in excess of 40 mph. Headwinds are no problem in maintaining a true orientation towards the tower.

(3) A high ground speed (above 50 mph) results in inability to read the meter accurately particularly within one mile of the tower since

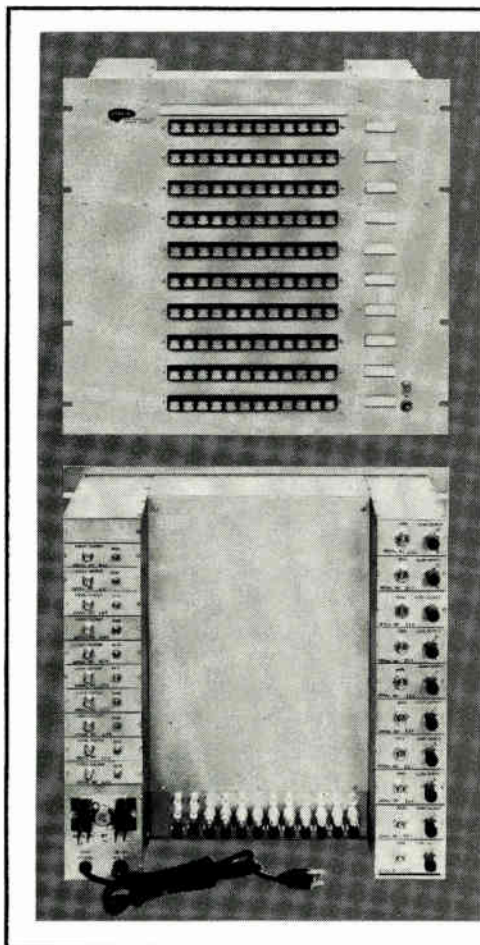
the readings are increasing more rapidly with distance as compared to flying two or three miles from the array.

(4) It may be impossible to fly at the required low elevations to accomplish close-in measurements in mountainous terrain or highly populated areas.

(5) A highly stable field intensity meter is required since the field set must run continuously for two to three minutes after calibrating.

Even with these limitations, the helicopter method of making field intensity measurements is more than just a novel way of satisfying the Rules. It saves valuable engineering time. And this time, converted into station costs, can more than offset the helicopter costs.

After set-up procedures have been standardized for a station, subsequent measurement flights require lower rental time. What's more, it just may be possible that airborne measurements made on a regular basis are more reliable than those made on foot after a rain or during a dry spell.



Patch Cable Eliminator

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

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

**Wouldn't a Series-X Switcher
solve some of your distribution problems?**

Write today for full details.

DYN AIR Electronics, Inc.
6360 Federal Boulevard
San Diego, Calif. 92114
Telephone (714) 582-9211



Flexibility in the '70's

The challenge of lighting

By Stanley Schwartz*

Most Lighting Directors in television should seek as much flexibility as possible in the systems they use. So should the engineers and technicians who arrange and operate these systems.

But for Herb Greeley, lighting director for the Johnny Carson "Tonight" show, flexibility is not just desirable—it is mandatory. Consider his problem as L.D. of NBC's most successful television program: Most L.D.'s get plenty of rehearsal time for a show that goes on the air one hour a week. "The Tonight Show" is on the air 90 minutes every night. The lighting crew shares the one-hour rehearsal time with the orchestra, the audio crew, the video staff, the technical director, and all the other technicians.

Although the show is taped, it goes out over the network less than four hours after the taping is completed. There is no opportunity to go back and correct mistakes or do anything twice. No one, including Lighting Director Herb Greeley, knows exactly what is going to happen on the show. Often, because of the nature of "The Tonight Show," unrehearsed events take place, timetables have to be instantly scrapped and lighting cues rearranged on the spot. To compound the problem further, the "Tonight Show" is broadcast every night in full blazing color, creating extra demands for the lighting system.

How these problems are solved every night so that a professionally prepared, well lit show is sent to the network is the story of an innovative staff working with a carefully designed lighting control system that delivers flexibility and precision.

Ten Scene Preset

Generically, the Kliegl Bros. system designed for the NBC Tonight Show is a ten-scene preset control system. There are 42 dimmer circuits and 18 non-dim circuits controlled through the system. The circuits connect to approximately 325 fixtures permanently located in the studio.

The operating section of the system is located one floor above the studio so that power lines can conveniently run from the fixtures and raceways, hung on the ceiling, directly into the patch panel and dimmer bank. The master control desk, the preset board and the dimmer bank are all located in this one room. An internal communication system keeps the electricians in the lighting control room in continuous contact with the L.D. and the floor crew.

Greeley sets up his 42 dimmer circuits this way:

Dimmers 1, 2 and 3 are connected to fixtures over the audience. Frequently, Johnny Carson or other performers will go into the audience as part of their routines. Those areas must be adequately lit.

Dimmers 4-11 are used to illuminate "home base," the term the Tonight staff uses to identify the desk at which Johnny Carson sits and chats with his guests.

Dimmers 12-19 are used to control the lights over the area where Johnny Carson, and guest comedians, deliver their monologues.

Dimmers 20-27 are used in the orchestra area.

Thirteen dimmers, 28-40, are used for production numbers. Since the Tonight Show has an air of casualness about it, most viewers don't realize that there is at least one production number (a singer, a

musical group, a magician or some other type of performer requiring special lighting) every night. It is also not uncommon to have two production numbers in a night. There must be adequate dimmer circuits to cover all those contingencies.

Dimmers 41 and 42 are used for commercials which are taped along with the show.

Lighting Rehearsal

Each afternoon, rehearsals for the Tonight Show begin at 4:00 o'clock. But Greeley and his staff have been on the job since that morning. Each day they check each of the color filters and each of the fixtures to make sure that the lights are still true and colors have not burned out.

Besides checking fixtures and running the system through its presets, the lighting staff also uses time during the day to rehang lights that have been moved for the show taped the night before. Greeley attends production staff meetings at which that night's show is run down and gets his first advance word of the type of performance he will have to light.

When rehearsals begin, the production numbers and guest stars are run through as quickly as possible. During the course of this rehearsal, Greeley takes light meter readings on each of the performers to get their incident light. He uses this to determine the foot candles of illumination he will need on those performers. The three cameras used at the Tonight Show are RCA TK 44 units, and they have a 20:1 contrast range. The average f stop of the cameras is 6.3.

Besides lighting people, the lighting system is used to wash color

*The Stanley Schwartz Co., New York, N.Y.



Fig. 1 Jerry Savitch at the master control console which provides for sub-mastering and blink-free cross fading. The system has 42 dimmer circuits, 18 non-dim circuits, connecting approximately 325 fixtures.



Fig. 2 Here are some of the 325 fixtures. All are connected overhead in wireways and run into the floor above the studio.

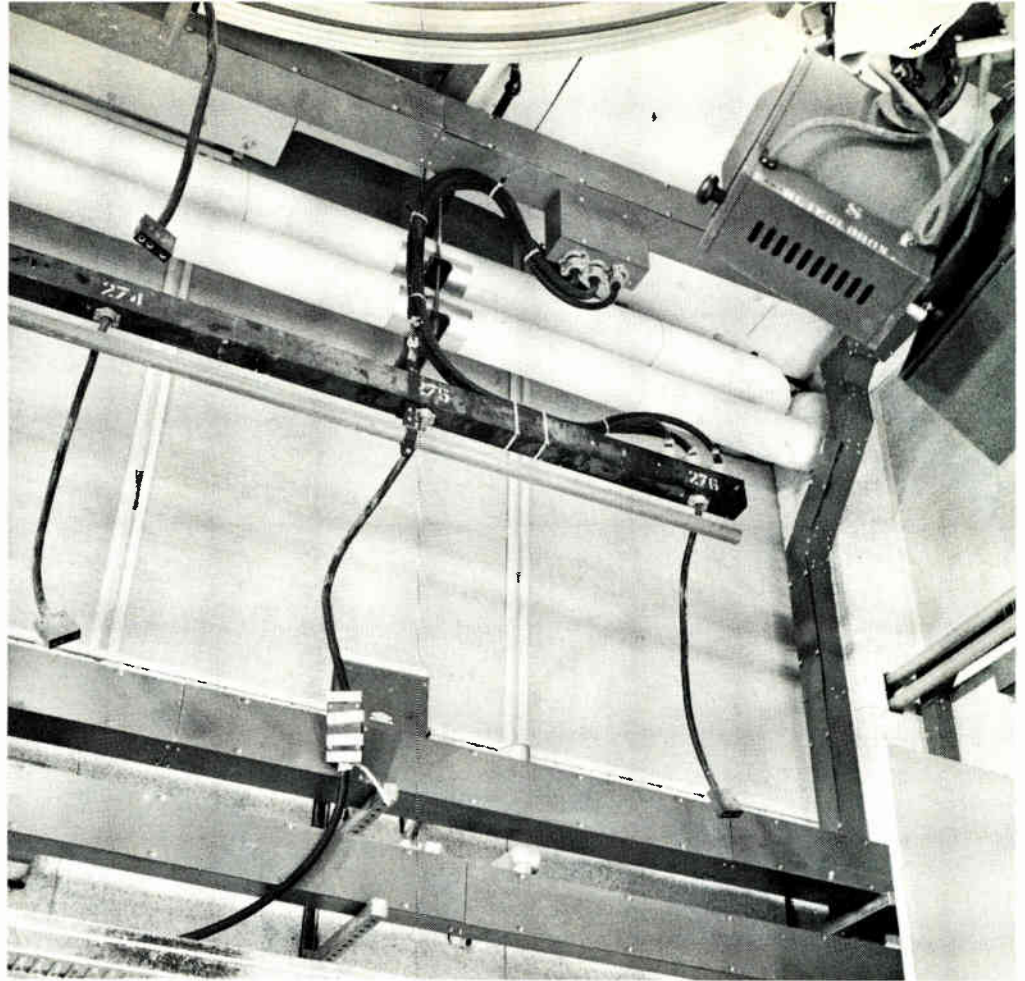


Fig. 3 This shot was taken in a corner of the studio, showing collection of cables into raceways. Note the plugs that allow fixture removal for quick changes.

over the sets. A new set is built for virtually every night's production numbers. The scenic designer paints all his sets off-white and the Kliegl luminaires, with Cinemoid filters providing the color, "paint" the scene with lights.

During this hectic rehearsal the lighting staff must determine the cues it will need, rehang lights where necessary, change filters, and assign cues to preset scene numbers. To make this task possible within such a short period of time, five presets are left standing each night. These presets are: 1. "Home base" . . . the famous desk where Johnny Carson sits; 2. The orchestra; 3. The curtain area from which the monologue is delivered; 4. The area to the left and rear of Johnny Carson from which guests enter. This preset is also used for the place in the studio at which many singers and other performers (except comedians) work; 5. The "funny mark". This is the spot in the studio closest to the audience. It's called the funny mark because it is used mostly for guest comedians who want to be as close to the audience as they can get.

Presets 6 through 10 are left for

production numbers which vary each night. During his brief time at rehearsal, Greeley assigns the 12 dimmer channels he has available to these presets (he does not use all of the five available presets each night) and writes his cues on a cue sheet.

Running The Show

When the show is taped, starting at 6:30 PM, Greeley calls the cues to his operators in the master control room and on the floors. There are two follow spotlights in the back of the studio, each equipped with its own dimmer and not normally operated through the system.

So flexible is the format and so unpredictable is the program itself that the master control operator only has an outline of the cues he will execute during the evening's performance. Often, Greeley will give him the setups for a cue during a commercial break or while the show is actually being taped. The preset board is handy to the master console so the chief electrician can set those on-the-air cues if needed.

Another electrician sits in the lighting control room each evening and often has to reassign fixtures

from the dimmer channels to which they were originally assigned. For that reason, it was important to have the patch board in the same room with the master control desk and preset panel.

Editor's Note: There are few shows that place such demands on the technical staff as does "The Tonight Show," but this does not mean that what Greeley's staff does is of little more than passing interest to others passing video signals.

The concept of lighting "The Tonight Show" hinges on realizing the potential and working to increase the potential of the lighting system. Tiresome sets, to take an extreme, are used every day for news shows. It might just be possible that looking at lighting as a challenge instead of as a necessity might add something to your picture.

Granted, most stations are not blessed with as many technicians as are used for "The Tonight Show", but with more attention being given these days by manufacturers to system improvements, a closer look at system potentials seems in order. You might end up doing the unusual with no additional staff.

The Only UHF Planar Triodes That Guarantee 20 dB Gain Up to 1000 MHz with Intermodulation Better Than -52 dB*



The outstanding linearity of our triodes allows the engineer to design TV transmitters and translators with the visual and sound carriers amplified through the same tube—exceeding FCC and CCIR specifications. 20 dB gain also permits driving these tubes with an all solid state exciter. All ceramic and metal construction assures long-life and reliability under severe environmental conditions. Thousands are in field use today at very low operational cost. These triodes are part of the most comprehensive line of UHF tubes available, ranging in output power up to 25 kW at 1000 MHz. A range of coaxial cavities is also available for UHF operation and assures the optimum performance of our tubes. For specific information please write or call your nearest Cain & Company representative, or contact us directly.

RATINGS	TH306	TH328
Heater Voltage (V)	5	5
Heater Current (A)	1.9	5
Anode Voltage (KV)	1.6	2
Anode Current (MA)	130	250
Power Output (W)	35	100
Intermodulation Level (3 tone test) (dB)	< 52	< 52

*Three Tone Test

Discuss these tubes with us at NAB. Booth 229, West Hall, Chicago Hilton, April 5-8.



THOMSON-CSF

Thomson-CSF Electron Tubes, Inc./50 Rockefeller Plaza/New York, N.Y./10020

(212) 245-3900

Circle Number 42 on Reader Reply Card

Care and treatment of wire service machines

By Roy B. Carter*

There is probably no single unit at any broadcast station that gets more attention from the entire staff than the wire service teletype machine. From the "rip and read" for-

*Technician, Associated Press, Kansas City, Mo.

mat to the heavily staffed news team and on to the "all news" format, there is a natural dependence upon the wire service as a main supplier of the news. Yet for all its importance, the wire machine is probably one of the least understood units at the station.

This lack of understanding is not due to circuit sophistication. For

while the wire services have been matching steps with the advancing broadcast technology, the printer itself is still a relatively simple machine. And what causes the majority of wire machine headaches falls into two categories: timing and location.

No News Is Bad News

Not too long ago I went out on one of those "hurry up" calls. The station had agreed to take on the Associated Press wire service and was anxious to get the machine installed and in use. Ten days earlier a machine had been set in place at the station, but the telephone company had not yet connected the loop.

Having been sent out with orders to stay at the station until they were receiving good copy, I arrived with the intention of doing just that. But when I called the telephone company, they told me there would be a two hour delay.

During that two hour delay, I decided to go to a drive-in for a cup of coffee. As is my practice, when I'm working on or finishing work at a station, I listen to them. Sitting there in the drive-in, I nearly spilled my coffee down my shirt when I heard the DJ say, "Due to the stupidity of the wire service, who can't twist a couple of wires together, we still don't have any news!"

As I drove back to the station, generally irritated, I was reminded once more that timing is important. The wire service company must give the telephone company at least 30 days notice before service is to start. The Associated Press could, as in this "hurry up" case, deliver a machine within days after an agreement has been made between the AP and the station. But this will change little at the telephone company.

Even 30 days may be cutting it too close, especially if you are a new station. It takes time for the AP to make the necessary arrangements with the telephone company. This means that when you want new service you should give the wire service a 35-day advance start no-



Fig. 1 KPRS Kansas City has set up their radio wire room just seconds away from the DJ's position at the console. Also, note that there are bulletin warning lights to the left of the clock.



Fig. 3 Note that police, weather and radio wire machines are not jammed together. The other machines are a different type that do not require a far forward paper box position.

tice. It is always easier to postpone the start than it is to get a "hurry up" early start.

Locating the Machine

If you are starting out with a new station, plan a spot for the wire machine(s). What happens all too often is that they end up in attics, closets, hallways . . . even in the men's room. It is true that these machines will work in even these locations, but not efficiently.

In the attic the machine will run too cold in the winter and too hot in the summer. In the closet, the machine will run hot all year and the paper box cannot be properly located. And machines located in hallways have a way of being bumped by traffic. Visitors and even some of the staff lean on the machine and crack the plastic guard on the top. Then too, it is important to keep the paper box in place as shown in Figure 2. It may not look too neat, but the position is important.

If the paper supply box is pushed back under the machine to present a tidy appearance, the inevitable result will be a paper jam. Also, when running new paper into the machine, be certain to take the cardboard inserts out of the box. They are used in shipment to keep the paper from getting tattered edges. If

they are not removed, the paper will not be taken up into the machine evenly and without tension.

A major consideration in the installation and location of the wire machine is the distance from the back of the machine to the wall. This distance is as important to machine ventilation as it is to free paper flow. The optimum location is to place the machine the length of the paper box away from the wall. The long term result will be fewer paper jams and lower operating temperatures.

Here again are sound reasons for planning machine location during station construction. If you locate the machine for optimum operation, it will not fit in a hallway or a closet.

When planning the news room, the wire room, or whatever you call the place given over to your wire machines, be certain to put them on a separate AC line. While they do not draw excessive current, they should not be on lines that will blow from an overload by non-broadcast equipment.

No one likes to change the ribbon on a wire machine. The ink comes off on your hands easily, but the change must be made. If you're not sure just how to change the ribbon, ask your wire service technician on his next visit. He'll be glad to demonstrate.

There is nothing very technical about locating and operating a wire machine, but let's sum up by looking over this check list compiled for optimum operation:

1. Machine paper box length from wall (20 inches).
2. Paper box directly under front shelf.
3. Separate AC line in use.
4. Ventilation possible for all sides.
5. 3.2 amp fuse inserted and spare on hand.

The machine comes with a 3.2 fuse installed. If one should blow, do not use a higher rated fuse. I can recall a case where a station fire was started because someone had inserted a heavier fuse.

Whether your station facility is new or old, the wire machine must be given some priority for space and location. Given a chance, the wire machine can consistently provide even more copy than you can use on the air. ▲

look at the tips of these blades



Here's uniformity that's readily apparent and undeniable. Here's precision . . . achieved only through modern production methods, skilled workmanship, close quality control.

All Xcelite screwdrivers are made this way . . . slotted, Phillips, Allen type, Frearson, Bristol, Scrulox . . . fixed handle or interchangeable blade types . . . to fit precisely, preventing damage to fastener or tool.

That's why they're first choice of manufacturers who seek zero defects on the assembly line, of technicians who take pride in their handiwork.

If you service or assemble precision products, look for screwdrivers, nutdrivers, and other precision tools you need in the extensive Xcelite line.

XCELITE®

XCELITE, INC., 118 Bank St., Orchard Park, N. Y. 14127
In Canada contact Charles W. Pointon, Ltd.

Circle Number 43 on Reader Reply Card



Fig. 2 Forward edge of the paper supply box should come directly under the front shelf.

Q R K

Announces a
Break Thru!!

RUMBLE?



NOT WITH THE

Q R K

QRK is now producing turntables with rumble figures far better than NAB specifications!!

QRK rumble, -39db NAB, -35db
QRK weighted rumble -62db

Instant start; reliable; unequalled service; attractively priced; and now . . . rumble free performance!!

QRK ELECTRONIC PRODUCTS, INC.
1568 NORTH SIERRA VISTA, FRESNO, CALIFORNIA 93703 • Phone: 209 251-4213

Subsidiary of
CCA ELECTRONICS CORP.
716 JERSEY AVENUE, GLOUCESTER CITY, NEW JERSEY 08030 • Phone: 609 456-1716

ENGINEER'S EXCHANGE

Telephone RF Filter Unit

By Ron Toller

Equalizing telephone lines can represent a challenge for many stations who patch in telephone calls for those talk and record-talk stations. But those who have their studios located at the transmitter site know the phone line problem

lation of a transistorized recorder connector designed to filter the beep tone and feed the tone in only one direction—to the caller or the person being called. This beeper has a built in compressor amplifier circuit

(Continued on page 78)

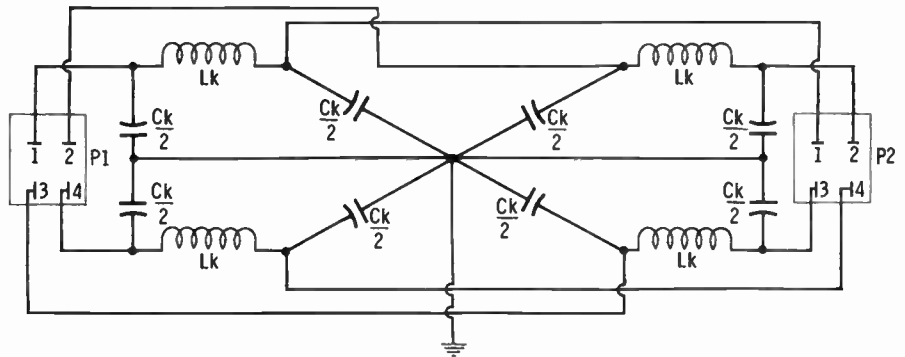
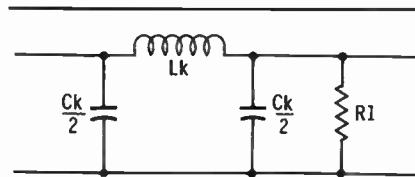


Fig. 2 Filter Schematic



$$Ck = 1/PifcR1$$

$$Lk = R1/Pifc$$

WHERE: R1 = LOAD RESISTANCE
CK = SHUNT CAPACITANCE
LK = SERIES INDUCTANCE
P1 = 3.14 (CONSTANT)
FC = DESIRED FREQUENCY TO ATTENUATE

IN THE WMWM FILTER:
R1 = 600 OHMS
CK = (.046/2) .023MFD
LK = 1.6 MILLIHENRIES
FC = 1090 KILOHERTZ

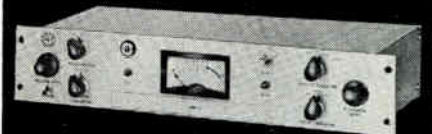
Fig. 1

doesn't end there. While sitting in the lobe, some mysterious things can happen in the studio. But there is nothing mysterious about RF on phone lines . . . and it can be cured.

Due to an unusually high amount of RF in the offices and studios of WMWM, and because of the need of the News Director to make clean telephone recordings, we built a low-pass filter unit designed to clean up the lines.

First on the list was the instal-

UPDATE YOUR AMPEX 350 WITH NEW LANG SOLID STATE ELECTRONICS!



* \$395 only

Check these advanced features:

- ALL SOLID STATE • COMPATIBLE WITH YOUR EXISTING AMPEX 350 SERIES HEADS • LOW NOISE • HIGH RELIABILITY • FRONT PANEL SWITCHING OF MICROPHONE AND LINE INPUTS
- RECORD ALIGNMENT CONTROLS ON FRONT PANEL • PLUG-IN PRINTED CIRCUIT CARD CONSTRUCTION • HIGH OUTPUT RECORD ELECTRONICS • LOW DISTORTION LINE AMPLIFIER • SAFE/RECORD SWITCH • MONITOR JACKS ON FRONT AND REAR PANELS • COMPACT SIZE — 3½" x 19" • OPTIONAL PLUG-IN MICROPHONE PREAMPLIFIER AND SYNC PREAMPLIFIER CARDS

*Based on trade-in of Ampex 351 series electronics. Trade-ins also available for Ampex 300 series electronics.

LANG ELECTRONICS INC.
507 FIFTH AVE., N. Y. 10017

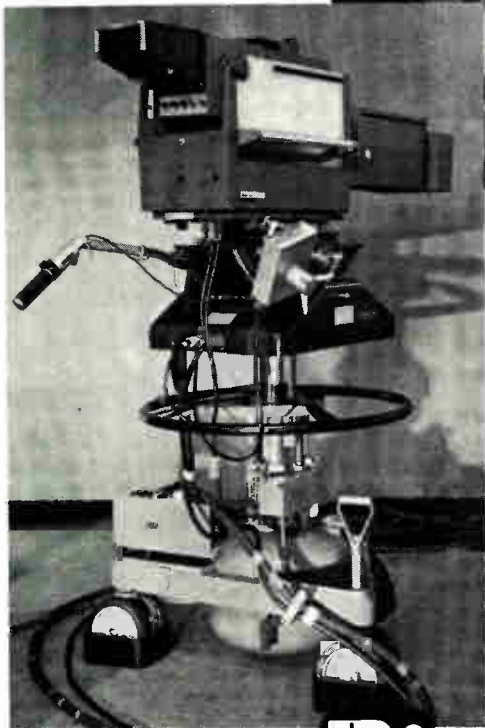
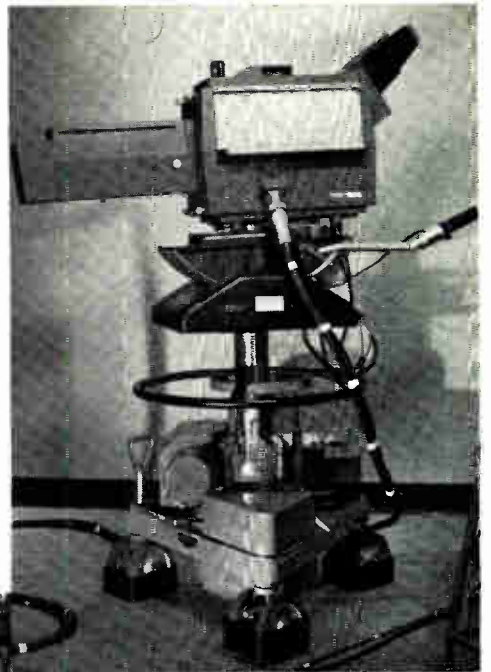
For all your audio needs look to Lang!

Circle Number 75 on Reader Reply Card

BROADCAST ENGINEERING

REMOTELY CONTROLLED CAMERA SYSTEMS

for: *News & Weather Presentations
Workshop & Demonstrations
Interviews & Panel shows
Commercial Video Taping
Special Effects*



A completely automated color news studio will be presented in our booth at the N.A.B. Convention Exhibit in Chicago, in April. We will demonstrate how, with this equipment, a variety of programs may be presented with our remotely controlled camera systems from master control.

Zoom, focus, pan, tilt, iris and pedestal height may be controlled from a remote location with a "shot fader" unit to provide smooth transitions from one shot to the next.

New engineering techniques now permit the "storage" of camera controls and video effects, all of which leads up to computer control. Random Access Memory Systems, we call them.

We invite inquiries on this remote control equipment and urge you to write for technical articles and material describing it, together with the names of stations now equipped with it.

VISIT OUR BOOTH 312
at the N.A.B. SHOW
April 5-8, 1970
Hilton Hotel, Chicago



POWER OPTICS, INC.

FAIRVIEW VILLAGE, PA. 19409 • (215) 272-5300 • TELEX 846411

Western Inquiries contact: Television Products, Inc. (213) 678-2388

Circle Number 44 on Reader Reply Card

(Continued from page 76)

that was working against us. It actually amplified any available RF.

Figure 1 shows one filter leg set up to illustrate the basic filtering constants. The controlling factor in the constants is f_c , the transmitter operating frequency. Figure 2 shows the schematic of the WMWM filtering unit.

The filter unit was wired into a 2"x2"x6" aluminum mini-box and is now mounted adjacent to the recorder connector.

bookreview

Latest Radio Handbook

William I. Orr, W6SAI, and the Editors and Engineers, Ltd., now have their 18th edition of the **Radio Handbook** for amateurs off the press.

The 1970 edition runs about 900 pages, including excellent chapters on antennas. While the modern day

amateur operator does not have the space to hang but a cut down version of the arrays described, they do offer some variety for the interesting operator who dares to experiment on the higher frequencies. Of special interest is the information included on the discone antenna.

Keeping up with the state of the art, this edition matches steps with the SSB equipment manufacturers. However, from chapter to chapter it is evident that solid state has not swept away the imagination of the authors. A great many example and design circuits are based on vacuum tubes, while hybrid and pure solid state designs represent a clearcut minority. But it is noteworthy that the beginning chapters include more theory time on transistors than on vacuum tubes.

While few hams today bother to build their own receivers, the authors offer the challenge to build a solid state HF receiver. And while few may never build this gem, it does offer some circuit ideas that are bound to find their way into manufactured circuit ham modifications.

This is one of the most comprehensive amateur books on the market for the last several years, although it lags in a few areas, most of the content will reflect well on the state of the art in amateur radio during the 1970's.

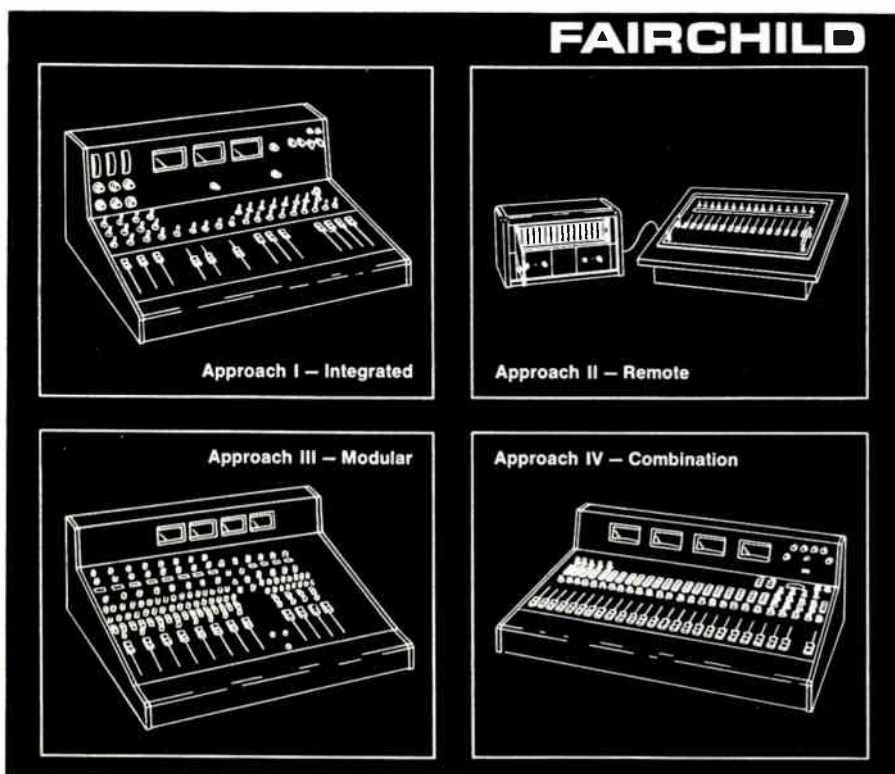
The 18th edition of the **Radio Handbook** is available through the Editors and Engineers, Ltd., New Augusta, Indiana.

Labor Relations

Labor relations in radio and television is the subject of **Broadcasting And Bargaining**, edited by Allen E. Koenig.

The book a must reading for those on either side of the management-union line. Written by representatives of the two interests, the authors discuss the evolution of management-union problems, union development, industry growth, and how the broadcast history and trends affect and shape the future of the broadcast industry.

Perhaps someone will follow in the not too distant future with the effect on unions on the direction of CATV. Meanwhile, this book is available through the University of Wisconsin Press, Madison, Wisconsin.



CHOOSE YOUR NEXT CUSTOM AUDIO CONSOLE FROM FAIRCHILD THERE ARE 4 BASIC APPROACHES...

APPROACH 1. Fairchild Integra I. The controls and the audio for any particular function are together as one component.

APPROACH 2. Fairchild Integra II. The controls and the audio for any function are separated for remote operation using simplified plug-in facilities.

APPROACH 3. Fairchild Integrated Control Module. All the controls for an input or an output channel are integrated together into individual modules. Each module has instant plug-in facilities for its audio. The

number of modules is determined by number of channels desired.

APPROACH 4. Combination. Virtually any combination of the previous 3 approaches are integrated into one combination console. Final component selection is determined by studio requirements.

For complete details and variety of systems available write:

FAIRCHILD
Sound Equipment Corp.
Dept. BE-3 10-40 45th Avenue
Long Island City, N. Y. 11101

SEE US AT NAB SHOW — BOOTH 306
Circle Number 45 on Reader Reply Card



Solid state of 55kW excitement.

Because the new Visual VTU-55A is the first 55kW UHF transmitter to incorporate a completely solid-state, fully integrated heterodyne exciter.

This very big move forward in the UHF state of the art gives you a previously unattainable degree of accuracy in signal shaping and precorrection, and integrates such normally external functions as vestigial sideband filtering, linearity and phase adjustment, envelope delay precorrection, and much more. It even connects directly to the VTU-55A's very advanced, very stable 5-cavity klystrons, so there's no need for intermediate amplification. And as if this development wasn't enough cause for excitement, we went and added a few more. Like an ingenious way to change



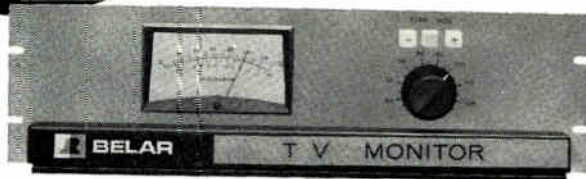
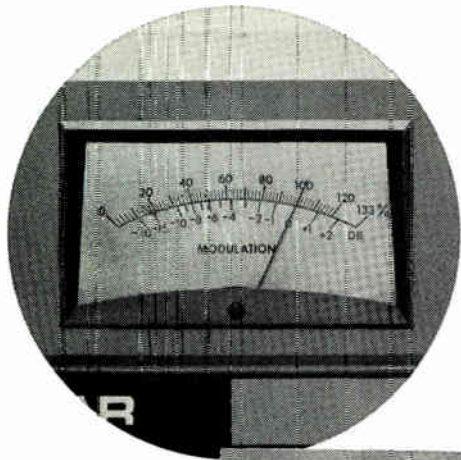
klystrons. All you do is roll the klystron and magnet assembly from the cabinet onto a mated dolly, and roll the new one in. In a matter of minutes, without the need for a fourteen foot ceiling. In fact, the VTU-55A needs a lot less space for a few other reasons. You can back it against the wall because all servicing is done from the front, and you don't need much room in front because of its bi-fold doors.

Meeting or exceeding all FCC specifications, the VTU-55A is the one to consider for starting-up new operations the right way, or for significantly upgrading what you have now.

VTU-55A. It also creates a very solid state of excitement with sponsors.

Write **Visual Electronics Corporation**, 356 West 40th St., New York, N.Y. 10018

the most accurate



plus (or minus)



The solid-state BELAR TVM-1 TV Aural Modulation Monitor is all you need to accurately monitor your TV sound . . . program peaks and all. Only BELAR measures positive and negative polarities simultaneously and registers the greater of the two on both the peak meter and peak flasher. Exclusive polarity lamps work in conjunction with the true peak meter and peak flasher to give totally accurate TV modulation monitoring.

Whether UHF or VHF, the full-range TVM-1 Monitor will take care of your signal. And it includes a built-in modulation calibrator. For SCA, simply plug in BELAR's SCA Frequency and Modulation Monitor.

For the most accurate, plus OR minus, call Arno Meyer at

BELAR

**BELAR ELECTRONICS LABORATORY, INC., DEPT. BE-30
BOX 83, UPPER DARBY, PA. 19084 • (215) 789-0550**

See us at NAB Booth #203 West Exhibit Hall
Circle Number 47 on Reader Reply Card

Waivers Granted For Public Service Program Plan

Requests for waiver of the sponsorship identification requirements of Section 317 of the Communications Act to permit operation of a Public Service Distribution Plan by the Arkansas Broadcasters Association, and a Non-Commercial Sustaining Announcement Program by the Wyoming Association of Broadcasters have been granted by the Commission. (Section 317(d) authorizes the Commission to waive identification requirements when the Commission determines that an announcement is not required in the public interest.)

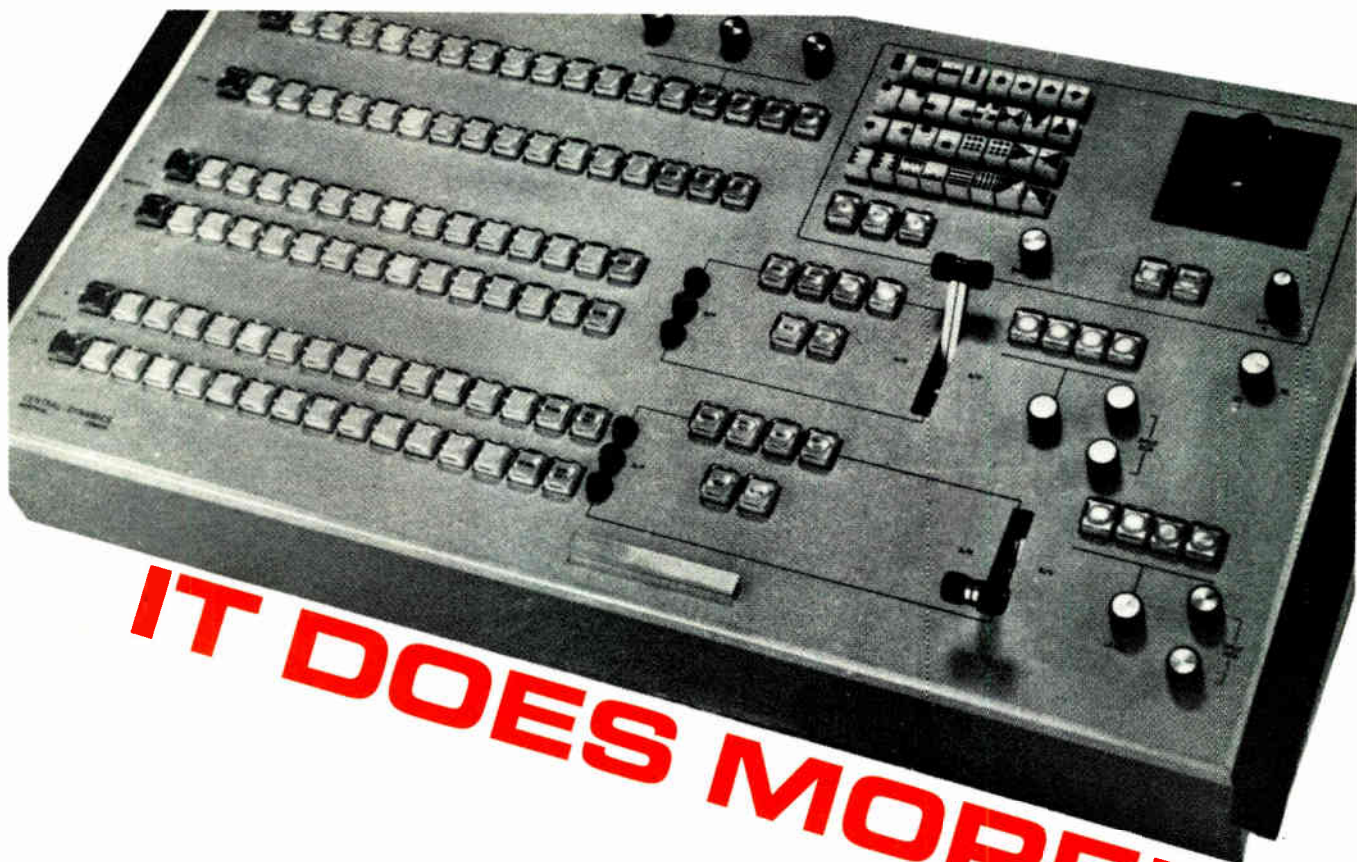
Under both plans, the Associations would receive cash contributions from unspecified non-profit organizations for assistance in the preparation and distribution of public service announcements.

The Commission noted that the Associations will process all requests from public service, non-profit organizations in the same manner, whether or not a contribution is made; that such non-profit organizations will or have been notified of this fact; and that only the Associations' executive office or committee, not its member stations, will know whether or not a contribution has been made.

Similar Requests From Other States

Similar requests have been granted the Southern California Broadcasters Association, the Kansas Association of Radio Broadcasters, and the Montana Broadcasters Association.

The Commission said it was concerned, however, with the possibility that some of the non-profit organizations may be prompted to contribute to the Arkansas and Wyoming Associations by a belief that they will be discriminated against if they fail to contribute and told them that in such an eventuality they were expected to take "effective action" to dispel any such misapprehension.



IT DOES MORE!

NEW SERIES 800

PRODUCTION SWITCHER

Makes you master of all you survey!

- ✓ 15 Inputs
- ✓ VI Switching
- ✓ Mixing
- ✓ Wiping
- ✓ Keys
- ✓ Mixing to wipes
- ✓ Color mattes
- ✓ Automatic burst control
- ✓ Automatic sync control

Here's the Production Switcher you've been waiting for. The one that lets you go all out on special effects without being a magician or a mathematician.

The new Series 800 has been called the most flexible switcher ever and a major breakthrough in TV broadcasting. But you know what? Even though it lets you do more than most of those larger double re-entry systems, it costs anywhere between 30 and 50% less! Interested? Then please get in touch with us. Brochures and specifications are available right away.

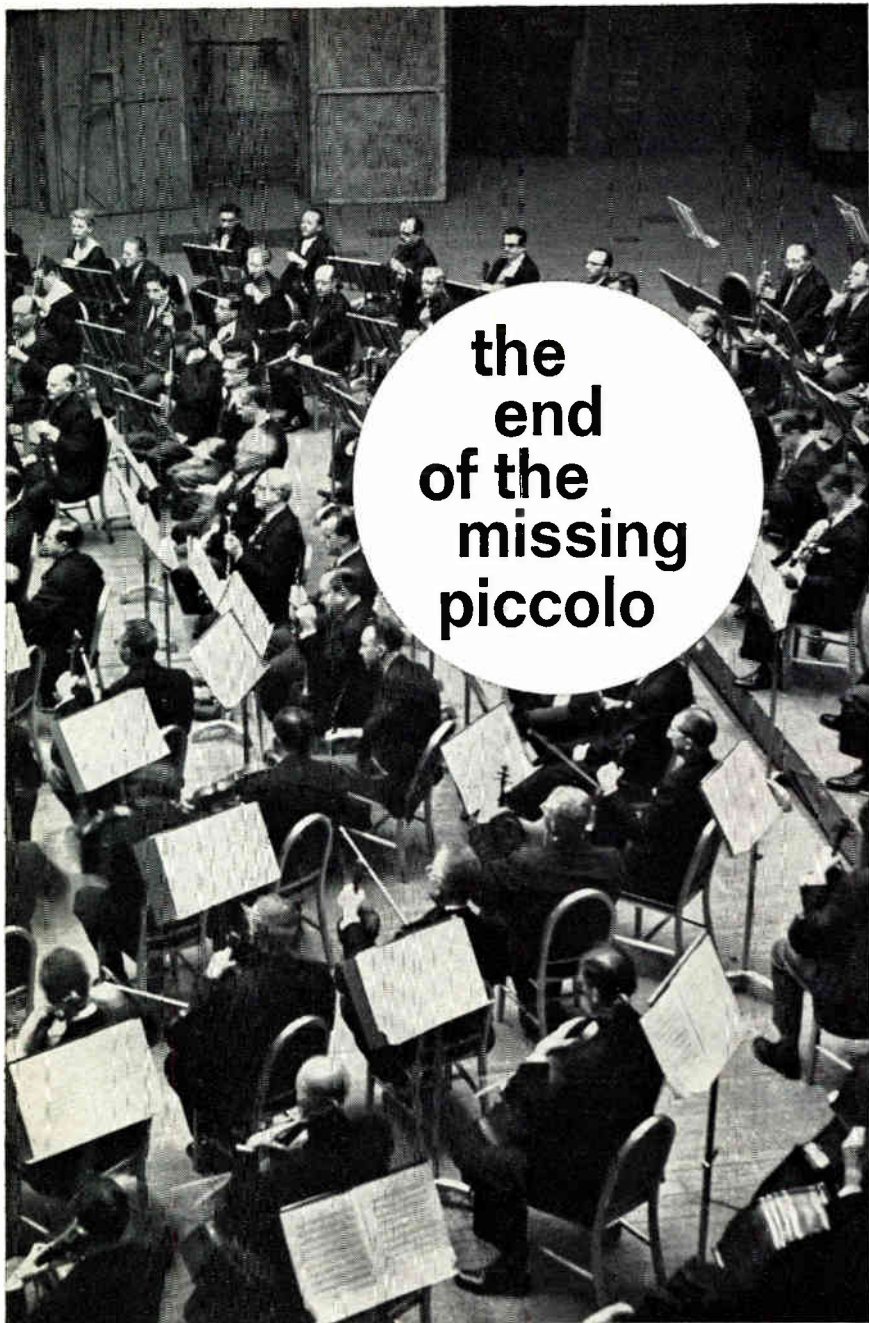
NAB See us at Booth 103, East Hall



CENTRAL DYNAMICS CORPORATION

230 Livingston St., Northvale, New Jersey 07647

Circle Number 48 on Reader Reply Card



the
end
of the
missing
piccolo

Every signal that comes from AEL's new FM Solid State Exciters and Solid State Stereo Generators carries the same full range sounds that went in.

Features like extremely low audio harmonic distortion, flat responses, and only two printed circuits, make the AEL exciters and generators the most up-to-date available.

Signal us and we'll tell you about all our broadcast equipment.



fidelity
capability



See us at the N.A.B. Show —
April 4-8, Booth 243, West Hall
Conrad Hilton, Chicago

AMERICAN ELECTRONIC LABORATORIES, INC.

P.O. Box 552 • Lansdale, Pa. 19446 • (215) 822-2929 • TWX: 510-661-4976 • Cable: AMERLAB
Circle Number 49 on Reader Reply Card

PEOPLE IN THE NEWS

Irion To Head NAB Broadcast Management

Ron W. Irion has been named director of broadcast management for the National Association of Broadcasters as of January 1, succeeding William L. Walker who is resigning to enter the brokerage/consulting field.

Vincent T. Wasilewski, NAB president, said in announcing the appointment:

"We certainly wish Bill Walker the best in his new endeavor. We are most appreciative of his contribution to NAB and the industry during his 21 years with the Association. He will be missed by his colleagues and by our members."

The Broadcast Management Department advises NAB members on station business, personnel and financial matters, provides labor relations and wage-hour services, conducts surveys on wages and other operating costs, and develops yardsticks and other suggested procedures for more efficient and economical operation.

Irion joined NAB in May, 1967, as assistant director of the department. During the past two years, he has participated in NAB-sponsored Management Development Seminars at Harvard University and in Labor Clinics held for broadcast executives during NAB's 1968 and 1969 conventions.

Wasilewski Stays On

Willard E. Walbridge, chairman of the Executive Committee and of the Joint Board of Directors of the National Association of Broadcasters, issued the following statement:

"The Executive Committee of the National Association of Broadcasters yesterday tendered a two-year employment contract to the organization's president, Vincent T. Wasilewski, which he accepted. The term covered extends through Jan-

uary, 1972, and the action is subject to ratification by the full NAB Board.

"We took the action in order both to recognize the outstanding job performed by Wasilewski as our president over the past years as well as to insure his continued tenure in the critical period for broadcasting in the next two years.

"In recent weeks there has been some public speculation that Wasilewski might seek to terminate his association with the NAB. This has created some confusion and uncertainty among our membership at a time when we are beset by many problems that require our full unity, strength and attention.

Vitelli Turns On

Imero Fiorentino Associates, Inc., Lighting Designers for "The David Frost Show" and "Beat the Clock" announced the appointment of Carl Vitelli, Jr. as Lighting Director for both shows. Vitelli has been Head Electrician at the Little Theatre since March, 1965 where he worked on "The Merv Griffin Show", "Hal Holbrook's Mark Twain Tonight", and "The Carol Channing/Pearl Bailey Special", among others.

Prior to his affiliation with the Little Theatre, Vitelli was Head Electrician for several industrial shows, the 1964 Presidential primaries and was also Head Electrician for CBS at both the 1964 Republican and Democratic Presidential Conventions.

CBS Records Honor

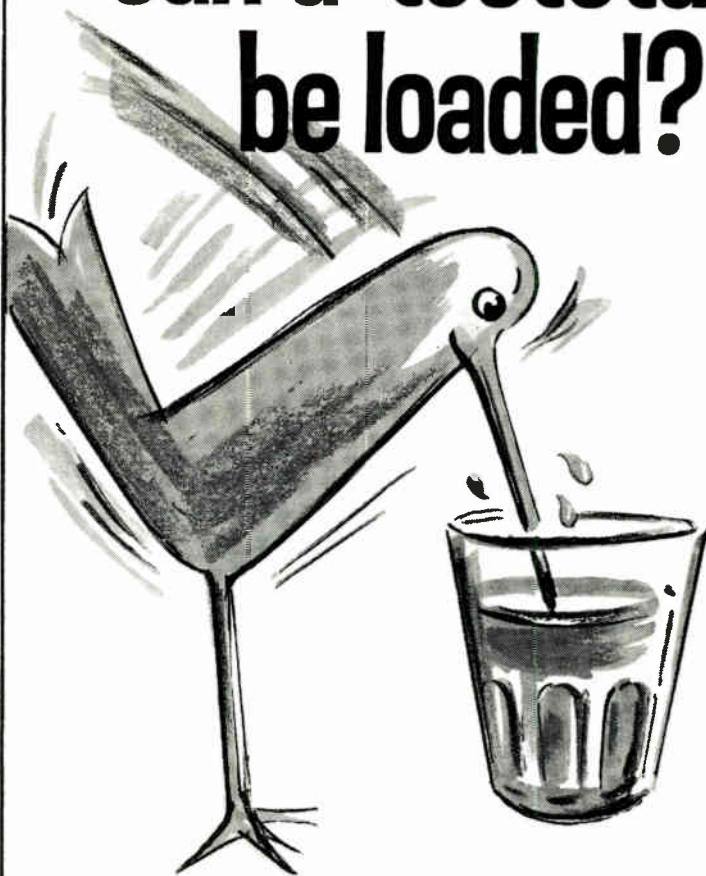
CBS-Columbia Records was honored as Record Company of the Year, Stax-Volt Executive Vice President Al Bell as Record Executive of the Year and WCCO-Minneapolis as Radio Station of the Year during the Fourth Annual Radio Program Conference.

Some 950 of the nation's leading broadcast, recording and advertising industry executives attended the three-day event, highlighted by announcement of winners in a total 37 categories of competition.

Six repeat winners included KMPC-Los Angeles, WVON-Chicago, KEGL-San Jose, WJLB-Deerfield, WJLB-Deerfield, WJLB-Deerfield, WJLB-Deerfield, WJLB-Deerfield, WJLB-Deerfield.

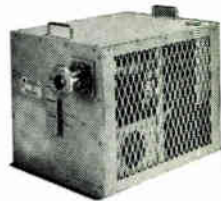
Single-most honored station was

can a "teetotaler" be loaded?



New BIRD RF Loads don't drink!

No external water supply is needed for the new 10kW Self-Cooling MODULOAD™ RF Load Resistor Module. In a scant three cubic feet of space, the Model 8636 coaxial load system terminates a 50-ohm line with a low VSWR of 1.1 from DC to 1 GHz and 1.15 to 1.4 GHz. The integral heat-exchanger permits continuous 10kW dissipation in 5° to 45° C ambients (-20° to +20° C with anti-freeze).



For lower power termination, a new family of dry RF loads now includes four models from 10W to 150W. The 100W and 150W TERMALINE® Load Resistors pictured exhibit VSWR of only 1.1 to 1 GHz and 1.2 to 2.5 GHz. Bird Quick-Change connectors (N, HN, UHF, C, SC, LC, BNC, TNC, 7/8" and 1 1/2" EIA) offer unparalleled flexibility without performance degrading adapters.



Write us for the latest developments on RF loads, self-cooled load modules and 15kW-50kW UHF terminations or circle reader service number 50



BIRD

FREE Write for 60-page Catalog of Quality Instruments for RF Power Measurements, Circle 50

ELECTRONIC CORPORATION

Cleveland (Solon) Ohio 44139 • 30303 Aurora Road
Ph. 216-248-1200 • TWX 216-248-6458 • Cable BIRDELEC

See us at IEEE Show Booths 2E40-2E42

Circle Number 50 on Reader Reply Card

Get a \$295 tape timer

Free

An impossible dream?

Not when you buy the Studer A-62 studio tape recorder.

It's got every feature you've ever looked for in a professional tape recorder—plus others you'll find only in ours. Like the tape timer. It's *not* the famous Lyrec TIM-4 you know so well. This one's built in to the deck.

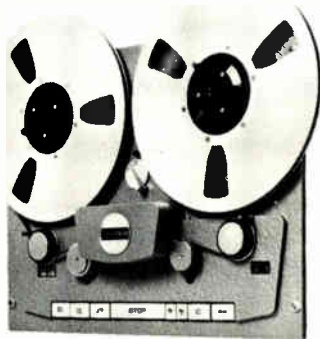
To get a direct reading in minutes and seconds, just run the recorder, even at fast speed. (The Timer's accurate to within 3 seconds in a ½ hour tape.) In the time it takes to rewind, your program will be timed.

We've also developed an electronic forward regulating servo loop that keeps the tape tension constant—regardless of reel size. Even the smallest reel hub won't cause any problem. So there's no speed variation, no need for reel size switching, and no varying tape tension. Ever.

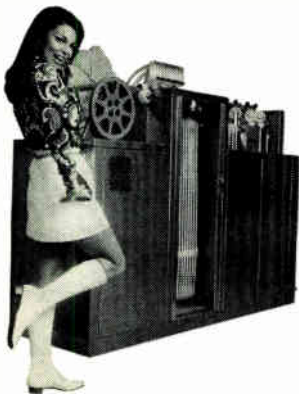
And the Studer A-62 practically takes care of itself. It's precision-made by the Swiss. So it will run like a dream. A not-so-impossible dream.

GOTHAM

AUDIO CORPORATION
2 West 46th Street, New York, N. Y. 10036 (212) CO 5-4111
1710 N. LaBrea Ave., Hollywood, Ca 90046 (213) 874 4444
In Canada: J-Mar Electronics Ltd.



Circle Number 51 on Reader Reply Card



NAB
Convention
April 5-8 • Chicago Hilton
Booth No. 114
Telephone 2631

New Houston Fearless Mini-Color Processor costs less than \$10,000

"Mini" means small, or compact. And Mini-Color is all of that—in size and price. "Color" means it processes every type of Ektachrome color film including the new "Super 8" and 16 or 16/35 mm film. Mini-Color is a totally new dimension in compactness, rapid access, operational simplicity and rock-bottom cost.

Also available: **COLORMASTER TV NEWS COLOR FILM PROCESSOR**. Chosen for precision high-volume production by more than 90 TV stations coast to coast.

send for
free brochures



**HOUSTON FEARLESS
CORPORATION**
11801 W. Olympic Blvd., Los Angeles, Calif. 90064

WORLD'S LARGEST MANUFACTURER OF FILM PROCESSING EQUIPMENT AND TV BROADCAST EQUIPMENT

Circle Number 52 on Reader Reply Card

WIP-Philadelphia, which earned three awards.

Independent producer Chips Mo-man was cited as Producer of the Year. National Promotion Man of the Year was Augie Blume of RCA-Victor, while R&B Promotion honors went to Cecil Holmes of Buddah Records.

IEEE Award To Houck

H. W. Houck of Wallpack, N. J. and Dr. O. H. Schade, Sr., of RCA at Harrison, N.J. received awards for distinguished achievement at a luncheon session of the National Electronics Conference, meeting at Chicago's Conrad Hilton hotel in December. The institute of Electrical and Electronics Engineers (IEEE) presented the annual Morris E. Leeds Award for 1969 to Houck "for outstanding contributions to the field of radio-frequency instrumentation."

Dr. Schade received the IEEE Vladimir K. Zworykin Award "for broad technical contributions to the electronics and optics of television."

CE Joins Gates

Leonard L. Oursler, Jr., E.E., has announced his resignation as Chief Engineer of Staten-Oursler Broadcasting, Princeton, Indiana, effective December 20, 1969, and will join the Gates Radio Company, Division of Harris-Intertype Corporation, Quincy, Illinois, as a project engineer effective December 29, 1969.

New VP For SMPTE

K. Blair Benson, staff consultant, Advanced Technology, CBS-TV Network, New York, has been elected Vice-President for Television Affairs of the Society of Motion Picture and Television Engineers. The election was announced at the Society's recent 106th Technical Conference in Los Angeles.

In 1948 Benson joined the CBS Television Network Engineering Department as a senior project engineer. Since that time he has been concerned with the many design and development problems encountered in video tape recording, television film recording, television film

transmission and standards conversion. He has also been actively engaged in the design of the television systems for the studio plants in the key cities of the Columbia Broadcasting System. He is the author of many technical papers, and chairman of the JCIC Ad Hoc Committee on Color Television Study.

New Film Company Ready For Business

The appointment of corporate officers and the opening of offices at 1926 Broadway, N.Y., have been announced by ABTO, Inc.

The company was recently formed by Technical Operations, Incorporated and American Broadcasting Companies, Inc. to continue development of commercial television and motion picture applications of a process for taking color pictures on black and white film.

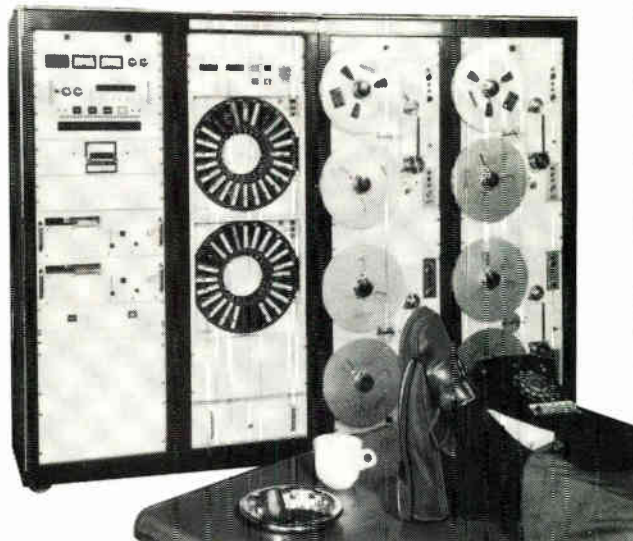
Albert W. Malang, former general manager of the Riker Division of the Riker-Maxson Corporation, has been named vice president for engineering and manufacturing. Previously he was manager of several General Electric engineering groups and chief engineer of the Gencom Division of the Whittaker Corporation. Malang was with the American Broadcasting Company from 1954 to 1964. In 1962, when he was ABC's chief video facilities engineer, he was awarded an Emmy by the Academy of TV Arts and Sciences for development of slow-motion video tape.

H. Charles Riker, former President of Riker Industries, Inc., was appointed vice president for marketing. Riker founded Riker Industries in 1962 and served as its President until 1967. Since that time he has been a director and marketing consultant of the Riker-Maxson Corporation.

Buying? Selling?

Get Results
With Classified Ads
In
Broadcast Engineering

For the Program Director who wants everything...



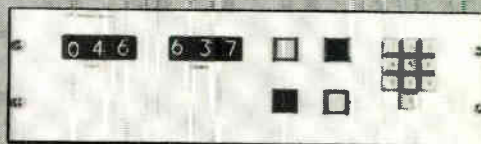
Total Automation means:

- Pre-programming up to 24 hours in advance from
- 12 separate audio sources with the new

AR-1000 AUTOMATION SYSTEM

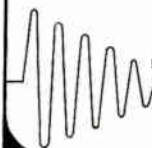
The new AR-1000 is an all solid-state, modular designed, total automation system that provides the ultimate in programming flexibility to meet any format requirements. It permits any station to readily individualize its programming up to 24 hours in advance, from up to 12 audio sources, and enables format changes to be made quickly and easily. The AR-1000 features all plug-in circuit elements, independent power supplies, photo-cell audio switching with full overlap, and built-in facilities for network joining. For real-time program logging, an all solid-state digital logger is also available.

NOW AVAILABLE...
...RANDOM SELECTION
OF 500 EVENTS FROM
UP TO 9 CAROUSELS



- Readily expandable to 1000 events
- Simplified push-button operation
- Easily programmed while "on the air"
- Direct visual display of current and next event
- All solid-state memories for high reliability
- Compact 5¼" panel height

For complete information, write or call:



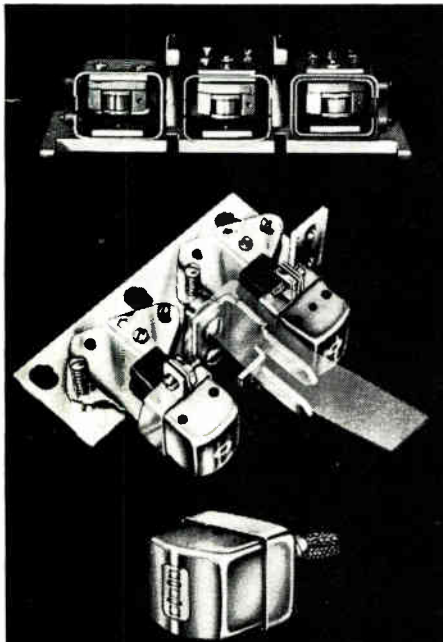
BROADCAST PRODUCTS COMPANY, INC.

12330 Wilkins Avenue Rockville, Maryland 20852 (301) 933-3400

Visit us at the NAB Show, Booth 217

FOR EVERY PROFESSIONAL APPLICATION

Nortronics
heads you right!



Nortronics heads offer excellent performance characteristics, long life, and quick, easy replacement with negligible downtime.

REEL TO REEL

AMPEX MAGNECORD SCULLY

CONCERTONE RCA CROWN

CARTRIDGE MOUNT

ATC COLLINS GATES

KRS MACARTA RCA

SPARTA TAPECASTER

Best of all, you can get them locally from your Nortronics distributor.

Nortronics
COMPANY, INC.

8101 Tenth Avenue North
Minneapolis, Minnesota 55427
Phone: (612) 545-0401

Circle Number 54 on Reader Reply Card

TECHNICAL DATA

For further information, circle data identification number on reader service card.

100. ALLIED ELECTRONICS CORP.—A supplement to the 1970 Industrial Catalog No. 700, introducing a wide range of new products for industrial use, is now available. The 56-page supplement includes an up-to-date, revised Semiconductor and Integrated Circuit Directory, plus latest digital display equipment, oscilloscopes, power supplies and other industrial products.

101. AMPEX CORP.—A data sheet describing the new Ampex TD-7020 series of low power, wide band FM broadcast transmitters for educational FM broadcasting and STL (studio-transmitter link service) is now available. The transmitter is designed for 20 watt output in the event the 20 watt limit is permitted in the future by the FCC, and can be operated at any power from one to 20 watts.

102. COLUMBIA ELECTRONIC CABLES—A data sheet on the complete line of Columbia Electronic Cables television cheater cords is now available. The UL-approved cords are all 10 amp, 125 volt hanked power supply cords with molded caps and connectors, available in 6-foot or 9-foot lengths, in brown or white. Caps are standard, polarized, or with pins. Connectors are standard with ears, snap-in or standard C clip; polarized with ears, C clip, snap-in, or polarized misalignment.

103. DELUXE-LISTA CORP.—The complete Block Line™ bench and storage system is fully described in the new 20-page Catalog BL. The system centers upon a series of five modular cabinets of different heights, each approximately 22" wide by 27" deep. Cabinets and accessories are combined to make up individual work stations or complete departments. Drawers are available in eight different heights, can be combined in various

For educational TV and other CCTV installations

Sturdy and rugged, yet light in weight, this all aluminum tripod is ideal for CCTV viewfinder cameras weighing up to 100 lbs.

FEATURES: ■ GEAR DRIVEN Elevating column 1 7/8" diameter slides up and down on nylon sleeves. No metal-to-metal contact. This reduces friction and wear. ■ SELF LOCKING GEAR Mechanism keeps the center post from running down regardless of the weight on the head of the tripod. ■ Two section aluminum legs. Sturdy box-tubing leg brace for tripod rigidity. All three swivels can be locked for straight line tracking. Ball bearing wheels with positive lock of both wheel and swivel.



Davis & Sanford

24 PLEASANT ST. / NEW ROCHELLE / NEW YORK 10802
DEPT. B.E.

Circle Number 55 on Reader Reply Card

6 Years of Unsurpassed Performance & Reliability!



LANG SOLID STATE PROGRAM EQUALIZER

Unsurpassed in design, performance and versatility, the LANG SOLID STATE PROGRAM EQUALIZER has been the leader for over 6 solid years incorporating the finest features...

PLUS THESE EXCLUSIVE FEATURES —

- Eight low boost shelf frequencies • Four low droop shelf frequencies • Eight high boost peak frequencies • Six high droop shelf frequencies • Frequency select switches and equalization controls for all boost and droop functions • All controls and switches may be used simultaneously • Low frequency peak boost by use of boost and droop controls • Equalization "on" lamp indicates when equalization is taking place • Stainless steel panel blends harmoniously with other equipment • Plug-in printed circuit amplifier and power supply cards • Compact size: 3 1/2" x 19"

For Complete details and new Lang Catalog write:

LANG ELECTRONICS INC.
507 FIFTH AVE., N. Y. 10017

For all your audio needs look to Lang!

Circle Number 56 on Reader Reply Card

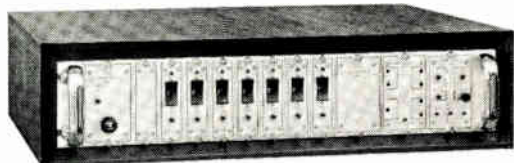
BROADCAST ENGINEERING

**DIRECT
NUMERIC
VIDEO
GENERATION**

WITHOUT CAMERA
ARTWORK OR
MECHANICAL
CLOCKS



For Timing Applications
SPORTS EVENTS TIMER • STUDIO TIMER
VIDEO TAPE EDITING



Write for
FREE brochure
information

Television broadcasters and others are now offered the ultimate in electronic equipment needed to serve a multitude of timing and display applications. This unique system is a completely self-contained timing device requiring no camera to pick up the display. The Video Devices system utilizes fully solid state counting techniques and direct video generation of numeric characters. This equipment provides advantages in timing, cost, and capability over conventional systems. Video Devices advanced numeric video generator design features fully adjustable character sizes and positions allowing complete compatibility with any program format.



VIDEO DEVICES CO.

13753 BURBANK BOULEVARD
VAN NUYS, CALIF. 91401 PHONE (213) 994-1000

Circle Number 57 on Reader Reply Card

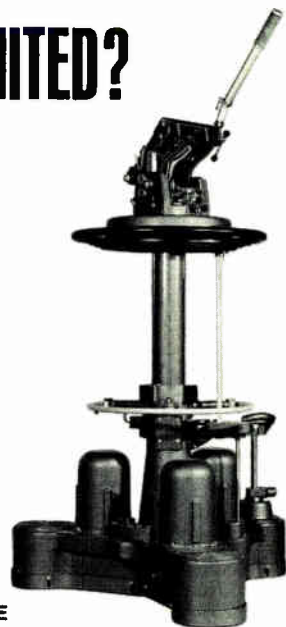
A Remote Possibility!



"YOU MEAN YOUR STATION BACK HOME IS REALLY
THIS REMOTELY CONTROLLED?"

WHY BE LIMITED?

Vinten



PNEUMATIC PEDESTAL

VINTEN PEDESTALS GIVE
20" MORE RANGE - 10" HIGHER* -
10" LOWER THAN ORDINARY PEDESTALS

Vinten Cam Heads and Pneumatic TV Pedestals offer greater range and flexibility than any other equipment available.

A choice of two pedestals complement the famous Mark III Cam Head; Type 556 with standard 20" lift and Type 419 with a full 30" travel (more than any other pedestal). Vinten's pneumatic design provides unequaled ease of handling. Each will carry up to a 430 lb. load, fully counter-balanced and allows finger tip lifting and combined crab steering for operational efficiency.

We know you will agree, Vinten Pneumatic Pedestals are worthy companions to the well-known Mark III Cam Head which, unlike other cam heads, has accurate cam profile to ensure perfect balance at all tilt angles.

SPECIFICATIONS

	TYPE 419 PEDESTAL (Extended Range)	TYPE 556 PEDESTAL (Standard Range)
Height and Range from floor (Excluding Cam Head).		
*Low Range	26-56 ins.	32-53 ins.
*High Range	32-62 ins.	38-59 ins.
Minimum Width	33 ins.	33 ins.
Maximum Width	41 ins.	41 ins.
Maximum Load Carrying Capacity (Including Cam Head).	430 lbs.	430 lbs.
All Up Weight (Including removable lead trim weights for simulated teleprompter, extra heavy zoom lens).	427 lbs.	391 lbs.

*With Optional Adaptor for those interesting high shots.

MARK III CAM HEAD

Maximum angles of depression and elevation $\pm 50^\circ$.
Maximum load carrying capacity—in excess of 400 lbs.
Weight (Including Standard Pan Bar and Quick Release Wedge Adaptor)—44 lbs.

If you are looking for quality at reasonable prices, why not look into Vinten today—Manufactured in England by W. Vinten, Ltd. Literature and prices available from:

Sole Distributor
in U.S.A.



**LISTEC TELEVISION
EQUIPMENT CORPORATION**

35 CAIN DRIVE

PLAINVIEW, NEW YORK 11803 (516) 694-8963

Circle Number 58 on Reader Reply Card

This is the most expensive turntable you can buy.



Also the cheapest.

It's a simple matter of economics. And quality.

At \$1350, the EMT-930st Turntable costs considerably more than any other turntable. But, for your money, you get a precision-made turntable that really slashes maintenance costs because it's virtually trouble-free. ("Still in excellent condition despite ten years of hard use," says one pleased radio station.*)

Typically, you get $\pm 0.035\%$ rms flutter; low, low rumble; and you can cue to any beat or syllable with a wow-free start from the world's only remote-controlled turntable.

A lot of broadcasters must think the EMT-930st is a smart investment. Right now, there are more than 10,000 in use throughout the world. We know of only one greater value: our brochure. It's free. Send for it today.

*Name of this and other station users on request.

GOTHAM
AUDIO CORPORATION
2 WEST 46 STREET, NEW YORK, N. Y. 10036 (212) CO 5-4111
1710 N. LABREA AVE., HOLLYWOOD, CA 90046 (213) 874-4444

Circle Number 59 on Reader Reply Card

One gift works many wonders



THE UNITED WAY



arrangements, and are interchangeable among all cabinets. Steel ball-bearing-drawers hold up to 220 lbs. and roll freely under all conditions. The complete line of accessories includes drawer partitions and dividers, plastic trays and boxes, zig-zag and corrugated tool inserts, special tool holders, counter tops, and other work station components.

104. DIALIGHT CORP.—A new catalog sheet, designated as L-191 provides data, dimensional drawings and ordering information on incandescent segmented readout modules for 5V, 6V and 14-16V supply voltages. Described are displays mounted directly to PC boards. The boards include integral connector accepting available IC decoder drivers (BCD to 7 line). The IC's provide direct translation from 8421 BCD code to 7 line, thereby eliminating the need for a separate decoder driver package in the readout system. The catalog sheet is included with nine data sheets plus a portfolio cover. Complete descriptive information on a variety of segmented readout displays is provided.

105. A. B. DICK CO.—A 16-page brochure outlines how the new Videojet high-speed ink jet printer is more than just a communications printer. The brochure points out that Videojet was developed because there was a need for an inexpensive computer-oriented printer capable of printing data as fast as transmitted over telephone lines, or to function as a remote printer, and in either case to print quietly on any continuous business form, even on offset masters. Additional advantages and specifications are included.

106. ELCO—This unique new 28-page manual describes 12 types of mil-spec connectors used in military systems design. Categories include printed circuit, power, and communications connectors specified by eight major application specifications, which govern the design of airborne, missile, naval (ship and shore), communications, and test equipment. A tabular index illustrates the connectors and indicates, in brief, their characteristics and special features. The manual also contains complete descriptions and specifications for all connectors, as well as MS-to-Elco cross-reference data for QPL items.

107. ELECTRONICS DEVELOPMENT CORP.—The Program Subcarrier Multiplex Brochure describes system for multiplexing one or more 15 KHz program channels for simultaneous transmission with color television signals in microwave or telephone carrier equipment.

108. FAIRCHILD SEMICONDUCTOR—A 24-page designer's guide outlining opportunities for improving discrete diode designs by means of multi-functional diode assemblies and monolithic arrays is now available. "Fairchild Specialty Diode Products" is a two-color, illustrated publication which shows how the multiple diode design approach can achieve better performance at less cost, using either standard or custom-made products. Readers can use the brochure both as an information guide to Fairchild's line of standard diode assembly-array products and as a design tool for a wide variety of specialized applications in military, industrial and consumer systems. To obtain a customized product, customers need only specify the interconnection pattern of selected diodes or diode chips so that Fairchild can design and manufacture an appropriate hybrid-like diode assembly or a monolithic diode array, whichever is desired. The brochure presents several diode charts containing electrical parameters, thermal ranges and matching data needed for the evaluation of assembly and array designs. Accompanying the charts are typical applications and schematic drawings.

109. GENERAL ELECTRIC CO.—A new "Relamping Guide" (SS-3) to help users of stage and studio lighting equipment determine the proper General Electric light sources for their fixtures is now available. The new publication is intended to be used in conjunction with another GE booklet, "Quartz-line and Incandescent List" (SS-1), which catalogs lamps most frequently used in lighting for theater stages, television and motion picture production, and professional still photography. "Relamping Guide" (SS-3) lists both old and new stage/studio lighting fixtures manufactured by 21 different concerns. Each product listing provides the manufacturer's catalog or model

(Continued on page 92)

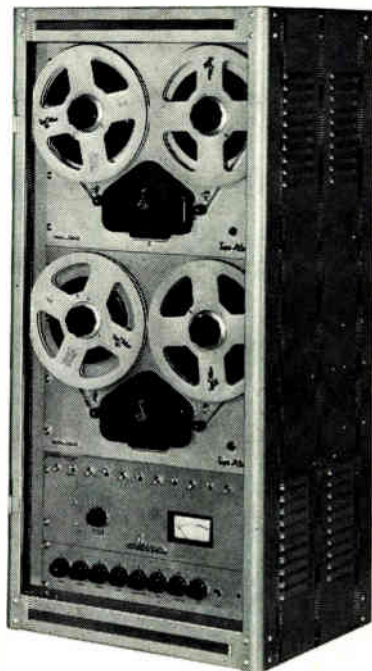
Tape-Athon®

MAKES A LIBRARIAN

for S.C.A. Background Music Broadcasting

The Librarian system shown at right is the ideal way to initiate automatic broadcasting for a minimum investment. A two-transport taped music system, it is entirely self contained, and includes a solid state intersperser for unlimited variety of programming, a 40 watt amp, monitor speaker, dB meter and time clock — all for \$1825.00.

Operating features include AGC for constant audio level, and hunt-and-seek circuit between transports to assure fail-safe operation.



also a Programmer

A self-contained, automatic system for background music broadcasting, with 2, 3, or 4 tape transports (it's expandable), solid state intersperser, amplifier, time clock. A master control panel allows synchronization of program or type of music with time of day.



the Channel-Caster

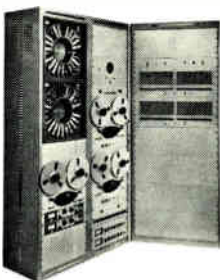
For the broadcaster or CATV station—an automatic background music system with two or more tape transports plus inputs for commercials, I.D., or other announcements. Six inputs in all, plus automatic operation.



and the 5000 System

The last and best word in automatic broadcasting systems—two to 14 tape decks with one to 8 Carousels for message and commercial insertion, and Program switchboard for unlimited flexibility. Building block construction permits small initial system with later expansion.

For information on one or all of these systems, write for Data File FM-2



Tape-Athon Corp.

502 South Isis Ave • Inglewood, Calif. 90301 • (213) 776-6933

See Tape-Athon at NAB, Booth 236, West Exhibit Hall
Circle Number 61 on Reader Reply Card



No Man's Land

The only true parallel system design makes RCA's transmitter safe enough for remote or computer control.

RCA's Maxim-Air VHF transmitter is guaranteed to hold its specifications for thirty days without adjustment.

RCA's Maxim-Air is reliable solid state with only 10 tubes,—just 3 tube types.

RCA's Maxim-Air modulates at high level, with only one tuned linear amplifier—plus signal shaping at the output—to assure signal integrity.

Only RCA's Maxim-Air was designed as a parallel system. It's two transmitter units.

If one goes out, the other takes over and no one notices but you.

That's what it takes to have a transmitter that can live alone.

That and the motorized controls we've built in so it can be tuned remotely, by man or computer.

RCA's TT-30FL 30 kW VHF transmitter. The best color picture today. The best use of people tomorrow.

No problems.

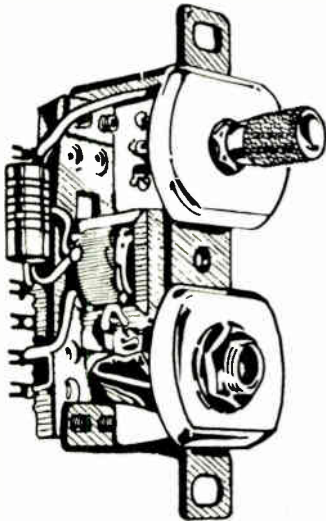
RCA sells solutions.

RCA



Circle Number 62 on Reader Reply Card

THE PROBLEM SOLVER!



WHERE CAN YOU USE IT?

WHAT: A complete intercommunications system, specifically designed for headsets or speakers. Modular constructed to fit into any standard electrical box. Basic system consists of: (1) Headset station with volume control (illustrated) (2) Line amplifier — 26dB voltage gain, and (3) Power supply to convert 110 AC to 24 DC. Available "in a box", too, for portable use wherever you have a 110 volt outlet.

WHO: Made by the company which designed and produced the "snoopy hat," the only headset that has been to the moon and back.

WHERE: Write for complete information on all 27 different modules and headsets designed to help you customize an intercom system for your own special needs, together with the name of your nearest dealer. Be assured of our prompt response to your inquiry.

David Clark COMPANY
INCORPORATED

360 Franklin St., Worcester, Mass., 01604

West Coast Office: 1696 Centinela, Suite 2,
Inglewood, Cal. 90302

Circle Number 64 on Reader Reply Card

(Continued from page 89)

number, describes the unit, gives its wattage limitations, and tells where suitable lamps for the fixture are listed in the publication SS-1.

110. HEWLETT PACKARD—A new 17-page Application Note, "Using the 675A/676A Network Analyzer as an Educational Tool," describes frequency behavior of electrical networks. Useful for both the instructor and student, Application Note 112-2 covers subject material frequently encountered in electrical engineering courses and some two year technical courses. Dramatic demonstrations illustrate frequency swept transfer and driving point measurements displayed on a conventional oscilloscope. Design engineers will find the Nichols chart oscilloscope CRT overlay (which is included with each application note) useful to predict the closed loop behavior of their feedback network designs.

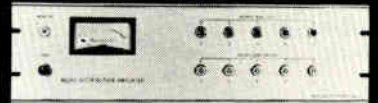
111. MADATORN CORP.—A six-page illustrated technical brochure, a supplementary product data sheet, and price list on a new alpha-numeric display and its various components are now available. The brochure and product data sheet describe the key features of the display, including its ability to present numerals, letters, foreign alphabets and characters, symbols and other types of characters. These can be displayed in varying sizes or character styles, at viewing angles up to 160° with outstanding legibility and resolution. Elements of this economical display, as described in the literature, include miniature CRT and decoder logic available in multiples from one to sixteen, a read-only memory, associated circuitry and power supply, and a bezel and filter assembly. Descriptions are accompanied by photos and diagrams. Also covered are input requirements, ordering information and detailed pricing information.

112. MELCOR ELECTRONICS CORP.—A new 6-page catalog describing the complete line of audio equalizers is now available. The company designs and manufactures operational amplifiers, servo and computer amplifiers and professional audio components. The Melcor equalizer line includes amplifier models, graphic module units, shelf module and active program equal-

SPOTMASTER

The all solid state AD1A

AUDIO DISTRIBUTION AMPLIFIER

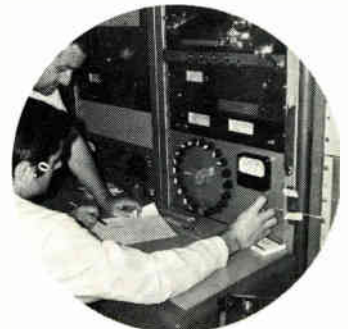


Meet the AD1A, a solid state audio distribution amplifier specifically designed for AM, FM and TV broadcast stations and recording studios. The AD1A distributes audio signals via five separate output channels (up to 25 with the addition of AD1A-X extenders), and incorporates a front-panel VU meter and monitor jack to permit visual and aural monitoring of the incoming signal at the output of the line amplifier. Response is essentially flat from 40 to 20,000 Hz, with low distortion and noise, 60 db channel isolation and 12 db peak factor. For further information, write or call today:

Spotmaster
BROADCAST ELECTRONICS, INC.

8810 Brookville Road
Silver Spring, Maryland 20910
Area Code 301 • 588-4983

STL Tapes Measure Up!



One reason why STL tapes measure up to published standards is the professional pride of specialists using equipment designed exclusively for test tape production.

STL 1/4" test tapes are top quality, full-track alignment tapes for playback equalization adjustment and accurate phase reference.

Available in three speeds—3.75, 7.5, or 15 ips at \$21 each. Shipped same day order received.

FOR A SOUND BUY, MAKE TABER
YOUR TAPE HEADQUARTERS!

Call or Write **TABER**

MANUFACTURING AND
ENGINEERING COMPANY

OAKLAND INTERNATIONAL AIRPORT, BLDG., L-821
P. O. BOX 2365 • OAKLAND, CALIFORNIA 94614
Telephone (415) 635-3832

Circle Number 63 on Reader Reply Card

BROADCAST ENGINEERING

izers. These equalizers are used in the broadcasting, recording and sound systems industry. Detailed electrical and mechanical specifications are given for all units. Photos, wiring diagrams, performance curves and general descriptive information are also provided.

113. **MIDSIL CORP.**—K100, a 14-page publication describing the versatile silicone rubber family, developed by Midland Silicones Ltd., U. K., and marketed by Midsil Corporation, Emerson, New Jersey is now available. Characteristics of silicone rubbers, and MS silicone rubbers in particular, are described, applications are discussed, and typical properties and reference materials are listed. While K100 is a summary of principal products and their applications, the full range of Midsil silicone rubber publications number well over fifty, including individual data sheets on all products. Similarities in the products include elastomeric properties usually associated with natural and synthetic rubbers and an ability to maintain thermal stability even at sustained exposure to any level of the temperature range -90°C to 250°C . The products are used in applications as complicated as the Concorde superjet, as basic as electrical connectors.

114. **MONSANTO CO.**—High-light stories in Metricist No. 8 describe the use of a pulse generator in frequency-domain testing and a way of using a computer-controlled frequency synthesizer in a closed-loop, adaptive test system. Also described are two new plug-in modules for the 1500 Series Counter/Timers. The new Model 1201A Digital Voltmeter plug-in converts any of the 1500 Series main frames to a five-digit voltmeter having ranges of 0-1, 10, 100 and 1000 VDC full scale. The second plug-in, Model 1101A, is a prescaler which divides by two or four, permitting direct-reading frequency measurements to 250 or 500 MHz, or 140 or 280 MHz, depending upon which of the 1500 Series main frames are used.

115. **NEUMADE PRODUCTS CORP.**—A new 36-page catalog covering all Neumade products including film handling and editing equipment, projector tables, and storage facilities for films, filmstrips, slides, disc records, audio

Replace Your Present AM Monitor with a

Metron*

all
solid
state



* AM MODULATION MONITOR

The Metron Model 506B-1 Amplitude Modulation Monitor is a high quality instrument, field-proven for several years.

- FCC Type Approval 3-127
- Compact — Only 5¼" high on a standard 19" rack
- All solid state circuits — silicon transistors for greater reliability.
- Low Cost — only \$550.00.



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

Circle Number 65 on Reader Reply Card

dsc color telecine alignment slides

for critical alignment of color chains

■ TA SERIES DYE IMAGE STAIRCASE SLIDE

An essential tool for accurate set-up of grey scale tracking, gamma and gain

Five step staircase produces clear waveform display to simplify alignment

Widely used by stations, networks and manufacturers as a standard reference

Endorsed by the Canadian Telecasting Practices Committee for the alignment of color chains

■ CB SERIES COLOR BAR SLIDE

Invaluable in checking and matching color rendition of telecine systems

■ FS SERIES FLARE TEST SLIDE

Used to detect and control optical flare in all channels of a telecine chain

All three slides are available in either 3¼" x 4" or 35 mm. sizes

To ensure that absolute accuracy is maintained, the STAIRCASE and COLOR BAR slides are distributed on a lease basis and replaced every six months

■ TA STAIRCASE SLIDE

including replacement — \$115.00 per year

■ CB COLOR BAR SLIDE

including replacement — \$115.00 per year

■ FS FLARE TEST SLIDE

replaced every year — \$24.00 per year
outright purchase — \$30.00

One each TA, CB and FS slide,
including replacements — \$230.00 per year

Additional TA or CB slides,
including replacements — \$70.00 per year
Broken or damaged slides are replaced at no charge

dsc Test Slides

exclusively from

D AND S CORLEY LIMITED
4800 Dundas Street West
Islington, Toronto
Ontario 416-231-6936

Circle Number 66 on Reader Reply Card

YOU CAN GET MORE FROM YOUR CARTRIDGES



JOA gives you MORE CARTRIDGE PERFORMANCE ... that's practical! MORE ENGINEERING TIME ... that's economical!

Let JOA Cartridge Specialists recondition and rebuild your worn cartridges and keep your engineering personnel "engineering."

—JOA will inspect, service and re-load your cartridges with ANY LENGTH tape

NO MINIMUM

NO EXTRA CHARGE FOR—

(a) **FOAM TEFLON-FACED PRESSURE PADS**

(b) replacement of minor parts

(c) **VISIBLE SPLICE**

ALL cartridges PRETESTED under actual broadcast conditions 48-hour Processing

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

JOA—the cartridge service of authority—serving the broadcast industry. phone or write



Cartridge Service
P. O. Box 3087
Philadelphia, Pa. 19150
Area Code 215, TUrner 6-7993

Circle Number 67 on Reader Reply Card

tape, 1" and 2" wide video tape, etc. is now available.

116. NJE CORP.—A new, condensed, 28-page catalog describing "Power Supplies Unlimited," is now available. It features the LVC II/PVC line of laboratory and bench supplies, which offer a new concept or regulation via the use of accessible plug-in regulator cards in either the voltage or current output modes. Voltage ranges for the LVC II/PVC line are 0-10V, 20V, and 50V, while power loads range from 25 watts, 50 watts and 100 watts, respectively. Also described in the illustrated catalog are system rack and modular supplies; over 200 voltage and current regulation models; high voltage supplies from 2.5 KV to 250 KV; frequency converters 60 Hz to 400 Hz; and a complete description of NJE's custom capabilities. The firm offers 5 or 10 year warranty on all products.

117. NORTRONICS CO., INC.—The most comprehensive catalog ever issued by Nortronics, presenting detailed specifying information about the industry's most comprehensive line of heads for audio,

mastering, duplicating, instrumentation, and mini-digital applications is now available. Special features included are a new cross-reference between OEM and Distributor part numbers, a convenient track configurations chart suitable for wall hanging, and tear-out postcards for requesting additional information.

118. SIGNALIGHT INC.—A new 12-page technical brochure describing application ideas for neon glow lamps as circuit components and voltage regulators is now available. The brochure, "Application Ideas", lists some 22 circuit applications for neon lamps in vidicons, photomultipliers, power supplies, remote controls, memories, timers, proportional controls, moving signs, etc. Detailed discussion is presented on various types of lamps recommended for certain applications. Most of the neon lamps discussed are new and were chosen for the specific application because of their unique characteristics.

119. SIMPSON ELECTRIC CO.—A new 32-page catalog describing over 1,500 stock ranges, sizes and types of panel instruments is

ANY WIRE, ANYWHERE.

Coaxial and RF cable connectors for any place you need them . . . and direct sales and assistance anywhere in the U.S.A. Over 30,000 other wire connecting products from #26 AWG to 1000 MCM. Talk to us about your connecting problem or write for free Terminal and Connector Handbook. American Pamcor, Inc., Valley Forge, Pa. 19481

AMERICAN PAMCOR

A SUBSIDIARY OF
AMP
INCORPORATED

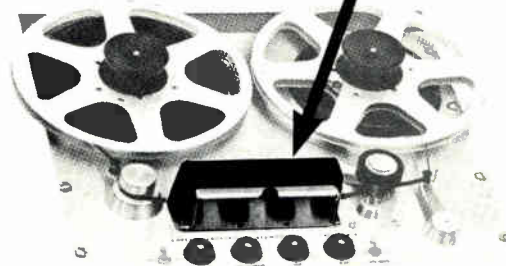


Circle Number 68 on Reader Reply Card

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



36 HOUR SERVICE - LOANERS AVAILABLE
(612) 884-7393



MINNEAPOLIS MAGNETICS, INC.
8125 PLEASANT AVE. SO., MINNEAPOLIS, MINN. 55420

Circle Number 69 on Reader Reply Card

Norelco

VIDEO TAPE RECORDER



- High picture quality
- One inch helical scan
- Plug-in video head
- Direct coupling connections

AT
A
NEW
LOW
PRICE
OF
\$585

#29,503

This video tape recorder is a precision engineered unit designed for professional, commercial and home use. It has many outstanding features such as the unique inductive coupling between the rotating record/playback head and the rest of the system. The electronics are exceptionally stable; there are no video drop-outs as a function of the machine. The unit operates from a standard 117 vac line. Recordings can be made direct from a television receiver or camera. The excellent picture and sound quality of this video tape recorder plus its low price make it extremely desirable for a wide variety of applications.

GENERAL DATA —

Video Tape Recorder based on the helical scan principle, with a tape wrap of 355° and one rotating replaceable video head.

CHARACTERISTICS —

- Supply Voltage: 115 VAC., 60 Hz., 350 W
- Audio Frequency: 120-12,000 Cps. (6 db)
- Video Frequency: 120-12,000 Cps. (6 db)
- Video Band Width: 2.5 Mc (6 db)
- Tape Width: 1" (Thickness: 1.5 Mils)
- Tape Speed: 9 ips.
- Tape Wow: 0.5% weighted
- Dimensions: 24 3/4 x 16 1/2 x 15 1/4"
- Weight: 100 lbs. (approx.)

ELECTRONIC DATA —

1. Camera (video) Input: EIA, random interlace, industrial (30 cycle frame rate) sync; BNC receptacle, 75 Ohm 1 V., positive
2. TV Rec Sig: (IF) input pix carrier 45.75 mc/s; Sound carrier, 41.25 Mc/s., 20 Mv (100% mod.) BNC receptacle, 75 Ohm
3. Video Output: BNC 75 Ohm, IV, for 100% mod.
4. VHF Output: 300 Ohms
5. Choice of three channels: 2, 3 or 4
6. Uninterrupted recording can be made in excess of 1 hr. duration on 9" reel. (std. 8" reel allows up to 40 min. play time).

AUDIO DATA —

1. Mike Input: Phone-jack; sens. 1 Mv, int. res. 1K Ohm
2. Phono Input: Phone-jack; sens. 200 Mv., int. res. 500K Ohm
3. Audio Output: Phono-jack, output, 1V., source res. 20K Ohm
4. Freq. Range: 120-12,000 Cps. (6 db)
5. Distortion: 5%
6. Signal to Noise Ratio: 50 db
7. Signal to Hum Ratio: 40 db

This VTR will accept any composite video signal (random, 2:1 or EIA) fed from a single coaxial cable. TV camera, off-the-air tuner, tape duplicator, monoscope generator are all acceptable inputs. These units are brand new, complete with head, and instruction manual in original factory cartons. Original list price was in excess of \$3000. Limited quantity—shipped by truck or REA, transportation charges collect—check with order only. \$585 net. Stock #29,503.

Additional Information — Free Flyer 970J2

THE DENSON ELECTRONICS CORP.
PO Box 85 • Longview St.
Rockville, Conn. 06066
203/875-5198

Circle Number 70 on Reader Reply Card

March, 1970

now available. Included is a quick-reference index on the cover for fast locating of ranges and types in the desired case style. Introduced in this catalog are Simpson's new Century Series panel instruments, which combine the advantages of a modern clean-cut design with rugged phenolic and glass construction. Available for immediate delivery in four sizes, they can be used to directly replace older glass and phenolic designs. Also being introduced are the Model 2800 digital panel instruments. Advanced integrated circuit design has non-blinking readouts, changing only when the measured value changes. Accuracy of these readings is ± 0.1 per cent, with resolution of 1 part in 1000. Like all the Simpson instruments shown in the catalog, they are stocked by electronic distributors for "off the shelf" delivery. Other new products include Bold-Vue 3-hole mount instruments, contactless controllers and illuminated Designer Series VU instruments. The catalog (Bulletin 2081) has a panel instrument characteristics chart, and a useful glossary of terms.

120. SKIRPAN ELECTRONICS, INC.—A new catalog of the most complete line of professional lighting control equipment ever offered by any manufacturer is now available. It supplies the requirements of every application which demands accurate and dependable control of the intensity of large lamp loads. In addition to the established line of solid state dimmers, console control components, packaged lighting control systems and new products are available. These include solid state programming and cycle control amplifiers, projector dissolve systems and solid state architectural dimmers with either rotary or pushbutton control.

121. SOLITRON DEVICES, INC.—A new Radiation Hardened Silicon Power Transistor Manual is now available. The manual presents the "state-of-the-art" capability of Solitron's Florida Semiconductor Division in manufacturing neutron hardened silicon power transistors. Information on neutron irradiation effects relative to each family of Solitron transistors is clearly outlined. The manual also contains engineering data sheets for Solitron's BR100, BR101 and BR200, 201 device series, as well as a third and



NEW Russco STUDIO-PRO

CUSTOM MODEL TURNTABLE

Single lever controls 33 & 45 Speeds. Plays 45's without adapter. Illuminated speed indicators. Has detachable tone arm mounting plate. Comes with syn. motor only.

INTRODUCTORY PRICE **\$198**

SOLD
DIRECT
OR TO
DEALERS



NEW Russco CUE-MASTER

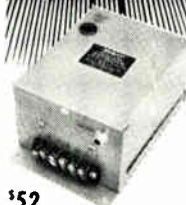
STANDARD MODEL TURNTABLE

Single lever controls 33, 45 & 78 speeds. Plays 45's without adapter. Simple rugged construction, only 3 rotating parts.

PRICE WITH 4 POLE IND. MOTOR **\$145**

PRICE WITH SYN. MOTOR **\$169.50**

Call
or write
for folder



\$52
MONAURAL MODEL 1-M

RUSSCO BROADCAST PHONO Preamplifiers MONAURAL & STEREO MODELS

STEREO MODEL 1-S **\$104**

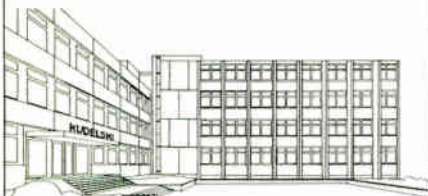


RUSSCO POWER
SUPPLY UNITS
model 1-P **\$42**

RUSSCO Electronics Mfg.
6879 N. SUNNYSIDE, CLOVIS, CALIF.
PH. 299-4692

Circle Number 71 on Reader Reply Card

**THE NEW
Kudelski Nagra Plant
NOW IN OPERATION!**



To produce
Nagra recorders
in sufficient quantities
eliminating the long waiting period.

Call at your Nagra Dealer or at the addresses below

Distribution—Service—Sales
NAGRA MAGNETIC RECORDERS INC.
19 W. 44th Street, New York, N.Y. 10036

Southern California — Service — Sales
RYDER MAGNETIC SALES CORP.
1147 NO. VINE STREET
HOLLYWOOD, CALIF. 90038

Exclusive Distributor in Canada
BRAUN ELECTRIC CANADA, LTD.
3269 AMERICAN DRIVE
MALTON ONTARIO, CANADA

Circle Number 72 on Reader Reply Card

**New D&S
Cradle Head**



Pat. Pending.

**The heavy-duty head with
a lightweight price.**

The new D&S cradle head incorporates the basic engineering principles of the more expensive models at a price that is within everyone's budget. They are built to high standards, capable of controlling heavy cumbersome cameras with ease and safety and will meet all your requirements.

- Cradle rolls on needle bearings... slides on walls of Teflon
- Friction drag adjustments
- Pan handle adjusts to any angle
- All cradle heads are designed especially for cameras with cables located at the rear bottom of the camera
- Easy to lock
- Smooth pan action
- Ideal for cameras weighing up to 100 lbs.

For literature write:

DAVIS & SANFORD
24 Pleasant St., New Rochelle, N.Y.

Circle Number 73 on Reader Reply Card

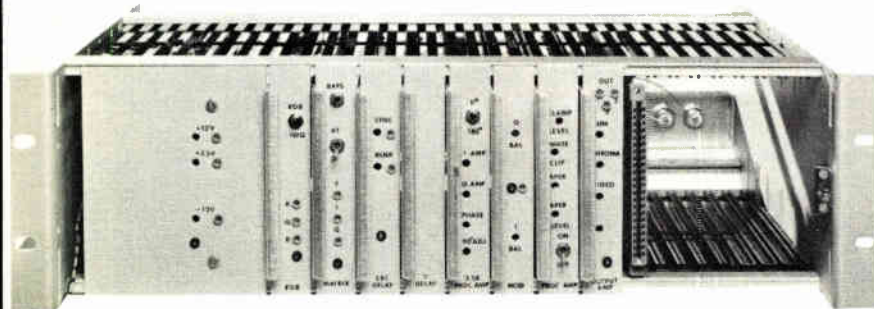
higher current series, the BR300, 301. Information on design parameters and processing techniques is also described in detail. A special section is devoted to analysis of post-radiation data, with emphasis on hFE and collector saturation voltage parameters. Photographs, curves and specification charts are found throughout the 92-page manual.

122. **TECKNIT** — A four-page data sheet is now available describing the Conductive System 72-00002, which is a one-part, pure silver-loaded, silicone rubber adhesive. The two most important characteristics are high electrical conductivity and permanent flexibility. Detailed photos and illustrations point out the many applications and mitered cutting methods of gaskets, insuring maximum bond strength. Complete physical, electrical and mechanical properties are included along with bonding directions.

123. **UNITRODE CORP.**—The Reliability Report R-169 from Unitrode covering its line of fused-in-glass zener diodes, rectifiers and rectifier assemblies, thyristors, and microwave PIN diodes is now available. Contained in the report is a discussion of product design as it affects reliability, failure analysis and corrective action procedures, material control and process control procedures, acceptance testing procedures, and a discussion of reliability engineering as related to the effectiveness of stress screening. A summary of operating life test data is given showing a total of 47 million unit test hours the results of which are used to predict a failure rate of less than .0006 per cent per thousand hours for a Unitrode device in a typical application.

124. **VISUAL ELECTRONICS CORP.**—A new brochure describing the complete Rapid-Q automatic cartridge tape equipment product line—monaural and stereo models is now available. The publication explains the technique of 100% faster recueing speeds and adaptability to all cartridge sizes.

**COLOR
ME
VERSATILE.**



MODEL 511 NTSC COLOR ENCODER

A color sync generator is available as an option to be installed in the same housing and circuit modules are contained in verticle slide-out trays for easy maintenance. Specifications and pricing available on request.

AMERICAN DATA CORPORATION

4306 GOVERNORS DRIVE, S. W., HUNTSVILLE, ALABAMA 35805

Circle Number 74 on Reader Reply Card

**Send Your News
Of Staff Honors
And Changes
To Broadcast Engineering**

ADVERTISERS' INDEX

AKG Div.	14
ABTO	Cover 4
Alma Engineering, Inc.	59
American Data Corp.	96
American Electronic Laboratories, Inc. ...	82
American Pamcor Inc.	94
Amperex Electronic Corp.	48
Andrew Corp.	5
Belar Electronic Laboratory, Inc.	80
Belden Corp.	18-19
Bird Electronic Corp.	83
The Robert Bosch Corp.	57
Broadcast Electronics, Inc.	21, 25, 92
Broadcast Products Co., Inc.	85
CBS Laboratories	3
CCA Electronics Corp.	8, 76
Central Dynamics Ltd.	81
David Clark Co., Inc.	92
Cohu Electronics, Inc.	1
Conrac Div., Conrac Corp.	17
D & S Corley Ltd.	93
Davis & Sanford	86, 96
Denson Electronic Corp.	95
Ditch Witch Trenchers Div. Charles Machine Works, Inc.	27
Dynair Electronics, Inc.	69
Electro-Voice, Inc.	Cover 2
Fairchild Recording Equip. Corp.	78
Filmline Corp.	61
GBC Closed Circuit TV Corp.	21
Gates Radio Co.	11
Gotham Audio Corp.	84, 88
The Grass Valley Group, Inc.	41
Gray Research & Development	47
Houston Fearless Corp.	84
ITT Jennings	51
International Good Music, Inc.	12
International Nuclear Corp.	Cover 3
JOA Cartridge Service	94
Jamieson Film Co.	15
Jampro Antenna Co.	46
Lang Electronics	76, 86
Listec Television Equip. Corp.	87
3M-Magnetic Tape	43
Metron Instruments, Inc.	93
Metrotech, Inc.	26
Mincom Div., 3M Co.	52-53
Minneapolis Magnetics, Inc.	94
Mobile Color, Inc.	45
Moseley Associates, Inc.	22
Nagra Magnetic Recorders, Inc.	96
North American Philips Corp.	14
Nortronics Co., Inc.	86
Power Optics	77
RCA Commercial Electronic Systems Div.	90-91
RCA Service Co.	13
RF Systems, Inc.	20
Russco Electronics Mfg. Co.	95
Sarkes Tarzian, Inc.	37
Shure Brothers, Inc.	67
Spotmaster	21, 25, 92
Stanton Magnetics, Inc.	63
Taber Mfg. & Eng. Co.	92
Tape-Athon Corp.	89
Tech Laboratories, Inc.	23
Telcomp, Div. of TV and Computer Corp. ...	97
TeleMation, Inc.	9
Thomson CSF Electron Tube, Inc.	73
Valad Electric Heating Co.	46
Video Devices	87
Visual Electronics Corp.	79
Vital Industries, Inc.	7
Ward Electronics	31
Xcelite, Inc.	75

PROFESSIONAL SERVICES

FRANK A. ZOELLER
TELEVISION SYSTEMS
CONSULTANT
20 Years Experience
Box 366 • San Carlos, Cal. 94070
(415) 593-1751

VIR JAMES
CONSULTING RADIO ENGINEERS
Applications and Field Engineering
345 Colorado Blvd.
Phone: (Area Code 303) 333-5562
DENVER, COLORADO 80206
Member AFCCE
TWX 910-931-0514

CAMBRIDGE CRYSTALS
PRECISION FREQUENCY
MEASURING SERVICE
SPECIALISTS FOR AM-FM-TV
445 Concord Ave. Phone 876-2810
Cambridge, Mass. 02138

JAMES C. McNARY
Consulting Engineer
National Press Bldg.
Washington 4, D.C.
Telephone District 7-1205
Member AFCCE

JOHN H. MULLANEY
and ASSOCIATES
Suite 71,
1150 Connecticut Ave., N.W.
Washington, D. C. 20036
Phone 202-223-1180
Member AFCCE

ROSNER TELEVISION
SYSTEMS
ENGINEERS — CONTRACTORS
29 South Mall
Plainview, N.Y. 11803
(516) 694-1903

ALLSTATE COMMUNICATIONS
ENGINEERS - CONTRACTORS
CATV - CCTV - VTR
1200 WEST CHESTNUT STREET
UNION, NEW JERSEY 07083
(201) 687-8810

CLASSIFIED

Advertising rates in Classified Section are 15¢ per word, each insertion, and must be accompanied by cash to insure publication.

Each initial or abbreviation counts a full word. Upper case words, 30¢ each.

Situation Wanted

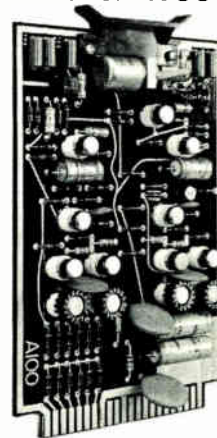
Man, First Class Radio Telephone License. Desires permanent job as broadcast transmitter technician in deep south working under chief engineer. William H. Wilson, 320 Brown St., Douglasville, Georgia 30134. Phone 942-6014. 2-70-1t

\$171

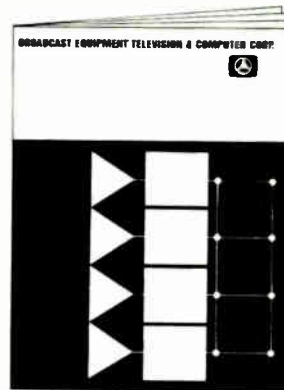
NEW IC...OP

AMP AUDIO D.A.

Model A100



IS ONE FOR THE BOOK



At \$171, our new Model A100 is another uncommon value in audio and video modules. It's in THE book . . . TelComp's new 1970 catalog and price list! A100 features 6 outputs, + 20 DBM each, 60DB isolation between outputs, 20DB gain for unity adjustment. 12 units use only 5-1/4" rack space. Order now. For better broadcast equipment made by broadcast engineers . . . write for your free TelComp catalog.

TELCOMP

Division of TV and Computer Corp.
2056 U.S. Highway 27
Scotch Plains, N. J. 07076

Circle Number 76 on Reader Reply Card

Training

To advance in electronics, knowledge and ability are required. Grantham offers correspondence and resident instruction, in depth, leading to the degree of Associate in Science in Electronics Engineering, G. I. Bill approved. Credit for previous training and experience allowed. Free Catalog Write: Dept. E-2, Grantham School of Electronics, 1505 N. Western Ave., Hollywood, California 90027. 6-67-tf

First phone through tape recorded lessons at home plus one week personal instruction in Washington, DC, Atlanta, Boston, Detroit, New Orleans, Minneapolis, Seattle, Denver, Portland, Los Angeles. Proven results. Our 17th year teaching FCC license courses. Bob Johnson Radio License Preparation, 1060D Duncan, Manhattan Beach, Calif. 80266. Phone 213-379-4461. 1-69-tf

Help Wanted

Job Headquarters for all Radio and Television Engineers. Immediate openings exist in 9 western states and elsewhere for qualified engineer and technical personnel. All categories from trainees to experienced transmitter maintenance, chief, assistant chief, live color video maintenance and technical operations. Send us your complete resume now. The AMPS Agency, 3924 Wilshire Blvd., Los Angeles, California 90005. Telephone DU 8-3116. By Broadcasters—For Broadcasters. 11-68-tf

IMMEDIATE OPENINGS: Qualify for any of the following positions: RCA CCTV Equipment, monochrome or color. TV Systems Engineers — Project Engineers — Supervisors — Managers — Maintenance Technicians — Video Engineers — to work in either New York, Pennsylvania, New Jersey or California area. Write: RCA Rep., 1959 Jericho Tpke., New Hyde Park, New York 11040. 1-70-tf

Contemporary Radio Station in growing medium Alabama market wants Chief Engineer. The man we are looking for must be competent. He will be working in one of the most modern broadcasting sta-

CIRCUIT/PRODUCT DESIGN ENGINEERS

The engineers we seek will include their talents in Video. Audio and Computer related circuitry designing products for the Television Broadcasting Equipment market. Send resume to the personnel manager, Vital Industries, Inc., 3614 S. W. Archer Road, Gainesville, Florida 32601.

tions in the south. He will be in charge of maintenance. His workshop will be equipped with everything he needs. Announcing ability helpful, but not necessary. The man we are looking for takes pride in his work and thrives on the satisfaction of a job well done. His reward will be good wages and fringe benefits. He will grow with the company. Send resume and photo to Broadcast Engineering, Box 237, 1014 Wyandotte, Kansas City, Mo. 64105. 3-70-1t

Equipment for Sale

Surplus audio and video patch panels and patch cords. 500 to 500 ohm repeat coils flat to 20,000 cycles. Send for list. Gulf Electro-Sales, Inc., 6325 Beverly Hill, Houston, Texas 77027. 4-69-12t

BARGAIN—G. E. Pyranol Capacitors. 25 mfd. @ 6250 volts \$20.00 18" high, 16½" wide, 5" deep. Weighs 65 lbs. F.O.B. Ackard, 729 East 17th Ave., Denver, Colo. 80203. 2-70-3t

Tower Lite Control Panel Box containing alarm, telo & auxiliary circuits, auto transformer and flasher units—115V 60 cycle, unused, \$125.00 each. Sierra-Western Electric Co., Oakland, Cal. 94623. Phone 415-832-3527. 6-69-tf

CARTRIDGE TAPE EQUIPMENT—Completely reconditioned Spotmaster and Tapeaster Record/Playbacks. \$375.00. Playbacks \$250.00. 30-day money-back guarantee on all equipment. BROADCAST PRODUCTS CO., INC. 12330 Wilkins Avenue, Rockville, Maryland 20852. Ph: 301-933-3400. 10-69-tf

Used Equipment for Sale. McMartin FM Modulation Monitor. TBM 3500 \$600.00; McMartin FM Frequency Monitor. TBM 3000, \$600.00; CBS Audimax 444, \$475.00; CBS Audimax R2Z tube model, \$275.00; Ampex AG500 full track demonstrator, \$1075.00; Used Fidelipac cartridges several lengths, \$1.00 each; 4 Ampex 622 Speaker amplifiers, \$150.00 each; MaCarTa model 500 cartridge player, \$375.00; MaCarTa Record Player model 570, \$425.00. Mastertone Co., 8101 University, Des Moines, Iowa 50311 (515) 274-2551. 3-70-1t

Highest prices paid for good used 1KW and 10KW AM Transmitters. Jeleco Electronics, Ltd., 2 Thorncliffe Park Drive, Unit 28, Toronto, 17, Ontario, Canada. Phone: 416/421-5631. 3-70-6t

QRK Turntables—We have approximately 20—12"/Sync. Type QRK Turntables that have been painted special colors and are Pre-Drilled for various non-standard Tonearms. These units, with full warranty are available on First Come, First Served, basis at \$139.50. Contact QRK Electronic Products, 1568 North Sierra Vista, Fresno, California 93703. Phone: (209) 251-4213. 3-70-3t

1 to 5 KW High Band Television Transmitter. Suitable for Ch. 11 use. Chief Engineer. WCKT-TV, P. O. Box 1118, Miami, Florida 33138. 305-751-6692. 3-70-1t

Time for the annual proof of performance tests? Order your forms from Broadcast Services Company and receive a beautiful plastic ID folder suitable for operator's verification card FREE with each form kit AM or FM, specify which. \$1.50 air mail dollar extra, cash, check or money order to Box 9292 Corpus Christi, Texas 78408.

TELECHROME Video Test Signal Receiver. Model 1004-B, and Video DA, Model 3206-A1. Both excellent, make offer. ELECTRONIC SYSTEMS, Box 20391, Denver, Colo. 80220. 3-70-1t

Closing our equipment rebuilding operation. Sell below cost all new parts and accessories for broadcast cameras, film chains, projectors, studio and VTR equipment. Mostly genuine RCA parts, for black & white and color. Also many hard to get instruction manuals for older equipment. Tell us your needs or ask for free list: COMQUIP Box 12, Ridgewood, New Jersey 07451. (201) 444-0196. 3-70-1t

AURICON 16mm Cine Voice motion picture cameras, accessories, parts, new and used. AURICON Pro 1200 camera complete except amplifier \$2700. Converted AURICON camera 15 and 30 frame speed for Kinescope Recording \$1200. Free list: COMQUIP Box 12, Ridgewood, New Jersey 07451. (201) 444-0196. 3-70-1t

PROFESSIONAL AMPEX 350-2 Tape Recorder to be sold as is. Three years old, less than 50 record hours and 100 playback hours on heads. Tape deck in portable case. 7½ and 15 IPS. Perfect condition. \$1500. Sam Montel, P. O. Box 2306, Baton Rouge, La. Phone 504/344-0514. 3-70-1t

TK-41 Color Cameras, used in network studios at NBC, Burbank. \$12,500 each. Includes turret lens, type 8673 Bi-Alkali image orthocons and 100 ft of TV-82 camera cable. Contact: John Frishette, 213-845-7000. 3-7-1t

TV DESIGN ENGINEERS

COHU NEEDS YOU

in Beautiful San Diego
for

Video Distribution and Switching
Broadcast TV Equipment
Color Camera Systems
Video Processing

Several positions are available at the senior and project level. EE or Physics Degree desired, equivalent experience is acceptable. 3-10 years' work in related circuit design a must.

COHU's modern facility is 15 minutes from bay and ocean, 50 minutes from mountains. Excellent Health/Life Insurance. Profit Sharing Retirement Program. Five institutions provide excellent graduate study opportunities.

Call (collect) or write (resumé) Jim Barnes, Chief Engineer, to arrange a personal interview.

COHU ELECTRONICS, INC., Box 623, San Diego, Calif. 92112
Phone (714) 277-6700

An Equal Opportunity Employer

The famous

TDA 2D

video/pulse
distribution amplifier



with differential input.

- * The first transistorized distribution / amplifier to be commercially available
- * More in use than any other model in the world
- * Over 1,000 in use by a major television network
- * In use at almost every TV station in the nation
- * Hundreds in use by telephone companies
- * Has a one year guarantee (never breaks down anyway)
\$295.00 FOB Nashville



INTERNATIONAL NUCLEAR CORPORATION

608 Norris Avenue • Nashville, Tennessee 37204 • 615—254-3365

New catalog sent on request.

NOW
Shoot
in black and white
Show
in color

In 1967 at the ABC Studios in New York there was a demonstration of a dramatic new photographic principle for color, using standard black and white film. 2x2 monochrome slides were shown in full color using a method developed for the U.S. government by Technical Operations, Inc. Viewed on system at a press showing, it promised to have exciting future applications for TV broadcasters.

Now after three years of intensive development and a field testing program, the 16mm. ABTO motion picture film process is ready for you.

Compared with the cost of the new ABTO process your present cost of color films is double. Yet high photographic quality and color fidelity is uncompromised. There is no change required in your standard procedures. Use Plus-X film, your own film cameras and projectors, standard black and white processor.

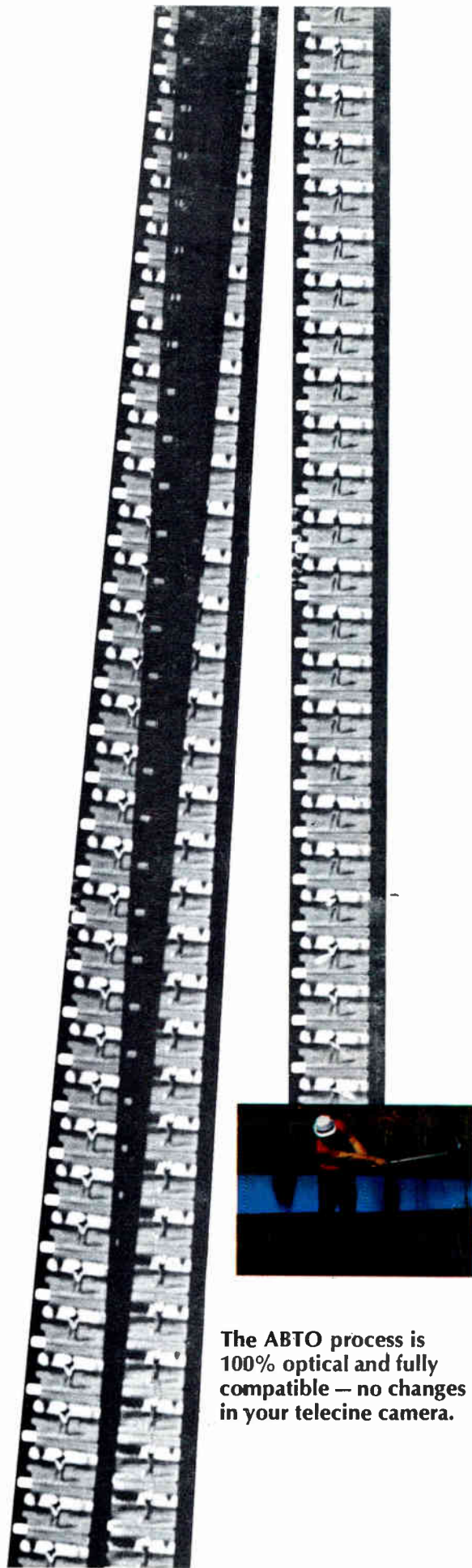
Hard to believe? Write for full details. Even better — come to the first public demonstration: NAB Show, Lobby of Essex Inn (just across 8th Street from the Conrad Hilton)

abto.INC.

1926 Broadway, New York, N.Y. 10023 (212) 787-5000

Affiliated with: American Broadcasting Companies, Inc. and Technical Operations, Inc.

Circle Number 3 on Reader Reply Card



The ABTO process is 100% optical and fully compatible — no changes in your telecine camera.