

A MACTIER PUBLICATION

MARCH 1971

BME

BROADCAST MANAGEMENT/ENGINEERING

4
PALUCH 3653200M X AJ2 4701
D CHRISTIAN CH R TV ENGR
PACIFIC LUTHERAN UNIV
TACOMA WA

98447

BUY NOW OR PAY LATER

SALE

A&B
'71

SUDUTH

SORRY
We have lost our
signal due to
faulty economies.

Air Check? Why Not A Video Check?



AKAI's 1/4" Portable Video Tape Recorder Makes It INSTANTLY!

AKAI's remarkable new 1/4" VT-100 Portable Video Tape Recorder provides everything your station needs to produce professional audio-video tapes. No film processing costs. No expensive lighting setups. No special equipment of any kind. And, all on exclusive, low-cost 1/4" video tape at 1/3 the operating cost of other systems. Simply aim the camera. Shoot! Presto! You make your own video-tapes for talent checks, program continuity, rehearsals, etc. Play them back instantly. Erase. Edit. Shoot over! Play the tapes anywhere for instant viewing on any television set.

Truly portable, the entire VT-100 system weighs under 20 pounds



BB-02-71
Yes, I'm interested in AKAI's new VT-100.

- Rush me literature.
- Have your representative call.
- Call me and schedule demonstration.

Name _____

Title _____

Address _____

Phone _____

City _____

State _____ Zip _____

(less Adapter-Recharger) and features:

- Instant playback on built-in TV monitor
- Exclusive built-in super-sensitive microphone
- Zoom lens
- Built-in optical view finder and automatic light compensator
- 12-volt AC/DC system (two rechargeable 6V batteries included)
- Easy-to-use, push-button operation with automatic fast forward and rewind
- The VT-100 plays through any TV (converter available)

**TOTAL PRICE FOR
EVERYTHING \$1295.00***

*plus state and local sales taxes where applicable.

Circle 100 on Reader Service Card

AKAI

World Renowned For Sight & Sound

AKAI AMERICA, LTD. 2139 East Del Amo Boulevard / Compton, California 90220 / (213) 537-3880

www.americanradiohistory.com

★ Revolutionary ★



PRESENTING ...
VIDIFONT
World's most versatile
electronic character
display system!
PRODUCED BY ...
CBS LABORATORIES

Vidifont

If Ben Franklin had Vidifont, "Poor Richard's Almanac" would have been on television. It took 200 years, however, for graphic arts to produce Vidifont. This new generation television display system, by CBS Laboratories, offers advantages never before available in the broadcast industry.

- ★ A choice of several type fonts and sizes.
- ★ Exclusive proportional letter spacing.
- ★ A unique type font (CBS NEWS 36) that is graphically superior to any being used today.
- ★ Upper and lower case characters
- ★ Display on command and in real time.
- ★ Automatic editing and centering. ★ Word by word color.
- ★ Three speed crawl and character edging. ★ Flashing and blinking.
- ★ And message storing. Vidifont adds a new dimension to television display and opens up a whole new area of programming possibilities for your station.

SEE AND TRY VIDIFONT FOR YOURSELF AT BOOTH 304, NAB, CHICAGO

CBS LABORATORIES

A Division of Columbia Broadcasting System, Inc.
227 High Ridge Road, Stamford, Connecticut 06905

Circle 101 on Reader Service Card

BM/E

BROADCAST MANAGEMENT/ENGINEERING



Sudduth's cover: Don't wait for "put up or shut down" time. Make a good buy at NAB, now.

Editor:
James A. Lippke
Managing Editor:
Thomas Whyatt
Technical Editor:
Thomas R. Haskett
Art Director:
Karen Weinstein
Editorial Director:
George Rostky
Production Manager:
Arline G. Jacobs
Production Assistant:
Rosalind Leifer
Research and
Circulation Manager:
Irene Chervin
Marketing Services Manager:
Lorraine de Camille
President:
Ralph E. Richardson

Mactier Publishing Corp.
820 Second Ave., New York, N.Y. 10017
212 661-0450

Also publishers of:
BROADCAST EQUIPMENT BUYERS GUIDE
EEE
ELECTRO-PROCUREMENT



BM/E, Broadcast Management/Engineering, is published monthly by Mactier Publishing Corp. All notices pertaining to undeliverable mail or subscriptions should be addressed to 820 Second Ave., New York, N.Y. 10017. BM/E is circulated without charge to those responsible for station operation and for specifying and authorizing the purchase of equipment used in broadcast facilities. These facilities include AM, FM, and TV broadcast stations; CATV systems; ETV stations, networks and studios; audio and video recording studios; consultants, etc. Subscription prices to others: \$15.00 one year, \$25.00 two. Copyright © 1971 by Mactier Publishing Corp., New York City.

Controlled Circulation postage paid at Duluth, Minn.

- 6 Broadcast Industry News
- 10 Interpreting the FCC Rules and Regulations
- 16 Convention Log

NAB CONVENTION 1971

- 19 Austerity On The Floor
- 24 Exhibitor List
- 40 The Money Crisis In England: Independent TVs Face Another Bad Year
- 44 Meeting the Engineering Shortage
- 47 A Cartridge System Using Cassettes
- 53 AM Stereo: Just Around the Corner?
CM/E Magazine—Inserted for cable readers only
- 59 Broadcast Equipment
- 66 New Literature
- 68 Sale of the Month
- 70 Crosstalk
- 77 From The Editor

MANAGEMENT:

You'll want to know what to look for at the '71 NAB Convention—see highlights on page 6 and equipment information starting page 19. What happens if broadcasters get hit with a tax on ad revenues? It happened in England—can it happen here? See page 40. Cablemen worried about their status April 1 should read our FCC Rules column, page 10. Radio operators trying to work in a tight budget, learn about a cassette system that may solve some problems, page 47. Or, on page 53, find out about AM stereo: It may help solve tomorrow's problems. As for the article on page 44—you and your engineers may want to talk the "engineering shortage" over.

ENGINEERING:

Our NAB equipment coverage presents concisely major new equipment to be shown this year in Chicago, starting page 19, but first, take a look at page 16's report on the SMPTE Convention—with more previews of NAB. Bound to start controversy is page 44's article on the "engineering shortage." It takes a close look at the industry's use and abuse of engineers. AM stereo, page 53, and a cartridge system using cassettes, page 47, may be of interest now, essential tomorrow. And the new literature, page 66, and equipment, page 59, will help keep you informed of products already available.

12:17:53 PM

TIME	VIDEO SRCE	AUDIO TR	SC	TR
AIR				
-MAN-	N1			N1
12:29:37	=====	=====	=====	=====
NEXT				
0:30	F3A			
0:08	F1A	FM		
0:02	F			



NAB
BOOTH 115

THE GRASS VALLEY GROUP, INC. 

BROADCAST INDUSTRY NEWS

NAB Convention '71 Concentrates on Issues

"A sixth decade of unmatched service to the public" is what the 1971 NAB Convention will be planning in Chicago (March 28-31, at the Conrad Hilton Hotel). License renewals, prime-time programming, one-to-a-market and operator license requirements will be competing for discussion time with highlight speakers giving attention to other specific issues: Al Capp will talk about drug use and youth; Notre Dame U. president Father Theodore M. Hesburgh will discuss minority-group involvement in broadcasting; FCC chairman Dean Burch will discuss FCC plans and answer questions.

Other features: a joint radio-television assembly; a radio-only meeting; a conference on TV programming; early-bird workshops; a talk by FCC Commissioner Robert Wells; small-market radio and television sessions; and many additional gatherings, such as the NAFMB, APBE, AMST and TV Code Board annual meetings.

And, of course, the exhibits: more than last year, it appears. To get a rundown on these, see p. 19.

Sony reveals \$1000 color TV camera

BM/E previewed Sony's prototype—production is planned for 1972 at under \$1000—and found it uses a single vidicon tube with an integral optical grating and electronic filter system to separate colors. Sig-

FCC activities: Less program exclusivity?

Present exclusivity practices applied to non-network programming may make the programs "unduly and inordinately unavailable to other stations (than those first granted rights) and their potential audiences," according to the FCC. Thus the Commission has opened a rule-making procedure which would give smaller stations freer access to desirable non-network programming—UHF and CATV stations being the chief beneficiaries. Proposing no specific new rules, the FCC invited comments on: cutting the time of exclusivity down to one or two years; limiting exclusivity to one or two showings; eliminating all exclusivity; restricting exclusivity to a short period—six months to a year—with or without a specification of the number of showings; restricting exclusivity to a short period, with the requirement that thereafter the program be available to any UHF or CATV, with a fee based on the station's share of the market. Other activities:

- The FCC has proposed rules for **CATV station log keeping**, to meet the requirements of the revised CATV annual report (FCC Form 325) for cablecast programming data. Entries: the time each pro-

gram starts and ends; type and source of each program; channel lessees, sponsors of advertising announcements or paid-for programs, and political affiliations of campaign speakers; the total duration of commercials in each hourly time segment; and other program material.

- Upon the request of International Digisonics (see BM/E, January 1971, page 22) the FCC has granted a 90-day extension of its relaxation of rules allowing IDC's technique of **electronic verification of commercials** to be tested nationwide. Also working on an audio coding system, IDC has received FCC permission to verify radio commercials using tones below the bass end of the audible spectrum.

Commercial substitution gets first trial

Bucks County Cable TV, Falls Townships, Pa., is earning itself a few lines in the history of cable TV by developing the first working system of commercial substitution.

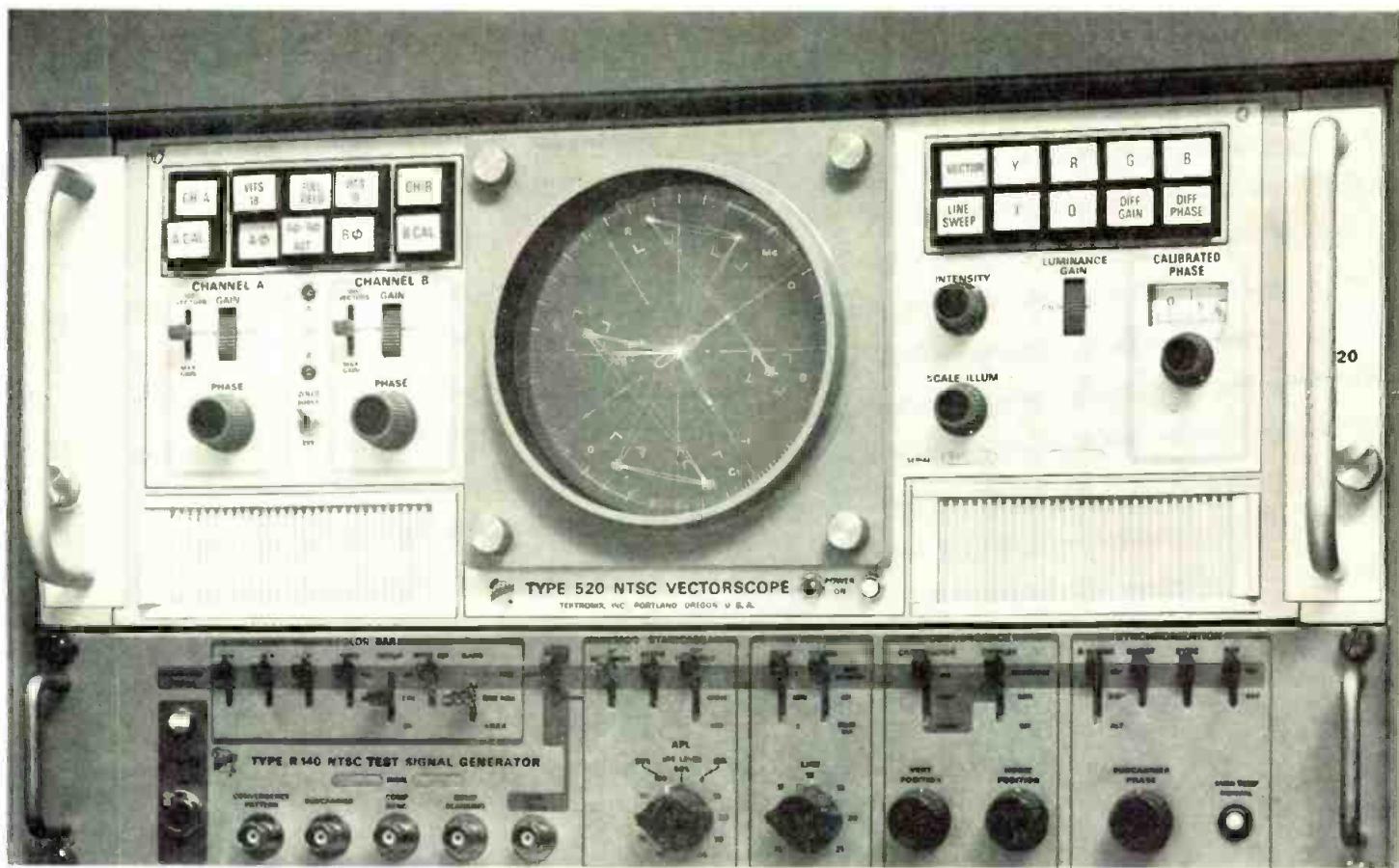
After the FCC ruled that Bucks County had to stop importing signals of four independent TV stations in New York City, the cable operator argued it could not survive without the stations (WNEW-TV, WOR-TV, WPIX and WNDT). So now the FCC has authorized Bucks County to resume carriage of the signals. Just one condition: Bucks has to act as trial runner for the Commission's distant-signal importation rule-making proposal—and thus must substitute local TV station advertising for ads on the imported signal.

Automated switching might do the job. A Bucks County spokesman reported investigating other techniques as well. But whatever the cable tries, it will probably be going it alone. The FCC says it doesn't contemplate granting this "unique" authorization to any one else. And there might not be many cable operations desperate enough to join Bucks County in its pioneering effort.

Forum covers B'caster legal and business problems

The business and legal problems of television and radio are being discussed and answers offered by a distinguished panel of broadcasters, lawyers and others (including former FCC commissioner Kenneth Cox) participating in a two-day forum co-sponsored by the NAB

Continued on page 8



convenient color signal measurements

- Advanced measurement capabilities
- Push-button operating convenience
- Dual-display inputs
- All silicon solid-state reliability. Cool, quiet operation

Excellent resolution for measuring small phase-angles is provided by a 30° precision calibrated phase shifter where 1 inch of dial movement represents approximately 1° of phase shift. Differential gain and differential phase measurements are made with accuracies within 1% for gain and 0.2° for phase. A unique graticule switching arrangement provides automatic selection of an IRE graticule or an illuminated parallax-free vector graticule. The selection occurs at the same time the operating mode is established.

The Type 520 Vectorscope provides the ability to check equipment performance during regular programming times through the utilization of Vertical Interval Test Signals. A digital line selector permits positive selection of Vertical Interval Test Signals from lines 7 through 21 of either field 1 or field 2.

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

Type 520 NTSC Vectorscope \$2500
 Rackmount Type R520 Vectorscope \$2550
 U.S. Sales Prices, FOB Beaverton, Oregon

Available in U.S. through the Tektronix lease plan



TEKTRONIX®

*committed to
technical excellence*

The **Tektronix Type 520 NTSC Vectorscope** provides new operator convenience, advanced measurement capability and silicon solid-state reliability. Push-button operating controls permit rapid selection of displays for quick analysis of color signal characteristics. A luminance channel separates the luminance (Y) component of composite color signals for display at a line rate. Combining the Y component with the chrominance demodulator outputs provides displays of the Red (R), Green (G), and Blue (B) values, revealing luminance to chrominance amplitude and delay errors if present. Line Rate displays of chrominance demodulated along the I or Q axis are provided for checking encoder performance.

Phase and amplitude accuracy of the vector presentation is verified by internally generated test signals. Errors in color encoding, video tape recording or transmission processes are readily apparent and are easily measured. Separate 0° to 360° phase shifters provide independent phase control of channel A and B displays.

Circle 103 on Reader Service Card

and the Practicing Law Institute.

The first program was held February 26 and 27 in New York City's Barbizon Plaza Hotel. The agenda covered speeches and discussions of such topics as the ways and means of buying and expanding in the broadcasting industry; acceptability of broadcast material; commercials; news operations and "Waves of the Future."

Registration is still open for the second running of this forum to be held March 26-27, Water Tower Hyatt House, Chicago, Illinois. Cost: \$125. Write Ruth Druss, Practicing Law Institute, 1133 Avenue of the Americas, New York.

IN BRIEF . . .

The first regular broadcast of Electro-Voice's compatible four-channel stereo system (see *BM/E*, February 1971, page 16) was heard in New England January 23. WJIB(FM) Boston played 30 minutes of four-channel music, encoded into two for broadcast, received by listeners as compatible two-channel or mono—although selected receivers in the New England area were equipped to decode back to four channels. E-V has shipped encoding equipment to WCRB-FM Boston, WASH(FM) Washington, D.C., KSL-FM Salt Lake City, KSAN(FM) San Francisco, WNEW-FM New York, and WDHA(FM) Dover, N.J. E-V has also added classical record specialist Gold Crest to the list (now there are three) of labels producing four-channel encoded discs.

NAB activities: The TV board has amended **TV code time standards**, reducing from 10 to 9.5 minutes per hour the amount of non-program material which may be broadcast during prime time. The actual period to be designated "prime time" may be specified by individual stations as any consecutive 3.5 hours between 6 pm and midnight, an increase of a half hour from the old prime time period. No more than four non-program announcements are permitted within programs, no more than three during station breaks. Details include the exemption of 30-minute news programs from the prime-time limitations; credits over 30 seconds (except in feature films) will be counted as non-program material, a maximum of 40 seconds being allowable. The new restrictions go into effect October 1, 1971. NAB members are not required to adhere to the TV code—although the TV Code Review

Board did offer an unsuccessful recommendation making such adherence a condition of membership in the NAB. Other activities:

- The NAB Board of Directors approved a **1971-72 fiscal year budget**, starting April 1, of \$3,369,000.
- The Board ordered an investigation "to see what can be done to eliminate discrimination under Federal Law which prohibits radio and television stations from advertising government-sponsored lotteries," while other media are allowed to advertise the events.
- Board chairman Willard E. Walbridge urged action toward three goals: **Increase the license period** from three to seven years—to correspond with FCC commissioners' terms; **reverse the Red Lion decision restrictions** requiring only the broadcast media to answer to the government for its decisions as to what views to present on controversial issues; **establish property rights** in the broadcast signal.

NAEB activities: A scholarship plan has been established enabling minority-group broadcasters to attend forthcoming NAEB professional development seminars. Eligibility: You must be an NAEB member, employed full-time by a member institution, and capable of successfully completing the course.

Schedule of NAEB Programs

Supervisory Management

New Orleans: April 2-5
San Francisco: April 12-15

Instructional Design:

Lincoln, Neb.: March 7-12
San Antonio: March 14-19
Des Moines: March 28-April 2
Sacramento: April 18-23
Lincoln, Neb.: April 25-30

Helical-Scan VTRs

San Francisco: April 12-15

NAEB reports heavy subscription for these programs and space is limited. At press time, six tuition scholarships had been awarded.

Direct application letters to the Office of Minority Affairs, NAEB, 1346 Connecticut Avenue N.W., Washington, D.C. 20036. Include in the letter reasons your institution is applying for scholarship aid, and background information on your professional involvement at the institution. . . . HEW has announced it will spend the full \$11 million appropriation made for the Educational Broadcasting Facilities Program in fiscal 1971—which will

get the ball rolling on many of the 140 projects public broadcasters have proposed to HEW for the year.

New services: "Boating Tips" and "Miracle Gardening Tips" are two recorded radio series available this spring and summer from Alan Sands Productions, New York syndicator of radio programs. Each series contains 260 45-second features. . . . "The nation's first country and western radio library" is available from Memphis's Pepper & Tanner, Inc., a broadcast service supplier. On 27 12-inch discs, the library includes "more than 830 individual productions with more than 90 country and western backgrounds and 454 authentic sound effects," supplemented by 30 new productions per month. . . . Complete engineering, facility planning and operational consulting services for commercial broadcast, CATV and educational/public broadcasting are available from former Metromedia v-p Malcolm Burleson's Burleson Associates, Washington, D.C.

Financial reports show CBC net income up to \$7,636,568. \$1.32 per share, in 1970, from 1969's \$7,101,864. \$1.23 per share. CBC president J. Leonard Reinsch credited the increased earnings to improvements in all nonbroadcasting divisions, reduction in surtax, and sale of an unprofitable TV syndication operation. . . . Record sales and earnings in 1970 jumped Communications Properties' net income from \$382,765 in 1969 to last year's \$671,596, earnings per share going from \$.12 to \$.26. . . . Hewlett-Packard's 1970 totals showed a lowering of net income from 1969's \$25,585,000 to \$23,103,000 (or \$1.01 a share down to \$.90).

Recent acquisitions include the purchase of Jerrold's 50% interest in Florida TV Cable, Inc., by American Television & Communications Corp., making the 23,000-subscriber Florida systems wholly owned subsidiaries of ATC. With this \$4 million purchase, ATC now claims 156,000 subscribers for its wholly owned systems. Another wholly owned subsidiary, Southwestern Microwave Co., has just purchased the microwave communications system formerly owned by Florida Cablevision Corp.—thus making ATC's entry into the microwave transmission field; the system runs signals from Miami to Vero Beach and Fort Pierce, Fla. . . . Microwave Associates bought all microwave component lines from SCM Melabs, including company's Land Mobile Components group.

DITCH WITCH '71... THE NEW V30C "COMBO"

**Revolutionary design
performs
five operations
without changing
attachments**



THE NEW DITCH WITCH V30C "COMBO" will trench, backfill, backhoe, do vibratory plowing and horizontal boring operations without changing attachments! You have the capability of all five operations with one basic machine. No other trencher on the market can offer all these combined features. Digging chain and vibratory plow are mounted at the rear of the machine; backhoe, backfill blade and boring unit are mounted at the front. The operator instantly can select the required job function. This 30-HP model offers all this, plus the proven Ditch Witch design advantages of hydraulic travel speed independent of mechanically-selective digging chain speeds, four-wheel drive, directional power steering and unmatched operator convenience and safety. Trench to depths of 42" at 6" widths; plow in material to diameters of 1½" to depths of 24".



**The
Professionals**

A Division of Charles Machine Works, Inc.

100 Ash Street, Perry, Oklahoma 73077

Circle 104 on Reader Service Card.

INTERPRETING THE **FCC** RULES & REGULATIONS

CATV Program Origination—New Developments

On October 24, 1969, the Commission released its *First Report and Order* in Docket 18397¹ concerning required program origination by CATV systems. The initial rules have now been modified by a *Memorandum Opinion and Order* dated July 1, 1970² and, most recently, a *Memorandum Opinion and Order*, dated January 25, 1971³. While certain CATV systems must still begin local program origination, the rules have been changed regarding which systems will be affected.

First Report and Order

In its *First Report and Order*, the Commission declared that CATV program origination is in the public interest and should be encouraged. The Commission also decided that the public interest would be served by encouraging CATV systems to operate as Common Carriers on some channels. This would afford an outlet for others to present programs of their own choosing, free from any control by the CATV operator as to content (except as required by Rule or law). Also CATV would provide other communications services. Specific rules in this area were not formulated, however.

All CATV operators recognize cable technology's great potential, but the Commission's avowals are directed instead at TV broadcasting's long-established goals. These goals the FCC is attempting to further by increasing the number of outlets for community self-expression, as well as augmenting the public's choices of programs and types of services. Moreover, the Commission is seeking to promote new national and regional television networks, and intends to actively explore this possibility for CATV.

As a first step towards its announced goals, the Commission, in its *First Report and Order*, declared that all CATV systems with 3500 or more subscribers must, by January 1, 1971, "operate to a significant extent as a local outlet by cablecasting," and must have available facilities for local production and presentation of programs other than automated services. To enforce the provision, the Commission said that CATV systems could not carry broadcast signals from regular television stations unless they provided local program origination.

Obvious questions arose concerning what was

meant by the phrase "to operate to a significant extent as a local outlet" by originating programs. The Commission replied: "By significant extent we mean something more than the origination of automated services (such as time and weather, news ticker, stock ticker, etc.) and aural services (such as music and announcements)."

In essence "operation to a significant extent as a local outlet" necessitates that the CATV operator have some type of video cablecasting equipment for the production of local-live and delayed programming (camera, VTR, and the like). However, the Commission specifically refrained from instituting regulations relating to hours of origination, categories of programming, types of cablecasting equipment, and technical standards.

Additionally, the Commission declared that rules—analogous to (1) Section 315 of the Communications Act concerning broadcasts by candidates for public office, (2) Section 317 of the Communications Act concerning announcement of sponsored programs and (3) rules for broadcasters relating to making time available for the discussion of conflicting views of public importance,—would be adopted for CATV systems. These lengthy rules need not be discussed herein; however, attention is directed to Sections 74.1113, 74.1115, 74.1117, and 74.1119 of the Commission's CATV Rules. *All these provisions are currently in effect.*

In its *First Report and Order*, therefore, the Commission expressed its desire to make full use of CATV systems and expand their role in serving the public interest; local program origination requirements were a paramount consideration.

July 1970 Order

Following release of the *First Report and Order*, numerous petitions were filed with the Commission seeking reconsideration of its action.

After analyzing the many petitions, the Commission ordered that the time for requiring initiation of local CATV program origination *would be extended until April 1, 1971*. The rule was still in effect that all systems with 3500 or more subscribers would be required to begin such origination.

Through these petitions, an important development came to the Commission's attention: Some cable operators were found to be simply leasing the origination channel to a local radio station, which, in turn, presented its disc jockey shows over

1. 20 FCC 2d 201.

2. 23 FCC 2d 825.

3. — FCC 2d —, FCC 71-78.

**now...
a company
that has AM, FM
and TV frequency
and modulation
monitoring
systems.**



Now... Belar. Belar is the only company that has the necessary type approvals on all three monitoring systems. Belar accuracy permits use of the maximum power allowable and maximum power means maximum profit. Add to this that all Belar equipment is immediately available.

Isn't it time you stopped running around and finally settled for a company that can handle *all* your frequency and modulation monitoring needs? Contact Arno Meyer... he'll show you the way.

See this equipment, plus some startling new ideas, at NAB Booth #205—West Exhibit Hall. You won't be sorry.



BELAR

BELAR ELECTRONICS LABORATORY, INC., DEPT. BM-31
BOX 83, UPPER DARBY, PA. 19084 • (215) 789-0550

Circle 105 on Reader Service Card

the channel for virtually the entire broadcast day. The Commission, in eliminating such leasing arrangements, declared that "a most important contribution to the public interest is the existence of available facilities for local production and presentation of programs." This meant, for example, that a mayor or local political candidates, or others willing to discuss controversial issues, would have a means of access to the television viewer. Noting that the leasing of the origination channel to another source frustrated this avowed purpose, the Commission amended the Rules to make it clear that CATV systems could not enter into any arrangement which would inhibit or prevent "the substantial use of the cable facilities for local programming designed to inform the public on issues of public importance."

January 1971 Order

On January 25, 1971, the Commission released another *Memorandum Opinion and Order* in Docket 18397.

In its *Order*, the Commission noted that Midwest Video Corporation, an operator of various CATV systems, had (1) filed a Petition For Review of the rules adopted in Docket 18397 with the United States Court of Appeals for the Eighth Circuit, and (2) subsequently filed with the Commission a Motion for Stay of the effective date of April 1, 1971 for beginning local CATV program originations. The Commission denied Midwest's Motion and ruled, in essence, that the allegations contained in the Motion were not substantial.

However, the Commission did note that re-

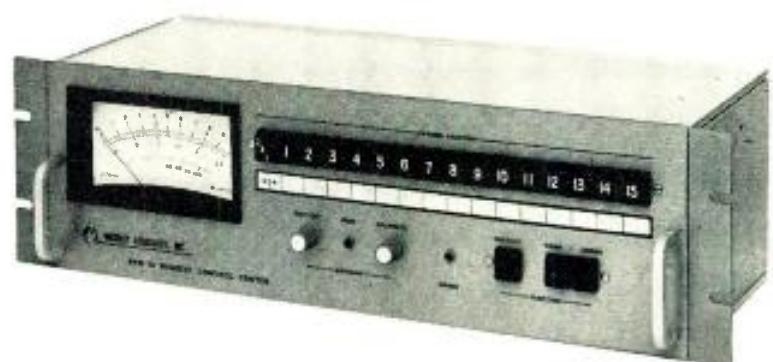
quests had been filed by the California Community Television Association and the National Cable Television Association requesting that rule-making be inaugurated to increase the minimum subscriber number from 3500 to 10,000. The Commission declined to initiate such rule-making proceedings and stated that adequate showings to support these requests had not been made. But the Commission did rule that "we see no public benefit in risking injury to CATV systems in providing local origination. Accordingly, if CATV operators with fewer than 10,000 subscribers request [on a case-by-case basis] waiver of . . . the Rules, they will not be required to originate pending action on their waiver requests." The Commission also declared that CATV systems with more than 10,000 subscribers may also request waivers, but they will not be excused from compliance with the rules unless the requested waiver is specifically granted.

For those systems planning to request appropriate waivers, the following guidelines have been set forth by the FCC:

Waiver requests must contain sufficient information for the Commission to judge the net effect of program origination cost on the ability of the CATV system to serve its subscribers. This must include at least (a) complete financial operating statements for each of the last 3 years including separate cost entries for all major expenses (such as depreciation, labor, interest, taxes, etc.) and identification of the amount included as expenses but paid to principals, (b) a description of the depreciation periods and computation method, (c) a company balance sheet as of the beginning of the 3 years, (d) average number of subscribers connected to the system and homes passed by the

NAB '71 AND

MOSELEY ASSOCIATES



A startling new 15-channel, push-button remote control system that's field-convertible to DC line voice-grade line, or total wireless operation — the PBR-15A — will be on display. Additionally, the AMR-1 off-air AM Modulation Monitor,

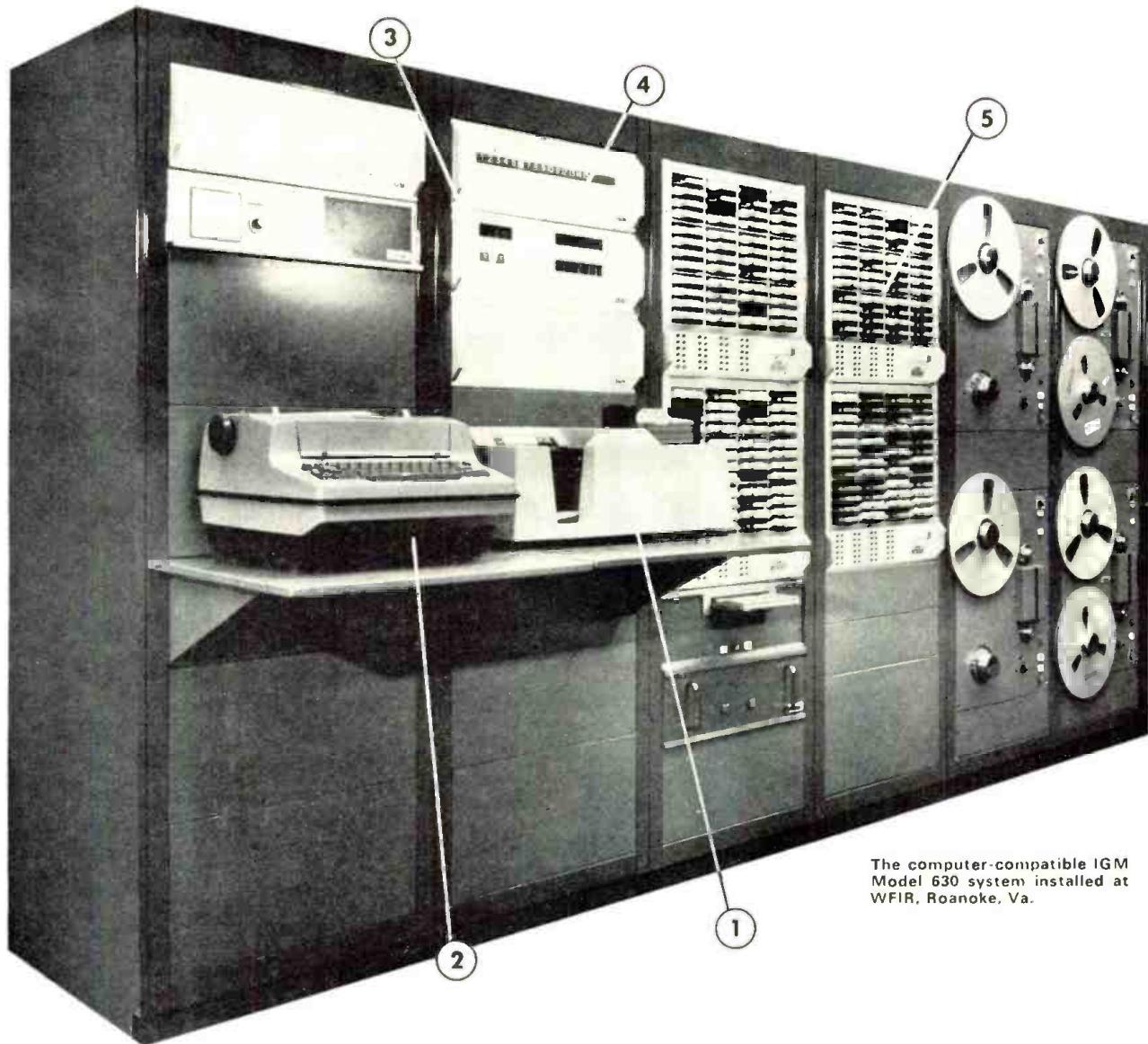
ADP-220 Automatic Data Printer, all solid-state RPL-2 Remote Pickup Link, and other major products will be available for your inspection in the West Hall, Booth 224. If you will not be attending the convention, write for details on the PBR-15A.



MOSELEY ASSOCIATES, INC.
SANTA BARBARA RESEARCH PARK

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

Circle 106 on Reader Service Card



The computer-compatible IGM Model 630 system installed at WFIR, Roanoke, Va.

Six features that put IGM Series 600 automation systems out in front:

1. Control by punched cards, for unequalled simplicity and reliability.

2. Automatic production of a complete FCC log, including a verification code from the source itself as it is switched on the air.

3. Real time capability to smoothly join net, to fade, switch and mix audio, and to actuate transmitters or other equipment.

4. Control of up to 960 inputs. If needed or desired, the system has the capacity to schedule a virtually

unlimited variety and number of program events, without repetition.

5. Use with IGM Instacarts, as shown, provides instant random access to each of the 48 cartridges in each Instacart. No waiting for the system to cue up the right spot or feature.

6. Manual addressing from a 10-key keyboard for last-minute changes. Full remote control allows live participation to any degree desired.



In short, IGM Series 600 systems are special purpose computers designed expressly for radio, and fully compatible with computerized accounting and billing.

For "tomorrow's engineering today" in automation equipment,
write or call International Good Music, P. O. Box 943,
Bellingham, Wa. Tel. (206) 733-4567.

Circle 109 on Reader Service Card

IGM

TELEVISION

- SWITCHING SYSTEMS
- AUTOMATION SYSTEMS
- VTR EDITING SYSTEMS

PRECISION CRAFTED

BY

CENTRAL DYNAMICS

SEE THESE SYSTEMS

AT **NAB**

- THE NEW PEC-102
VTR EDITING SYSTEM
FEATURING:
CRT EDITING DISPLAY
MINI COMPUTER CONTROL
SMPTE TIME CODE
- THE NEW VSP-850
PRODUCTION SWITCHER
FEATURING:
TWO MIX/EFF AMPLIFIERS
P/V KEY BUS
32 WIPES
- THE VSP-860 PRODUCTION
SWITCHER
- THE VSP-830 MASTER
CONTROL SWITCHER
- WARD-BECK AUDIO SYSTEMS
- MARCONI TEST EQUIPMENT

AT BOOTH 103

(VSP-860 AT PHILIPS BOOTH 327)



CENTRAL DYNAMICS

POINTE CLAIRE, MONTREAL 730, QUEBEC.
NORTHVALE, NEW JERSEY, 07647.

Circle 107 on Reader Service Card

system during each of the last 3 years, (e) plans for future expansion of the cable miles in the franchised area, and (f) estimated capital and operating costs for program origination. The waiver request should also include any other data which appear to be relevant, but the financial showing will be heavily relied upon in determining whether the waiver application will be granted.

Conclusion

The present rules requiring certain CATV systems to begin local program origination are as follows: (1) All CATV systems with over 3500 subscribers must begin local program origination not later than April 1, 1971. However, (2) all systems with *under* 10,000 subscribers may, if they so desire, petition the Commission for waiver of the program-origination Rules on an individual basis. These Petitions must, of course, contain sufficient data to support such a request. (3) If such a waiver is requested (by systems with under 10,000 subscribers) *the CATV operator will not be required to originate programs pending Commission action on the waiver request.* (4) Systems with over 10,000 subscribers may similarly request waivers, but these systems will not be excused from compliance *unless such waiver is actually granted.* That is, even if a waiver request is filed, local program origination must be implemented not later than April 1, 1971, pending action on the waiver request. (5) All of the other rules relating to broadcasts by candidates for public office, announcement of sponsored programs, lotteries, discussion of controversial issues, and the like, as outlined above, are still in effect and must be adhered to by all operators originating local CATV programming.

Finally, it should also be noted that the Commission has instituted an inquiry into the possibility of requiring CATV program-origination operators to maintain *standardized program logs*, similar to those now in use by all broadcasters. It is likely that some rules will be promulgated in this area in the not too distant future.

Obviously, your counsel should be consulted regarding your special problems in the important area of CATV program origination. **BM/E**

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

(Advertisement)

**Want to free
your VTR's for more
teleproduction?**

See page 26.

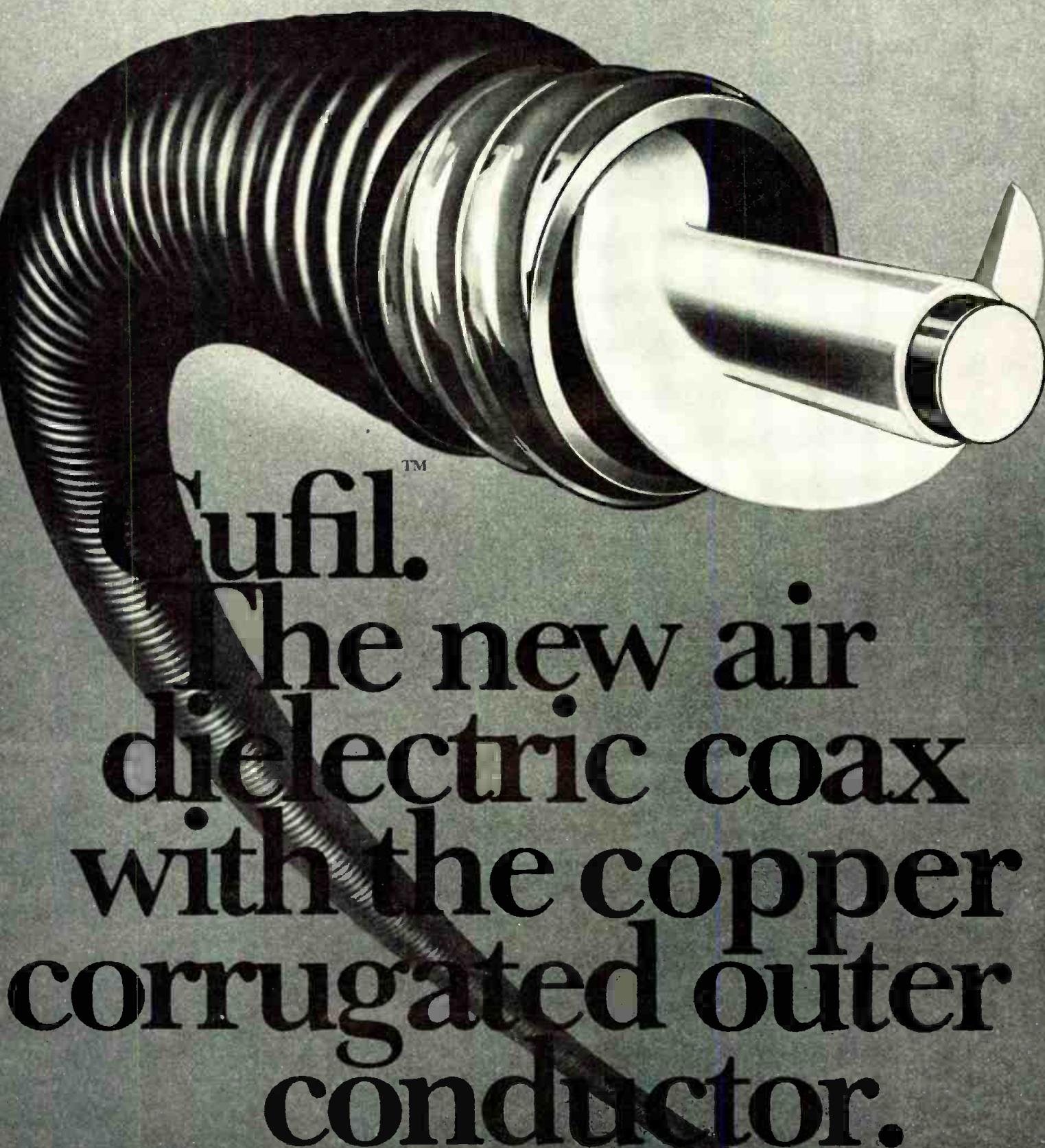
Ideal for sampling lines, low loss RF systems, medium power HF, AM and FM antenna installations, high power RF services or microwave applications. We have the size to fit the work to be done.

New Cufil offers a solid polyethylene, noncollapsible helix completely covering the center conductor. The outer conductor is a corrugated copper tube. This means great mechanical stability, strength and extreme flexibility. Very

easy to install in non-interrupted transmitter-to-antenna one-piece lengths, attenuation is low, velocity of propagation extremely high. Matching connectors? Of course.

May we send you all the details? Just write: Phelps Dodge Communications Company, 60 Dodge Avenue, North Haven, Connecticut 06473.

**phelps
dodge**
Communications Company



CONVENTION

LOG

Broadcasters Considering Helical Scan VTRs, Automatic Color Correction

SMPTE Winter Television Conference
Surveys Recent Developments



Werner H. Ruhl, conference chairman, beams: Conference was a success.

In many respects, the 1971 SMPTE winter conference was a preview of what will be seen at the 1971 NAB Convention. This year's winter conference dropped its panel of technical commentators, who generally discussed field problems, in favor of more individual presentations of things recently accomplished—and soon to be.

Add to this conference fare a plant visit to Ampex, and you end up with a sneak preview of what will be touted heavily at the NAB exhibit later this month, March 28-30, at the Conrad Hilton in Chicago.

Among the recent or brand-new products discussed at the winter meet that will be seen at NAB are:

- An automatic color corrector from Ampex to produce balanced color programs and commercials regardless of source.
- An extended bandwidth color corrector for video-disc recorders from Data Memory, Inc.
- A helical recorder with excellent time-base stability from IVC.
- A processing system from Grass Valley for helical scan recorders to provide sync and fill in dropouts.

A big stir was made at last year's NAB with Ampex's introduction of a high-speed tape duplicator (quad)

and an automated quad cassette player. Ampex showed a production version of the duplicator during its plant visit and an art rendering of what its production version of the video cassette player will look like. An overview paper by Charles Crum of Ampex said the two products together represent a breakthrough in the mass distribution and playing of videotape.

Conferees received a glowing account of how RCA's video cartridge recorder is working for WDCA-TV from Paul Weber of the Washington, D.C., station. Weber said the introduction of the cartridge player changed station procedures in many ways, all of which were positive. He said the traffic department in particular was able to put more elements into the commercial segment than ever before because the cartridge machine provided increased production capacity and smoother switching. Far greater use of existing tape recorders is achieved, Weber said, because the recorders are available during the day for production of commercials and spots.

It didn't come up publicly at the Winter Meeting, but a question foremost in the minds of many engineers is standardization or lack of it in the video cartridge/cassette field. Some chief engineers have flatly said they'll buy neither RCA nor Ampex until some standards on compatibility are set. We did get a statement from Ampex's Howard Townsend on the subject. "Since NAB of 1970 we've actively participated in several meetings of the SMPTE subcommittee for tape and reels on the subject of standardized forms for spools and tape leaders for use in broadcast cassette recorder/reproducers. I am hopeful that we will achieve early agreement on an industry-wide standard for tape leaders and removable

spools in the interest of total interchangeability for commercial distribution."

Helical VTRs assume new importance

The 1971 winter conference marked the first time the helical scan VTR was seriously discussed as a piece of broadcast equipment. This is primarily because of advances made in the area of time-base stability. Keith Reynolds of IVC described his company's system which offers a color time-base corrector which will correct the time base of an IVC 900 VTR to ± 7 nanoseconds. Jitter is reduced in two steps: Monochrome corrector (IVC-4100) holds the time base to ± 75 microseconds and an add-on color corrector (IVC-4102) goes down to the nanosecond figure.

IVC rented a nearby suite of rooms to demonstrate how the equipment did reduce jitter. Mixing, dubbing, and split screen presentations were shown. The company reports that several broadcasters have purchased the system (first shown at NAEF last fall but not yet produced) and will use it for on-the-air broadcasting. Stability permits intermixing of both quad and helical programming.

Some of the problems in achieving high time-base stability were discussed by Delmar Johnson of Ampex. Johnson cited the following: Temperature variation of 50°F leads to $7.5 \mu\text{sec}$ variation on playback; a relative humidity change of 50% equals $9 \mu\text{sec}$ errors; scanner diameter tolerance variations contribute $1 \mu\text{sec}$ or more; tape shrinkage during storage, 1 to $3 \mu\text{sec}$ (and $10 \mu\text{sec}$ at 140°F); tape tension variables, $1 \mu\text{sec}$ phase error.

New tape tension control sys-



Michael T. Fisher, ABC, called for a systems approach to color balance for television.



Helical-scan VTRs that meet broadcasters' standards. IVC announced purchasers: KRCR-TV Redding, Calif., KOBI-TV Medford, Ore., WVIZ-TV Cleveland, WBNB-TV, St. Thomas, Virgin Islands.

tems in the latest helical scan VTRs reduce or compensate for these changes, Johnson said. Johnson did not comment on time-base corrector units per se, but told *BM/E* that the industry could expect shortly to buy a TBS stability system for the new Ampex VPR 7800-7900 line that would equal or better the specs offered by IVC.

To compensate for head dropout or lack of standard sync and blanking information from the general industrial type VTR, Robert L. Cobler of Grass Valley described a new processing system introduced last November at the NAEB Convention.

The Grass Valley design incorporates two modules: A genlocked sync generator provides sync blanking and other pulses necessary for operation of the system; and the processing module performs various correction functions. Genlock is possible with discontinuous input signals by incorporating an inhibiting pulse to hold off the AFC circuit during head dropout. A sample-and-hold type AFC system is used in the sync generator with the inhibit pulse acting to retain the last sample until the end of the inhibit intervals. The processor gates through color burst rather than regenerating it.

Giant efforts to improve telecine reported

In 1968 and 1969 the TV Winter Conference talked despairingly about the wide variation in color film for telecine. In 1971 the tenor of the papers on color telecine was upbeat. Michael T. Fisher, ABC New York, urged a total new system approach to film correction to avoid costly color print correction in the film lab and costly "painting" of the telecine at the broadcast station.

With available state-of-the-art equipment, he feels film labs could analyze color corrections that should be made for telecine reproduction and introduce a coding onto the film that would automati-

cally adjust the telecine whenever a frame requiring a change was projected. Thus no expensive broadcaster previewing would be necessary.

An encoding system that would work has already been perfected by CBS Labs (See *BM/E*, Color Correction Model 500, March 1970, page 23). All that remains to be done is to work out some automatic control and interface problems. Fisher feels that with just a little more manufacturer-broadcaster-lab processor cooperation, this could come about.

A step in this direction was shown by Ampex in the form of its new programmed color corrector, the ACC-1, which enters desired color correction into a memory system. An operator views the program material (film or tape) and decides on a correction that should be made. This correction setting is entered in the memory. Up to 32 different correction factors could be entered and Norm Boroski of Ampex feels this many different kinds of scene changes are more than adequate for most program segments. The Ampex automated unit incorporates the CBS Labs color correction device.

A general raising of the level of consciousness about color quality problems on the part of station operators has occurred this last year through the efforts of Eastman Kodak. The company has made calls on all broadcasters and has urged that they standardize on setting color monitors to D6500. They further urged that one color monitor be established as the master unit and that others be set to match it by using Colorgard or Minolta transfer instruments.

Eastman Kodak feels it is essential to establish one color monitor as the master (many stations had not done this) and to adopt a standardized procedure for adjusting this monitor. A standard reference for Illuminant D is needed—Eastman-Kodak used either the IRT (Hellige) or Macbeth light source for this purpose. Because

D6500 "white" looks pinkish, Eastman said a Kliegl filter could be put over the CRT to make it look white.

To help in setting up camera tubes for proper gray scale tracking and gamma correction, Eastman has delivered to the industry a new gray-scale slide, Eastman 285, made of Inconel. This slide is extremely stable and thus gives the broadcaster a standard that can be used for good telecine alignment and adjustment.

Other developments

Improvements in VTR time-base stability have not been limited to the helical scan area. Both Ampex and RCA gave papers on improvements in time-base stability for quad machines which make possible rapid synchronization (full color pictures at the touch of the button—no pre-roll). These improvements, which use digital control techniques, permit easier assembly of varying program material.

In the tape duplicating area, William Hendershot described the dynamic thermal transfer contact duplication process developed by Memorex. Hendershot reported he had formed a new company, Consolidated Video Systems, to manufacture a high-speed thermal duplicator for helical-scan formats. Chromium dioxide tape is used as the master.

Three papers at the Winter Conference were portents of keen future interest in one-tube color cameras. Messrs. Albert Mackovski and Louis Schafer of Stanford discussed color encoding produced by colored optical gratings and two-dimensional spatial filters that would electrically extract the separate signals.

A paper submitted by Nippon Columbia Co., Japan, discussed a new color vidicon that included an integral strip (grating) filter and a spatial frequency-limiting quartz filter that cuts down spurious color signal pickup. The electrode used was transparent indium oxide. This tube will reportedly work in 30 fc of light. (See page 6). In early February, Sony Corp announced a single-tube color camera that would be priced at \$1000. Sony spokesmen implied that they, too, had evolved a high-resolution, integrated optical system consisting of a grating, vidicon tube, and electrical filters that would cost as little as \$500 in large-volume productions.

BM/E

Hey- look at the new industry leader in tape systems

TAPE-ATHON

STUDIO RECORDERS/REPRODUCERS
 14" TAPE SYSTEMS
 LOGGERS
 CATV MUSIC/SPOT EQUIPMENT
 CHIMES SYSTEMS
 AUTOMATION INSTALLATIONS
 BACKGROUND MUSIC PLAYERS
 COMMERCIAL WIRE MUSIC SYSTEMS
 S.C.A. BROADCASTING EQUIPMENT

All of a sudden one day we looked up at that list and said, "We're an industry leader".

Starting with background music transports 15 years ago, Tape-Athon's product lines, quality and reputation have expanded to a point of prominent position in the field. Our equipment is in use at over 10,000 locations, ranging from a private physician's office, through radio and CATV stations all the way up to household names

such as Disneyland, Cape Kennedy, and General Motors.

This acceptance is not just a function of time. It has taken better design, lower cost, and a dependable product to place Tape-Athon where it is today. Write for our new literature file 371 that presents a more detailed description of the tape systems shown below, and our extensive sale/lease music library.

Tape-Athon Corp.

502 S. Isis Ave., Inglewood, Calif. 90301 • (213) 776-6933



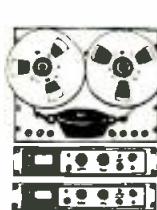
Programmer and
Librarian systems for
commercial wire and
SCA broadcasting.



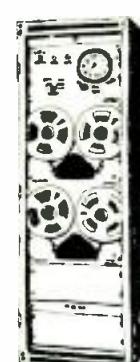
The Channel Caster, a
music/announcement
system for CATV
distribution.



Background Music
equipment in portable,
rack, or console
configurations.



Professional
recorders/
reproducers, the 900
and 1000. The 1400
14" recorder/
reproducer, and the
multi-channel
LOGGER for extended
recording.



For institutional
outdoor installations.
Tape-Athon recorded
Chimes.



The 5000 Automation
System for totally
unattended AM or FM
broadcasting.

Visit Tape-Athon at NAB Booth No. 236, West Exhibit Hall
 Circle 116 on Reader Service Card

nab '71

AUSTERITY ON THE FLOOR

Yes, Virginia, there will be exhibits at the Conrad Hilton this year. Most manufacturers are showing perfections of earlier developments (CBS labs' automatic color corrector, RCA's video cart player, etc.) but some firms are bringing out totally new developments (TeleMation's BC color studio camera, Hokushin's telecine projector). Despite the bleak economic picture, equipment companies have signed up for the show in numbers about equal to last year. We'll start with a picture of what's new and significant this year. Following this will be our rundown of the exhibits.

Color Correction—Two Approaches

At last year's NAB, CBS Labs introduced the (manual) Color Corrector which enables correction of encoded video to compensate for transmission or film errors in chroma (*BM/E*, March 1970, page 24). While useful, the Model 5500 is a manual device, requiring constant operator attention.

Big surprise at this year's NAB will be an automatic color corrector. The CBS Labs Model 6000 operates unattended, on-line, in real time, and does not have to be programmed ahead of time. While it will be useful on much programming, it should be particularly valuable on fast-breaking events such as news and sports, where rehearsal is often impossible. The Automatic Color Corrector will compensate for chroma variations between various cameras, or between film, tape, and network programs. The device was invented by Renville H. McMann, Jr., vp for engineering at CBS Labs, and Clyde W. Smith, an engineer with the Electronic Systems Dept. Price tag is under \$5000.

For those who like to roll their own, Ampex has devised a programmer for the CBS Labs manual color corrector. The new Ampex ACC-1 is

designed for use in producing corrected color tapes from tape or film sources. Program material is viewed by the operator, who enters color corrections in the ACC-1 memory. When the program material is replayed, electronic corrections are made automatically as programmed. Up to 32 scene changes



Ampex's ACC-1 Programmer

may be programmed into the random-access memory. Cost of the programmer is approximately \$25,000.

New BC color camera

From the desert labs of TeleMation comes a brand-new three-tube color camera which is expected to debut at the convention. Dubbed Chroma III, the camera is designed for either self-contained operation (it has inbuilt sync gen and NTSC encoder) using coax cable, with separate CCU, or as part of multi-camera studio system. Highlight of the new design is the elimination of operator-accessible centering and registration controls. TM says frequent setup just isn't necessary, as self-stabilizing yoke and preamp circuits make drift almost nonexistent. The operator presses two pushbuttons and presto—the camera is ready to make pictures. There are also automatic digital shading, automatic iris, and bias lights to retain color fidelity even at low light levels. Available optical assemblies are computer designed for use with vidicon, Plumbicon, or silicon-diode pickup tubes.

An Automatic Cassette-Loading Telecine Projector

Continuing the trend toward total TV automation, Hokushin Electric Works of Tokyo has recently developed a 16-mm telecine projector which handles up to eight automatic threading film cassettes, and which may be controlled by a computer. The projector will be shown at NAB by the U.S. agent, Listec Television Equipment Corp.

Originally developed for and field tested at Japan's NHK Broadcasting Corp., the Model TC-701 projector was designed to handle the

CBS Labs' Automatic Color Corrector





panic period at station break time. It holds eight cassettes, each of which may be manually loaded with up to 400 ft. of film. Cassettes may be selected for showing either sequentially or in random sequence. Total access time is approximately 19 seconds. This period is from the time when the control system receives a finish signal from one cassette, until the time the next cassette is threaded and ready for showing. Operational features:

- Instantaneous picture and sound startup. The picture is fully stabilized in less than two frames, and sound in less than half a second.
- Automatic selection of either optical or magnetic sound.
- Automatic light control: Range of 100:1 accomplished by a neutral density wedge wheel and associated servo system.
- Automatic projection lamp changeover and alarm in less than one second.
- Automatic exciter lamp changeover and alarm in less than half a second.
- Automatic lower loop reset.
- Automatic stop at any point on film less than two frames from metal foil mark on sound track edge.
- Second metal foil may be placed on sprocket hole side of film to provide pulse for external control.
- Still frame operation with full illumination.
- Fast forward and reverse, and normal speed reverse with automatic audio inhibit.
- All control functions provide visual answer back and confirmation to computer.
- Color temperature is 3200 K from a corrected 24-volt, 250-watt quartz halogen light source.
- Analytical projection is possible either frame by frame or at three frames per second.
- An optional detector senses B&W or color film, providing an appropriate control signal to the telecine camera.
- An internal nickel-cadmium battery system provides film protection if power fails. A time-delay circuit operates the pull-down claw long enough to allow the mechanism to coast to a stop.

Compact telecine chain

A new telecine chain will be shown by Rank Precision Industries. Unlike the usual crossfire telecine, Rank's Photoconductive Telecine is built on an inline format so that the projectors, multiplexer, and three-tube camera occupy a floor space of only about $6 \times 2\frac{1}{2}$ feet.

What's unusual about this new telecine is the camera, which has been designed specifically for reproducing color film, instead of simply adapting a live camera for the task. This means the camera can handle the extreme contrast ratio of film (up to 500:1). It does so with logarithmic amplifiers which are accurate over a range of 600:1, and matching exponential amplifiers. A choice of logarithmic masking is given, and joystick control of gain, lift, and gamma are available.

Another telecine problem is that initial color analysis has been made by the film and cannot be significantly improved by the video camera. Rank's camera has very narrow taking responses which lie near the peak density wavelength of each film dye. The three pickup tubes are run at currents of 300 nA, and with FET head amplifiers an unweighted S/N ratio of greater than 48 dB is achieved. This provides a matrixed luminance S/N ratio better than 50 dB.

The light-splitting system is direct imaging and narrow field, keeping flare to a minimum.

The Photoconductive Telecine is available in several versions with from one to three sources: 16-mm or 35-mm film, and a 2×2 slide changer. The changer is a dual sequential or random select model holding two magazines, each of which contains 30 slides.

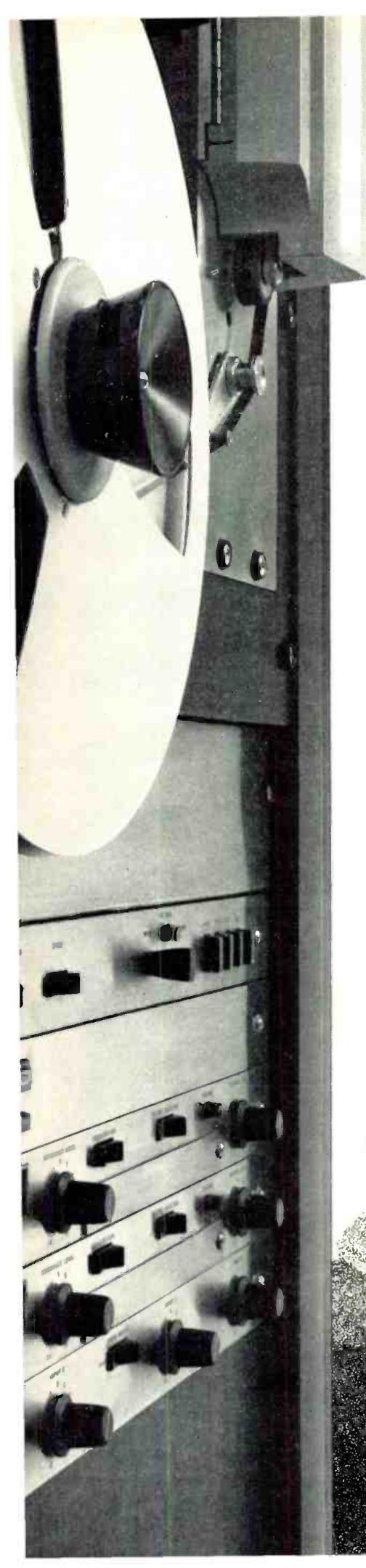
Transmitter monitors

Moseley has a new AM modulation monitor which includes a 10-kHz notch filter to eliminate adjacent-channel whistle. The AMR-1 also recovers subaudible remote-control metering information. McMartin is another company showing a new monitor—the TBM-5500 TV aural modulation monitor for VHF channels. It's a semipeak modulation percentage meter which can also measure AM and FM s/n ratio and input RF level. Critical circuits are mounted on plug-in cards accessible from rack front. Another new monitoring device is from Moseley, the Model TAU-2 Tolerance Alarm Unit which provides an out-of tolerance signal for Moseley's Automatic Data Printer. The TAU-2 can monitor base current ratios at a directional AM station using up to 11 towers.

3M Company's Mincom Division will unveil a helical VTR dropout compensator which should be of special interest to CCTV and CATV users. Another Mincom feature will be an improved version of the Chromabeam color film printer which now includes a video disc storage unit that overcomes color fringing or breakup during rapid image motion.

Tape Athon will show an updated line of audio logging recorders which use dual capstans and can record up to 400 hours on a 10.5-in. reel. In the tape cartridge field, International Tapetronics will introduce the Encore series, a lower-priced line using 450 rev/min hysteresis synchronous direct capstan motor.

IGM claims a first in its new automated time/



Put it all together with our ABR series broadcast recorders



Now you can get a tape recorder that fits the exact demands of your station. With our ABR series, the choice is yours. Install as much or as little reproducer or recorder/reproducer as you need. You'll have a broadcast recorder put together the way you want it, not the way someone else thinks it should be.

If yours is an automated station, you'll probably want a bidirectional, continuous-play, fully automatic ABR reproducer. Live... a 10-1/2 inch unidirectional recorder/reproducer. Bidirectional or unidirectional manual ABRs can be put together full-track, two-track or quarter-track. Playback only or recorder/reproducer. Speed pairs from 15/16 ips to 15 ips. And reel sizes from 5 inches to 10-1/2 or 15 inches.

From Ampex you expect more than just design flexibility. And you get it. Every ABR comes with Ampex quality and experience. Quality and experience that provide a combination of features and easy maintenance found in no other broadcast recorder.

Servo-controlled capstan motors for constant capstan speed—standard. Servo-controlled reel motors that spell exceptional through-the-reel timing accuracy (our conservative engineers specify $\pm .08\%$)—standard. "Joystick" control for fast forward/reverse tape search and cueing. Fast start/stop. Digital tape counter. An uncluttered design so neat that rack-mounted electronics and control modules are each only 1-3/4 inches high. All standard!

Put it all together with the ABRs. Contact your nearest Ampex ABR series Distributor. He's ready to help.

AMPEX

Ampex Corporation, Professional Audio Products Division
M.S. 7-13, 401 Broadway
Redwood City, California 94063

Studio
photo courtesy
of KCBS
NewsRadio 74,
San Francisco



temperature announcer. Four cartridge decks are used: one for even minutes, one for odd minutes, one for temperature (range 150°), and one for commercials.

Automation

Gates Radio will again operate a completely automated 1-kW AM station (running into a dummy load). It will be an unattended operation, with all music, news, weather, commercials, IDs, time announcements and features on tape cartridges. Event sequence will be controlled by an SP-10 programmer and a Gates Clear Text Logging System will provide a complete log automatically, in regular text, of the station's activities.



Schafer Electronics will demonstrate its PCC-8000 radio automation system, in which a single computer will operate separate AM and FM programming. A feature is CLEAR Language Verified Logging. Up to 32 characters of alphanumeric information recorded on cartridge or reel-to-reel tapes prints out to verify that the spot, ID, or other announcement was aired as scheduled. An RF interlock provides a notation if the transmitter is off the air.

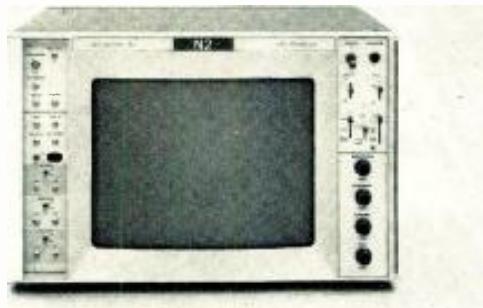
By the way, Cybrix was probably first with a clear-language logging system, and the company will demonstrate its equipment at the show. Look for it.

Color monitors

Tektronix—long a maker of waveform monitors—has at last brought out a pair of picture monitors. The Model 650 color version is an NTSC type using the 14-in. Sony Trinitron CRT, which means color setup is much simpler (only six adjustments) than for a standard shadow-mask tube. Companion Model 630 B&W monitor works on either 525 or 625-line standards, switch selected.

Rank Precision Industries will feature a new 22-in. color monitor which operates on either 525- or 625-line standards, and is available with either NTSC or PAL decoding. It has two RGB inputs with provision for loop-through of both video and sync inputs. Display capability includes red, green, blue, complete color, or monochrome. Convergence adjustments are potentiometer controls which are independent of each other for ease of setup. Remote controls are available for front-panel adjustments.

World Video has an all-new one-gun color



Tektronix Model 630 B&W monitor.

monitor, Model CB6200. It features a 12-in. rectangular picture tube, keyed back-porch clamping, improved linearity, high-voltage regulation, and A/B switchable inputs.

Tape equipment

A solution to the problem of stereo cartridge phasing is the Model 300S Stereo cart, says Marathon Broadcast Equipment Corp. The cartridge is rated at maximum L/R phase shift of $\pm 10^\circ$ at 10 kHz, thus improving stereo performance and eliminating phase dropout to mono listeners. The demonstration will include measurements and music playback in both stereo and mono.

Now that broadcasters are beginning to use cassettes (see story page 47 this issue), Nortronics will introduce a professional cassette alignment tape. The test tape incorporates a zero reference tone and a range of frequency-response tones in addition to azimuth alignment reference. As an introductory promotion, Nortronics will give away an alignment tape with each magnetic tape head order for \$150 or more. The test tape will be available separately at a show promotion special of \$30 each.

Generators

Rohde & Schwarz will show an unusual combination of video sweep generator, selective receiver, and display system known as the Type SWOF III Videoskop. The system has high selectivity and sensitivity which are achieved by a tracking, narrow bandpass filter with 2 kHz bandwidth. Dynamic range is 50 dB, and the Videoskop can make amplitude vs frequency measurements during normal on-air operation and on a continuous basis (no VIT signal). Using the inbuilt reference generator, video/video or video/RF measurements may be made on any open or closed TV link (baseband, RF, or microwave). It's also possible to make accurate sideband analysis as close as 50 kHz to the carrier.

A new VITS generator will be highlighted by Tektronix. The Type 147 NTSC Test Generator offers both full-field and VITS outputs. Full-field signals include \sin^2 pulse and bar, with internal selection of T or 2T pulse modulated 14T or 20T pulse and bar duration and T or 2T transition; linearity waveform with internal selection of 5 step, 10 step, or ramp; and multiburst. The gen-

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

CBS NEWS
New York, New York
Washington, D.C.

TELEVISIONE ITALIANA
Rome, Italy

NHK-NIPPON HOSO KYOKAI
Tokyo, Japan

EASTMAN KODAK COMPANY
Rochester, New York

ABS-CBN
Manila, Philippines

WISH
Indianapolis, Indiana

WTVM
Columbus, Georgia

KHOU
Houston, Texas

KDTV
Dallas, Texas

KVII
Amarillo, Texas

KMOX
St. Louis, Missouri

KHVN
Honolulu, Hawaii

WFGA
Jacksonville, Florida

WETA
Washington, D.C.

WTTV
Indianapolis, Indiana

WRBL
Columbus, Georgia

KCST
San Diego, California

KXTV
Sacramento, California

WKY
Oklahoma City, Oklahoma

KTVT
Fort Worth, Texas

KRGV
Weslaco, Texas

WDAM
Hattiesburg, Mississippi

WDHN
Dothan, Alabama

WTYY
Dothan, Alabama

WINK
Ft. Meyers, Florida

KLFY
Lafayette, Louisiana

WAPT
Jackson, Mississippi

WJTV
Jackson, Mississippi

WSWO
Springfield, Ohio

WLVA
Lynchburg, Virginia

KNXT
Los Angeles, California

WNDO
South Bend, Indiana

WPRI
Providence, Rhode Island

WTVC
Chattanooga, Tennessee

KJAC
Port Arthur, Texas

WCFT
Tallahassee, Florida

KCBD
Lubbock, Texas

WEAU
Eau Claire, Wisconsin

WUSN
Charleston, South Carolina

WLUC
Marquette, Michigan

KFYR
Bismarck, North Dakota

WTOK
Meridian, Mississippi

KOSA
Odessa, Texas

WJAR
Providence, Rhode Island

WHTN
Huntington, West Virginia

WRDW
Augusta, Georgia

WNCT
Greenville, North Carolina

WDAY
Fargo, North Dakota

KARD
Wichita, Kansas

WANE
Fort Wayne, Indiana

WBRZ
Baton Rouge, Louisiana

KHAS
Hastings, Nebraska

KRBC
Abilene, Texas

KATV
Little Rock, Arkansas

WPTA
Fort Wayne, Indiana

KOTV
Tulsa, Oklahoma

KTUL
Tulsa, Oklahoma

KNTV
San Jose, California

KBMT
Beaumont, Texas

KARK
Little Rock, Arkansas

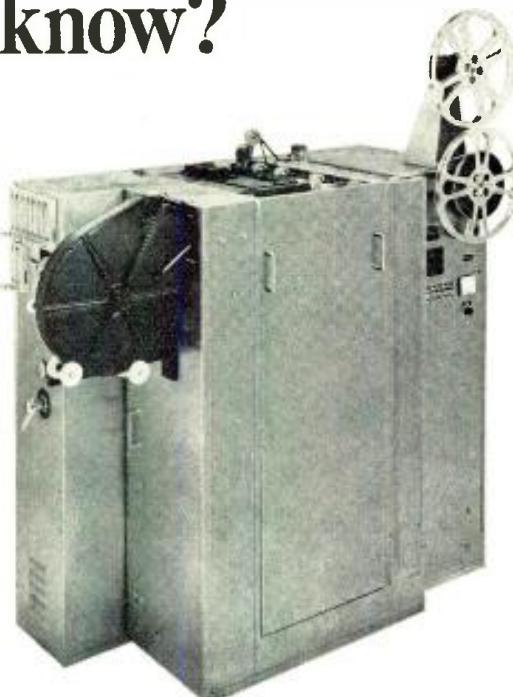
KALB
Alexandria, Louisiana

WSPA
Spartanburg, South Carolina

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

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

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



EQUIPMENT DIVISION



JAMIESON FILM COMPANY

9171 KING ARTHUR DRIVE, DALLAS, TEXAS 75247

(214) 638-2660

Circle 111 on Reader Service Card

erator also includes the new VIR chrominance signal.

Two new alphanumeric character generators will be shown by Chiron Telesystems. The Graphics I features high-resolution characters (24×20 point matrix), all-around edging, word-by-word color, and automatic centering. The Graphics II generator enables the user to design his own programmable fonts for a variety of character styles which can be mixed and programmed for immediate use. It automatically programs new characters from camera-generated video.

Television equipment

A new videotape production switcher, VS-600, will be shown by Ampex. The switcher is also a special-effects generator, and uses digital communication between the control console and the

switching electronics. By the way, Ampex is celebrating this year the 15th anniversary of the introduction of videotape recording; remember that first VR-1000 at the 1956 NAB?

CBS Labs has developed a new video display system called Vidifont. It produces alphanumeric characters for titling from several type fonts and sizes.

Sarkes Tarzian plans to unveil a new video production switching concept designed around digital logic computer techniques. It is claimed the system can produce an array of electronic transitions formerly restricted to film techniques.

General Electric's Visual Communication Products Department will feature two new color TV film cameras, update kits for earlier GE film cameras, and a complete station automation system. The exhibit will feature regular and frequent demonstrations of the new film cameras and the station automation system.

nab '71 exhibitor list

ABTO Inc. (Booth 414)

See demo of ABTOgraphy package: 16-mm film and slide cameras that color-encode B&W film, and complete telecine chain that converts coded B&W film to color. Amazing!

Circle 275 on Reader Service Card

Addressograph Multigraph Corp. (Booth 230)

Want fast copy for logs, schedules, spots, scripts, etc? Continuous Total Copy System from AM Corp. makes 150 copies per minute; does reduction copying, too.

Circle 276 on Reader Service Card

AKG Div. North American Philips Corp. (Booth 336)

Try some condenser, shotgun, and other microphones.

Circle 278 on Reader Service Card

Alford Manufacturing Co. (Booth 210)

FM-TV antennas are big here. Example: Alford designed and built new master FM system atop Chicago's John Hancock Building. Check it out.

Circle 279 on Reader Service Card

Booth numbers are keyed by halls in Conrad Hilton Hotel. 100 Series—Exhibit Hall: 200 Series—West Exhibit Hall: 300 Series—Continental Room: 400 Series—North Exhibit Hall. Our preview information was obtained from the manufacturers; some exhibitors are not listed because their booths were not confirmed at press time or they preferred to announce new products at the Convention itself.

American Electronic Labs (Booth 243)

New look in FM transmitters is Advanced Equipment Line, with first 25-kW FM model to be shown. Controls and meters are at convenient level for easy operation. Two-tube grounded-grid model has solid-state excitors, automatic power output and filament voltage control.

Circle 280 on Reader Service Card

Ampex Corp. (Normandie Lounge)

Production models of ACR-25 videotape cassette recorder and ADR-150 high-speed videotape duplicator will be demonstrated. Other goodies: AVR-1 third-generation VTR; RA-4000 automated programmer/editor; VS-600 production switcher and special-effects generator; VL-7404 video logger; helical video production recorder. You can also see UHF and VHF color TV transmitters in the vast Normandie Lounge. And new ABR series of audio recorders.

Circle 281 on Reader Service Card

Andersen Labs (Booth 112)

Video delay line, studio processing equipment are highlighted.

Circle 283 on Reader Service Card

Angenieux Corp. of America (Booth 109)

The 15x18E (f/2) zoom lens will be shown. It has focal length capability of 18-270 mm. Also see 6x9.5 high aperture (f/1.6) wide angle (68°) zoom lens, focal length 9.5-57 mm.

Circle 284 on Reader Service Card

Arriflex Corp. of America (Booth 318)

New audiotape recorder for film-sync use, Arrivox-Tandberg, will be shown, in addition to full line of

Arriflex 16-mm cameras.

Circle 285 on Reader Service Card

Ball Bros. Research Corp. (Booth 217)

See working display of color picture monitors.

Circle 286 on Reader Service Card

Bardwell & McAlister (Booth 340)

Various studio lighting equipment, including Quartz lights and dimmers.

Circle 287 on Reader Service Card

Belar Electronics Lab (Booth 205)

Inspect this dazzling display of modulation and frequency monitors for AM, FM, stereo, SCA, and TV.

Circle 289 on Reader Service Card

Berkey-Colortran Inc. (Booth 123)

Try out completely new dimmer package and control console. See new soft studio lights, Mini-Pan 20 and Maxi-Brute 4 and 6. Get in the spotlight here.

Circle 291 on Reader Service Card

Bird Electronic Corp. (Booth 323)

See new 3-in-1 VSWR meter with dual-element movement which displays simultaneously forward and reverse power and VSWR. Range 10-5000 W from 2-1000 MHz in discrete bands. Ingenious!

Circle 292 on Reader Service Card

Borg-Warner Corp.

Ingersoll Prods. Div. (Booth 219)

On display will be Emcor line of custom and off-the-shelf cabinets, consoles, racks, and similar equipment housings.

Circle 293 on Reader Service Card

Robert Bosch Corp. (Fernseh GmbH)

(Booth 306A)

A first at the show—the Fernseh TV

The Conrac Model DZA is not just new. It's the best monitor there is or ever was. All solid state. Quick disconnect boards, interchangeable from model to model. A test instrument with a cabinet full of features. Dual matched switchable inputs to make picture comparison possible. Designed for UL approval.

Excellent stability. Keyed back porch clamp. Pulse cross. 12" or 14" kinescopes. See it. Try it. Buy it. NAB booth 107. Conrac Corporation. 600 N. Rimstage Ave. Covina, Calif. 91722. (213) 966-3511.

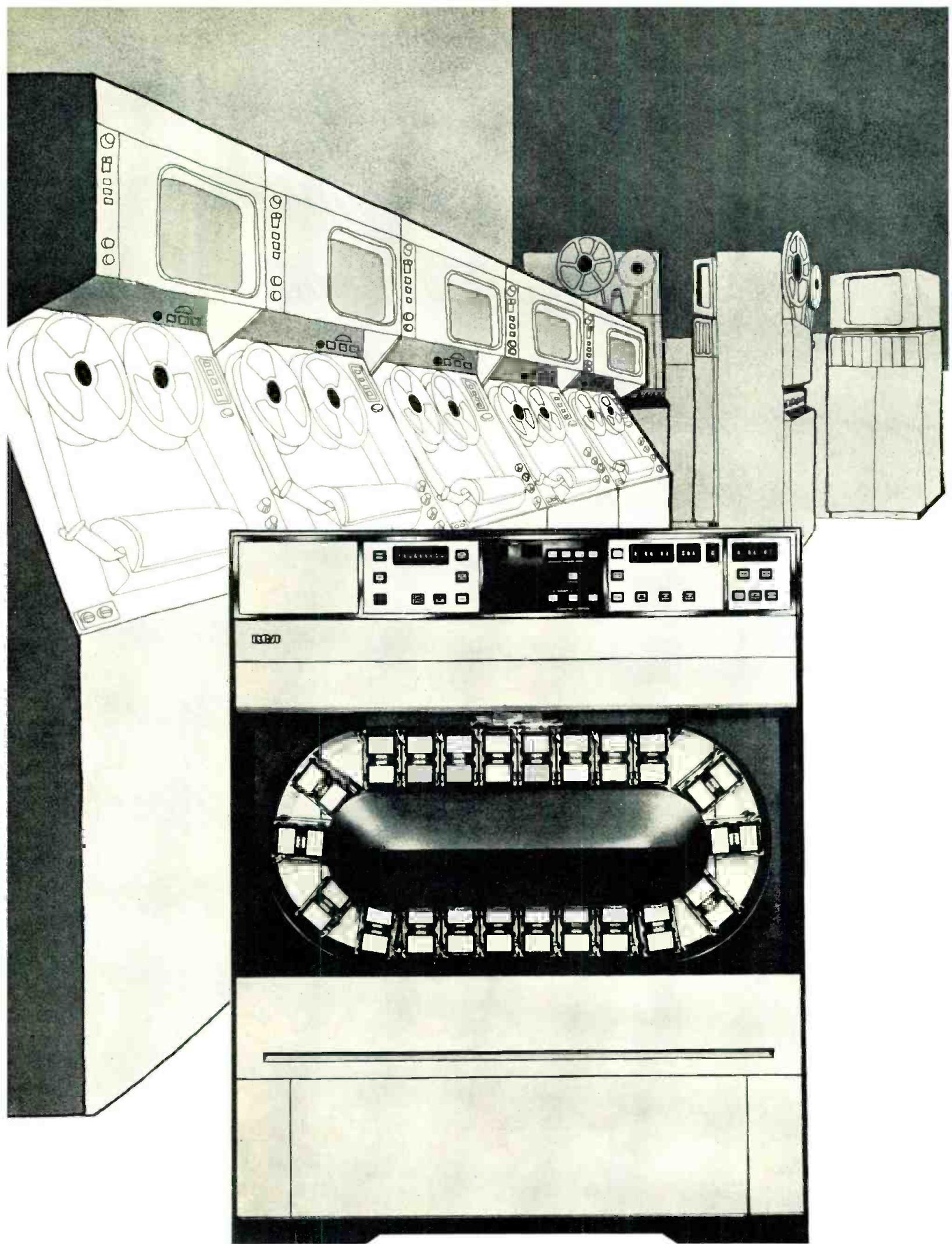
CONRAC
CORPORATION

NEW AT NAB

An Extraordinary Monochrome Monitor



Circle 112 on Reader Service Card



Should you put the 'cart' before the reels?

When a new piece of equipment creates as much excitement in today's cost-conscious broadcast industry as our "cart" machine has done, you know it's got a big potential for both saving and making money. The big question is how much can it do to make your operation more efficient, and what new profit opportunities will it bring? We suggest you take this little quiz and see for yourself what the "cart" machine can do, compared to the tape system you're now using.

1. How long does it take an operator to load, optimize and cue a tape commercial on a "cart" machine?
a. 3 sec. b. 30 sec. c. 3 min.
2. If you schedule 4 tape commercials during a break, how many "cart" machines would be needed to play them back?
a. four b. two c. one
3. How many cartridges can be loaded into the TCR-100 at one time?
a. 12 b. 22 c. 100
4. How many times can a cartridge message be replayed before it starts to deteriorate?
a. 25 b. 50 c. 100 d. 200 or more
5. What about tape costs, compared to a reel-reel-to-reel video tape recorder?
a. about twice as much
b. about half as much
c. about the same
6. The "cart" machine can free up your reel VTR's for which of the following tasks?
a. teleproduction b. promos
c. previews
7. What can the "cart" machine do about rebates?
a. virtually eliminate them
b. cut down on them drastically
c. nothing much

As you'll see when you've got all the right answers (upside-down, below), the "cart" machine is more than just a piece of hardware. It's a whole new system for saving time and money when you're airing commercials, promos, and ID's. And it opens up new avenues for making additional profits.

If you got more than five answers wrong, we'd say you need a "cart" machine right now. If you got them all right, you probably just ordered one.

And if you haven't already ordered one, ask yourself why not.





CBS Labs Vidifont char. generator produces many type fonts, sizes, logos in real time.

standards converter. Changes 525/60 to 625/50 (and vice versa) and converts NTSC, PAL, and SECAM. Pushbutton changeover, interlocked chroma/luma. Take a look at the KCU 40 color camera for field/studio use.

Circle 294 on Reader Service Card

Boston Insulated Wire & Cable Co. (Booth 244)

Eliminate heavy, bulky TV camera cables; see new miniature TV-81 color cable, adaptors, new miniature TV-85C connector, automatic camera cable tester. Get info on cable repair service, engineering and field service.

Circle 295 on Reader Service Card

Broadcast Computer Services (Booth 331)

See a demo of BCS computerized traffic and accounting system. User terminal at booth will be connected with Control Data Corp. 6400 computer in Colorado Springs, showing operation of system to handle any kind of broadcast schedule. Talk to the computer, it's lonely.

Circle 296 on Reader Service Card

Broadcast Electronics (Booth 308)

Get your picture drawn while you learn about new system using audiotape cartridge equipment with video character generator. Sally Zippert will do caricatures as mementoes of the convention. You can also see wide line (22 models) of tape cart equipment as well as a new compressor-limiter and a direct-drive turntable.

Circle 297 on Reader Service Card

Broadcast Facsimile Network (Booth 343)

With cooperation of WGN Radio and

the Chicago Tribune, BFN will transmit that newspaper via FM/SCA at the convention. Stop by and find out more about this new service.

Circle 288 on Reader Service Card

Broadcast Products (Booth 242)

New AR-2000 Series radio automation system will be demonstrated. Includes MOS programmer with keyboard entry, up to 99 sources, and English language print-out logger system. You can also see Model 5025 Time Gate, which enables control of 25 functions of any hour, minute, or second of any day in week.

Circle 298 on Reader Service Card

Canon USA Inc. (Booth 305)

A complete line of lenses for film and video cameras will be shown.

Circle 299 on Reader Service Card

CBS Laboratories (Booth 304)

Vidifont is a new TV character generating system with several type fonts and sizes available. Try it yourself. Also look for the Automatic Color Corrector, Image Enhancer, Automatic Loudness Controller, and the latest versions of Audimax and Volumax. Continuous live demos for your pleasure.

Circle 300 on Reader Service Card

CCA Electronics Corp. (Booth 234)

New at CCA is radio Mini-Automation (starts at \$6000) and Midi-Automation (starts at \$15,000). Then you'll find audio consoles for Top-40 and for simultaneous AM-FM operation. There'll also be a complete line of AM-FM transmitters and circular-polarized FM antennas.

Circle 301 on Reader Service Card

Central Dynamics Corp. (Booth 103)

Everything's new this year, says CD.

Would you believe an automatic videotape editor (PEC-102) using computer control and a SMPTE time code generator? How about a master control switcher with program and mix A&B primary busses with preview and prelisten? Then there's TV automation with a mini computer and switcher, some custom audio consoles, and Marconi TV test gear. That will check out everything but those pretty girls in the hospitality suites (which is your job).

Circle 302 on Reader Service Card

Century Strand Inc. (Booth 118)

TV studio lighting is spotlighted (and floodlighted) here. Everything from fresnels to barn doors.

Circle 303 on Reader Service Card

Chrono-Log Corp. (Booth 229)

Would you like a video clock system that furnishes digital time display on picture monitors throughout your station, without having to install cables? You can also observe the Pinboard STEP system for automated video/audio switching during station breaks.

Circle 304 on Reader Service Card

CinTel Corp. (Booth 114)

Find out all about Colormaster color film processing equipment, including the Mini-Color Processor; various models handle 35, 16, Dual 8, Super 8, and Just Plain 8. You'll also see camera mounting heads, tripods, dollies, and pedestals for broadcast video cameras. Keep an eye out for Cindy the CinTel girl.

Circle 305 on Reader Service Card

Cohu Electronics (Booth 325)

Visit this booth for a display of TV control equipment including switchers sync generators, and cameras.

Circle 306 on Reader Service Card

Collins Radio (Booth 212)

Watch live demo of Twintape audiotape cart playback unit, and inspect 1-kW and 5-kW AM transmitters, 2-kW and 20-kW FM transmitters, several audio consoles, peak limiter and compression amplifiers.

Circle 307 on Reader Service Card

Commercial Electronics Inc. (Booth 317)

Have you seen the low-light-level color camera that uses moon-type SEC vidicon pickup tubes? Splashdown at this booth for a demo.

Circle 309 on Reader Service Card

Conrac Corp. (Booth 107)

Two B&W picture monitor series will be introduced: Solid-state, uses interchangeable module boards, has 10-MHz video response, 800-line center resolution, linearity with 2% of pix height, loop-through operation, accepts comp or non-comp video and

CUT COST CUT SPACE CUT PROBLEMS
WITH SHARP NEW BROADCAST GEAR FROM

WILKINSON ELECTRONICS



A SUPERIOR PEAK LIMITING AMPLIFIER
MONAURAL OR STEREO MODEL LA-2C.



A SUPERIOR GAIN CONTROL AMPLIFIER
MONAURAL OR STEREO MODEL GCA-2.



A SUPERIOR SUBCARRIER GENERATOR
MODEL SCG-1.



THE BEST FM EXCITER IN THE WORLD
MODEL FME 10.



THE BEST STEREO GENERATOR IN THE
WORLD MODEL SG-IE.

PLUS— TWO NEW FM TRANSMITTERS A NEW AUDIO CONSOLE A NEW
REMOTE AMPLIFIER A NEW DIGITAL AM FREQUENCY MONITOR
NEW 5/10 KW AM TRANSMITTERS AND MANY MORE SHARPIES.

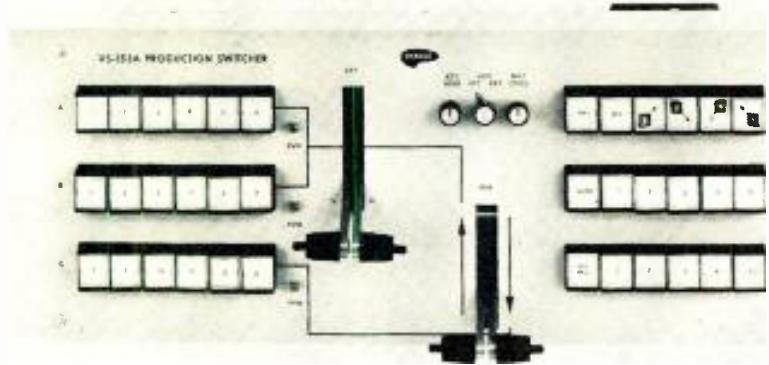
WILKINSON
ELECTRONICS, INC.

1937 MACDADE BLVD.
WOODLYN, PA. 19094

(215) 874-5236 874-5237

BOOTH 201 W. HALL NAB

Circle 114 on Reader Service Card



Vertical-interval production switcher from Dynair has three mix busses.



Cybrix clear-text logger has automatic readout.

sync, is available in 9, 12, 14 in. screen sizes. Color monitors will also be shown.

Circle 310 on Reader Service Card

Continental Electronics (Booth 200)
For a look at 5, 10, and 50 kW solid-state AM transmitters using Continental's high-efficiency final, modulate over to this booth.

Circle 311 on Reader Service Card

Cybrix Corp. (Suite)
See a new log-verification system that types out in English what went on the air and when. Designed for live, automated, or multi-station use. You can easily edit or correct errors. And encode cart cue tracks for your automation system.

Circle 312 on Reader Service Card

Delta Electronics (Booth 206)
AMers will be interested in the Delta trio: OIB-1 Operating Impedance Bridge, CPB-1 Common Point Bridge; and RG-1 Receiver/Generator. Keep your RF clean!

Circle 313 on Reader Service Card

Dynair Electronics (Booth 215)
Goodies here include low-cost solid-

state RX-3A TV demodulator that's tunable all-channel and wideband; a low-cost vertical-interval production switcher VS-151A with effects; and switching gear, sideband analyzer, and video distribution systems. Ask about price reductions.

Circle 314 on Reader Service Card

Eastman Kodak (Booth 128)

You'll probably learn about color newsfilm, shooting and processing it. Ask about the new telecine color balance slide.

Circle 315 on Reader Service Card

Effective Communication Systems (Booth 316)

Effective people will be on hand to discuss consulting services (audio, video, RF) available to commercial and educational broadcasting.

Circle 316 on Reader Service Card

Electronics, Missiles & Communications (Booth 310)

EMCEE will feature its 1-kW broadcast transmitter/translator for color TV, and a new ITFS 2500-MHz receiving converter with noise figure of 8 dB and gain of 30 dB. System design engineers will be on hand to advise you.

Circle 317 on Reader Service Card

Fairchild Sound Equipment Corp. (Booth 315)

Fairchild will premiere a completely new product—an automation system for small radio stations, designed to retrofit existing installations without rebuilding. You can go from automation into manual operation at any time. Also on display will be a new line of modular audio components including IC preamplifiers and amplifiers, custom broadcast consoles, and systems. Stop by for consultation.

Circle 318 on Reader Service Card

Fort Worth Tower Co. (Booth 329)

Climb up and look over displays of towers, equipment buildings, reflectors, for AM-FM-TV broadcast, microwave, and what have you.

Circle 319 on Reader Service Card

Gates Radio (Booth 221)

There'll be something for everyone in Gatesland this year. For video people, a VHF color-TV transmitter exhibit with details about IF modulation. For radio folk, an automated 1-kW AM station driving a dummy load, including monitors and automatic logging. For audiophiles, an operating demo of AM and FM limiters and an AGC amplifier, with scopes to show you what's happening. FMers can inspect a four-rack stereo program automation system in operation. UHF persons haven't been ignored; the Gates Theater will deliver a presentation on the new 220-kW UHF color-TV transmitter just installed at WDCA-TV Washington. Still more goodies too numerous to mention will be on display.

Circle 320 on Reader Service Card

General Electric (Booth 101)

Many warm GE bodies will show you how two new color TV film cameras work, as well as demonstrating the PE-400 and TE-201 live color cameras (by focussing on some warm female bodies). You can also see update kits for earlier GE film cameras and a complete station automation system. Other products: computer logic switching systems, VHF and UHF TV transmitters, TV transmitting antennas, B&W and color video projectors, CCTV cameras, and Quartzline studio lights. Don't miss the last camera show on Wednesday afternoon—it's a gas!

Circle 321 on Reader Service Card

Gotham Audio Corp. (Booth 237)

For jingles, laugh tracks, and other special effects, the new Mellotron PEG (Program Effects Generator) is useful. Contains four 1-min. tape cassettes which may be mixed, with variable speed capstan for pitch change. Another feature at this booth: Gotham Delta-T 101 audio delay unit, all solid-state, no moving parts, using A/D conversion with storage in IC shift registers, delay outputs variable in 5-ms step up to 320 ms maximum delay, with up to five independent time-controllable outputs.

Circle 322 on Reader Service Card

Grass Valley Group (Booth 115)

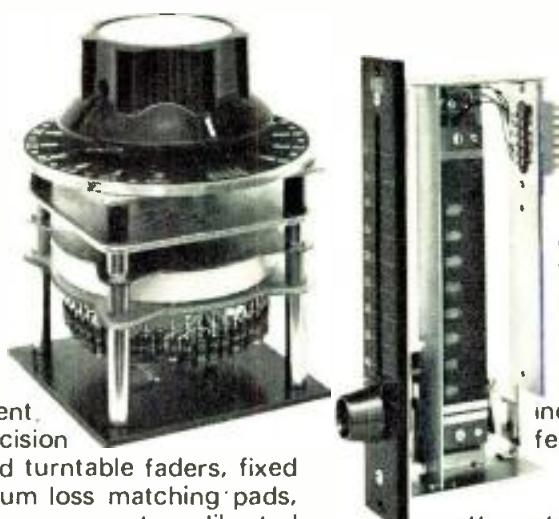
Products in this booth include TV automation for MCR switchers, rout-

More than 1000 standards

Altec attenuators are the standard of the broadcast and recording industry. And not only do we make them better, but we make more of them—over a thousand different kinds of rotary and straight line attenuators for every broadcast and recording requirement.

Available are bridging pads, precision decade attenuators, projection and turntable faders, fixed loss pads, mixer networks, minimum loss matching pads, impedance matching networks, stereo pan pots, calibrated attenuators, rotary differential attenuators, mixer controls, grid control pots, VU meter extenders and many more.

Variety is only part of the story. Every Altec-built attenu-



Units shown with cases removed

ator will last hundreds of thousands of operations. Precisely constructed, they're also "overbuilt"—for rugged dependability. Electrical integrity is assured, too, because of our exclusive use of cold-forged contacts of fine (100%) silver; also pure silver brushes, individually suspended to maintain perfect contact. Noise-free operation is further assured by dust-tight cases.

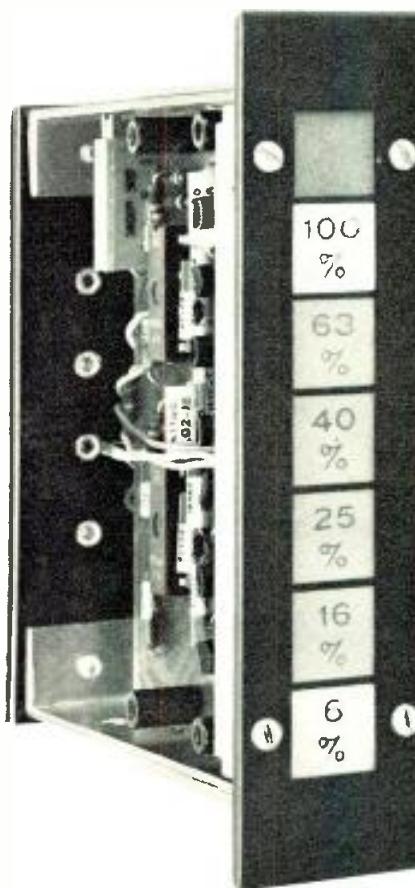
The most commonly needed Altec attenuators are available off the shelf. Custom configurations will be made to your exact requirements. For a complete catalog of the Altec attenuator line, please write.

and a brand-new hit.

Our new illuminated audio peak reading indicators are bound to be a hit with recording engineers. Levels are indicated by a slim, vertical column of different colored lights. Each light represents a percent of modulation—blue: 6% (-24dBm); green: 16% (-16dBm), 25% (-12dBm), 40% (-8dBm), 63% (-4dBm); yellow: 100% (0dBm); and red: Overload (+4dBm). Overload represented by a red light is easily spotted, even out of the corner of your eye.

Are they responsive? More so than any regular meter movement, because the lights are triggered by solid-state circuitry.

(Actual size: 4" H x 1" W x 4" D—including terminals)



1515 So. Manchester Ave., Anaheim, Calif. 92803
A Division of LTV Ling Altec, Inc.



Other benefits, too. Like size: Each indicator can be mounted on a 1" center.

For more information about this revolutionary product, please write for literature on the peak limiting indicator, model #9713A.

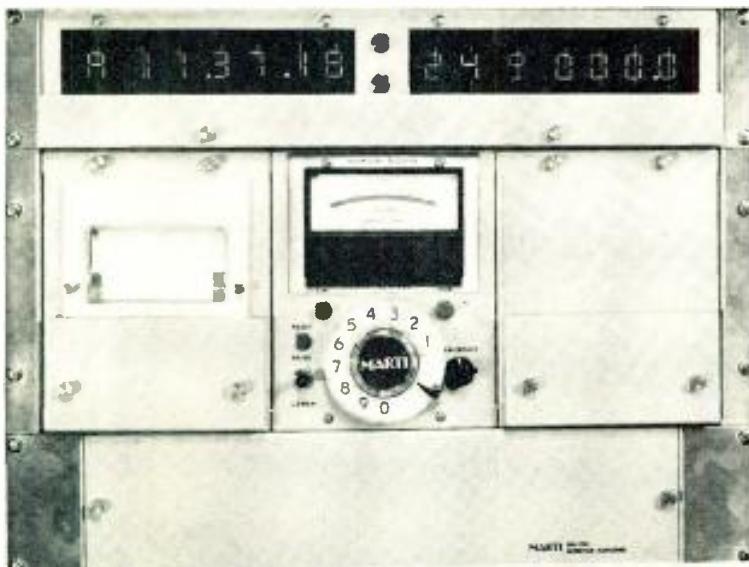
Altec Lansing,
1515 So. Manchester Ave., BME-3
Anaheim, Calif. 92803

- Please have authorized Altec representative call with complete information.
- Please send catalog "Altec Precision Attenuators and Networks"
- Please send information on Altec's new audio peak limiting indicator Model #9713A.

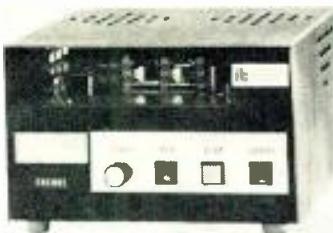
Name _____
Company _____
Street _____
City _____
State _____ Zip _____

Stereo components and ensembles for the home/Microphones, speakers, horns, amplifiers for public address systems Acousta Voice (TM) equalization/Audio controls, consoles, monitors for professional recording, broadcast and motion picture studios/Telephone transmission and termination products/Communications equipment for offices, factories, commerce, schools, hospitals, nursing homes, doctors' registry/Specialty transformers, filters, inductors, inverters

Circle 115 on Reader Service Card



ACL-100 Automatic Digital Transmitter Logging System by Marti works with 950 MHz aural STL.



Encore is new low-cost audiotape cart line from International Tapetronics.

ing switchers, machine control; switching and processing systems for production, transmitter, and helical VTR; and sync generators and pulse distribution amplifiers. Come to the valley and walk through the grass.

Circle 323 on Reader Service Card

Gray Research (Booth 228)

If you've got problems with turntables and pickup arms, the boys at Gray can help you. Just ask!

Circle 324 on Reader Service Card

Harwald Co. (Booth 235)

To show good TV film, you've got to inspect it. That's what this display is all about—equipment for inspecting and editing film.

Circle 325 on Reader Service Card

Innovative Television Equipment (Booth 322)

Exhibit will include a new counterbalance studio pedestal for TV cameras up to 130 lb, a cam head with dual interchangeable cam design, an elevator tripod for cameras up to 175 lb, and a companion lightweight dolly that folds into a compact package.

Circle 327 on Reader Service Card

International Good Music (Booth 247)

Make your automated radio station

sound more live; IGM will demonstrate an automated time/temperature announcer. Join live net or local news on real-time basis with new Model 393 switcher. Inspect new Model 364 program logger using SCM printing calculator to record audio source plus five-digit code. Other new items include 24, 12, 6, and 4 tray versions, mono or stereo, of Instacart multi-cart system.

Circle 328 on Reader Service Card

International Tapetronics Corp. (Booth 125)

Big news from ITC is new Encore series of economy-priced audiotape cart equipment with hysteresis synchronous direct capstan motor. Another interesting item is a three-deck cart machine. Slide by for a look.

Circle 329 on Reader Service Card

International Video Corp. (Booth 238)

Watch a demo of the new 1402 time-base corrector for IVC 900 series color helical VTRs. Reduces variations of 1.5 μ s to less than 7 ns, making possible dubs to quad tape with minimum burst-phase variation. Lovely models will be in front of lovely cameras, too.

Circle 330 on Reader Service Card

Jamieson Film Co. (Booth 330)

Inspect Mark IVA color film processor, fully instrumented, automatically controlled, handles 30 ft/min, warmup time 10 min, and put-through time of 23 min. For 16 and 8-mm film.

Circle 331 on Reader Service Card

Jampro Antenna Co. (Booth 225)

See the latest in antennas and diplexers for UHF and VHF TV, and horizontal and vertical radiators for FM.

Circle 332 on Reader Service Card

Jerrold Electronics Corp. (Booth 314)

Highlight is Starline 20 push-pull CATV distribution equipment—main trunk, line extenders, etc. In headend area, see Channel Commander II and II-FM. Then stop by Distributor Sales Div. section and see ITFS gear including J-Jacks for educational TV distribution systems.

Circle 333 on Reader Service Card

Johnson Electronics (Booth 240)

All you FMers come see a line of SCA multiplex receiving equipment.

Circle 334 on Reader Service Card

Kaiser CATV Div. (Booth 319)

Newest item you'll see is Phoenician coax cable. And Phoenician XR Series Extended Range distribution gear should generate interest: It's capable of 36 channels, or 32 TV channels plus FM.

Circle 335 on Reader Service Card

Kliegl Bros. (Booth 111)

Look over assortment of TV studio lighting and accessories.

Circle 336 on Reader Service Card

Lipsner-Smith (Booth 112)

You'll find film conditioning gear and projectors here.

Circle 326 on Reader Service Card

Listec Television Equipment Corp. (Booth 313)

Stand by and watch while the new Hokushin TC-701 cassette loading automatic threading TV film projector does its stuff to handle typical station breaks. There will also be demos of a new low-cost telecine projector TM-1. Vinten TV camera mounting equipment will be shown, too.

Circle 337 on Reader Service Card

Marathon Broadcast Equipment (Booth 316)

You FMers can hear and see demos of a new stereo tape cartridge, Model 300S. Marathon guarantees phase shift (L/R) maximum $\pm 10^\circ$ to 10 kHz, which makes both stereo and mono sound better.

Circle 339 on Reader Service Card

Marti Electronics (Booth 222)

Feature: 950-MHz aural STL system working with ACL-100 automatic digital transmitter logger.

Circle 340 on Reader Service Card

McCurdy Radio Industries (Booth 311)

Audio consoles, switchers, power supplies, and accessories.

Circle 342 on Reader Service Card

McMartin Industries (Booth 232)

Newest McMartin item is VHF-TV aural modulation monitor, TBM-

Circle 117 on Reader Service Card →

Our new krypton-halogen replacement for the PS52 fits the same fixture, lasts twice as long and maintains constant color temperature for life.

That's some replacement.

New DSF 1500-watt
krypton-halogen studio lamp.

PS52 1500-watt
incandescent studio lamp.

When you replace a PS52 studio lamp you can replace it with something better.

The something better is Sylvania's DSF krypton-halogen lamp, which fits the same fixture as the PS52.

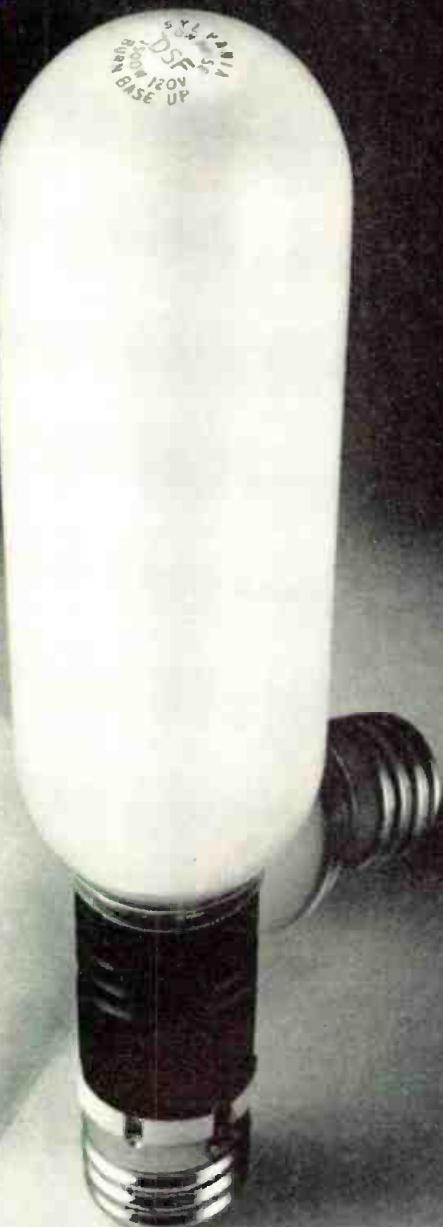
Its average rated life is 250 hours. More than twice the life of the PS52.

And that's useful life, because the DSF is as bright at the end of its life

as it was at the beginning. There's no darkening with age as in the PS52.

And its 3200° K color temperature is there right from the beginning. And it's still there 250 hours later. Constant.

The DSF has low-noise construction. There are no loose parts to resonate when used with SCR dimmers.



With all these advantages, the DSF is more than a replacement. It's a major improvement.

*Sylvania Electric Products Inc.,
100 Endicott St., Danvers, Massachusetts 01923*

SYLVANIA
GENERAL TELEPHONE & ELECTRONICS



Moseley remote AM modulation monitor AMR-1 uses FETs, has 10-kHz notch filter.



Philips PC-100 digital color camera premiered last November at Purdue-Ohio State football game.

5500, featuring plug-in card modules and front panel access. Also at the booth: modulation and frequency monitors for mono and stereo FM, SCA, and a complete line of SCA multiplex receiving equipment, RF preamps, consoles, and monitor calibrators.

Circle 343 on Reader Service Card

Memorex Corp. (Booth 306)

Broadcast videotape demo.

Circle 344 on Reader Service Card

Microwave Associates (Booth 117)

Possibly a first is new all-solid-state high-power heterodyne TV relay repeater. No klystrons or TWT amplifiers. Power output is 10 or 20 W at 2GHz, 3 W at 7 GHz. Another feature: low-cost microwave relay for one-or-two-way CCTV, CATV, etc.

Circle 346 on Reader Service Card

Mincom Div. 3M Co. (Booth 245)

Watch demo of new dropout compensator for helical VTRs. Listen to new 1/4-in. two-track professional audiotape recorder. See improved Chromabeam color-film recorder. It has videodisc storage system to overcome fringing, smear of rapid-moving images.

Circle 347 on Reader Service Card

Minolta Corp. (Booth 126)

For TV newsfilm people, a new Super-8 camera with 10:1 zoom lens lets you shoot up to 200 ft of film.

Philips Broadcast Equipment Corp. (Booth 327)

You saw the prototype last year; now see live demos of production models of the PC-100A digital-controlled live studio/field color camera with new anti-comet-tail Plumbicon pickup tubes. Another production model will be the PCP-90B portable digital-controlled live color camera. And the latest PC-70S-2 version of the widely used live color camera. There will also be the PCF-701 television chain, the LDH-1 low-priced three-Plumbicon studio camera suitable for CATV, CCTV, and a 17.5-kW VHF color TV transmitter. Plus the usual line of audio mixing and recording consoles.

Circle 354 on Reader Service Card

Potomac Instruments (Booth 207)

See line of AM field-intensity meters, phase monitors, and video switching equipment.

Circle 355 on Reader Service Card

Power-Optics Inc. (Booth 307)

Find out how a remote-controlled TV camera works by watching a live demo. Two cameras will be remote-controlled, one from the Power-Optics booth, other from GE booth, both using the Power-Optics auto pan and tilt head. In one demo, a series of preset shots will be programmed into a computer.

Circle 356 on Reader Service Card

QRK/Rek-O-Kut (Booth 234)

Display includes line of tape cartridge equipment and automatic Multiple Three Spotter, new continuous variable speed turntables, plus tone arms.

Circle 357 on Reader Service Card

Q-TV Sales (Booth 120)

See brand new VideoPrompter—a TV promoting device which accepts copy on letter-size paper from any typewriter, furnishing a video signal for display on a picture monitor or TV receiver. Other equipment on display: standard and cartridge model prompters, tilting devices, horizontal and vertical crawls.

Circle 358 on Reader Service Card

Quick-Set Inc. (Booth 209)

The spotlight will be on a new quick on/off accessory for use with the Hercules 5230 Cam-Link Head, which enables using the same camera and head for both live and multiplexer duty. You can also see a line of tripods, pedestals, pan heads, and dollies.

Circle 359 on Reader Service Card

Continued on page 36

Circle 118 on Reader Service Card →

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

TELEMATION'S TCC-1425 ELECTRONIC CHARACTER GENERATOR, DESIGNED FOR BROADCAST APPLICATIONS. COMBINES QUALITY ENGINEERING WITH OPERATOR CONVENIENCE.

READ THIS AD FOR OPERATING FEATURES, PRICE, AND GENERAL DESCRIPTION YOU MIGHT BE SURPRISED!

THIS DISPLAY WAS PRODUCED BY A MODEL TCC-1425 CHARACTER GENERATOR. NOTE THAT ALL 14 LINES ARE HORIZONTALLY CENTERED ON THE SCREEN - THIS WAS AUTOMATICALLY DONE USING THE "CENTER LINE" FEATURE CONVENIENTLY LOCATED ON THE TCC-1425 KEYBOARD. SAVES TIME - INCREASES FLEXIBILITY.

Put more character in your productions

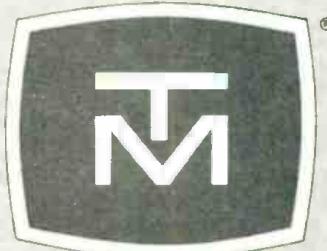
The TCG-1425 Broadcast Character Generator produces 14 lines of 25 characters each—full-page displays formed by line not dot matrix methods, so characters are all uniformly bright, easy to read. The TCG-1425 offers more editing functions than any other character generator and provides such flexible operating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

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

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

TCG-1425 Electronics Unit	\$7,200.00
Keyboard Control Unit	995.00
Matting/Shadowing/Edging Option	1,595.00
Random Access Disc Memory	On Application

**SEE US
AT NAB BOOTH #127**



TELEMATION

Post Office Box 15068
Salt Lake City, Utah 84115
Phone: (801) 486-7564

BRANCH OFFICES: ALBUQUERQUE • ATLANTA • BOSTON • CHICAGO • DALLAS • DENVER • HOUSTON • INDIANAPOLIS • LAS VEGAS • LITTLE ROCK • NEW YORK • NORWALK • MILWAUKEE • PALO ALTO • PASADENA • PHOENIX • SAN DIEGO • SALT LAKE CITY • ST. LOUIS • TULSA • WASHINGTON • RIO DE JANEIRO • SAO PAULO



He has a new view of life

He's had a heart attack, but he's back on the job. He saw for himself how coronary care units, modern drugs, and new methods of rehabilitation are helping doctors fight the Nation's Number 1 killer.

Heart scientists predict many exciting advances in the foreseeable future, provided more funds are available for research, education and community service. Help make these predictions come true. Give generously to fight the Number 1 threat to your life.

GIVE...
so more will live
HEART
FUND



Contributed by the Publisher

Rank Precision Industries (Booth 223)

Inspect the Rank Cintel Photoconductive telecine, which may be the most compact such unit around for broadcast color reproduction of 2×2 slides, 16- or 35-mm films. Two more featured products will be a 22-in. color picture monitor with NTSC decoding and a 20-in. B&W monitor with illuminant D phosphor. Also shown will be the series of Rank Taylor Hobson 10:1 and 16:1 Varotal zoom lenses.

Circle 360 on Reader Service Card

Raytheon Co. (Booth 106)

Ask for info on turnkey microwave systems for STL and intercity use in TV and radio.

Circle 361 on Reader Service Card

RCA Corp. (Booth 100)

Since last year's preproduction showing, RCA's videotape cartridge system is in production, and a field trial of the TCR-100 has been running at Washington's WDCA-TV. TCR-100 will be running at the booth, too. In other fields, something new may appear in the transmitter area, and radio and/or audio may have a new product. Top-of-the-line TR-70 videotape recorder has been refined. Wander around the vast RCA area for look at complete line of broadcast gear from mike and camera to antenna. Inspect new solid-state Ampliphase AM exciter.

Circle 362 on Reader Service Card

Recortec Inc. (Booth 342)

Bring your own videotape to this booth for evaluation on the new Video Tape Evaluator (VTE), which cleans and tests tape at 120 in./s to indicate tape length, number of edge damages, and number of tape surface defects. Also shown will be the Video Tape Conditioner (VTC) with new audio playback facility.

Circle 363 on Reader Service Card

Reynolds Printasign (Booth 334)

Need signs at your station? Try out sign embossing equipment here.

Circle 368 on Reader Service Card

Rodelco (Booth 404)

Want to fill in holes in your FM coverage? See the new 10-W solid-state FM stereo translator here. Also shown will be 1- and 10-W VHF TV translators.

Circle 364 on Reader Service Card

Rohde & Schwarz (Booth 239)

TV test gear will be featured, including the new Videoskop Type SWOF III, combination video sweep genera-

tor, selective receiver, and display; video test modulator, Type MZF; and TV signal generator, Type SDFA. Stop by and ask R&S engineers for advice in TV testing.

Circle 365 on Reader Service Card

Rohn Communications Facilities (Booth 113)

Towers for AM, FM, TV broadcast, CATV, microwave etc.

Circle 366 on Reader Service Card

Rust Corp. (Booth 233)

You'll be treated to a demo of the RC-2600 Digital Readout transmitter remote control with inbuilt high and low limit alarm, and the ALD-1RA Autolog system for automatic transmitter logging. Also shown will be the AP-200 10-position status/alarm system, a dc amplifier, and an audio-follow-video dial-access switching system.

Circle 367 on Reader Service Card

Schafer Electronics (Booth 213)

Models PCC-8000 and 800 automation systems will be functioning, with a single computer controlling both AM and FM separate programming. A feature of these updated systems is CLEAR language verified logging, which uses up to 32 characters of alphanumeric info recorded on cart or R-R tapes to verify spots were aired as programmed. Stop by for a discussion.

Circle 368 on Reader Service Card

Schafer International (Booth 214)

The 700/800 Series of professional cassette recorder/reproducer will be demonstrated. Available in various models with from one to four tracks, with or without control and cue tones, and high-speed cueing.

Circle 369 on Reader Service Card

Seeburg Music Library (Booth 241)

If you need a background-music library, this is the place to ask.

Circle 371 on Reader Service Card

Shively Labs (Booth 333)

Ask about FM antennas—design, engineering, installation.

Circle 341 on Reader Service Card

Shure Bros. (Booth 204)

A complete line of microphones and miniature mike mixers will be shown.

Circle 372 on Reader Service Card

Skirpan Lighting Control Corp (Booth 320)

Enjoy demo of modular studio lighting control system, and see array of control panels and solid-state dimmer

Continued on page 60

SEE IT

VISIT OUR BOOTH 307
at the N.A.B. SHOW
March 28-31, 1971
Hilton Hotel, Chicago

POWER OPTICS REMOTELY-CONTROLLED CAMERA SYSTEM

*... operating from the GE/BAC 100 Computer—
Supervised Control Center in the General Electric
Company Booth 101 and in our Booth 307
at the NAB Show.*



With the P.O.I. Remote Camera Control System it is possible to precisely set shots for repetitive exact recall:

**Pedestal Height . . . Pan . . . Tilt
Zoom . . . Focus . . . Iris.**

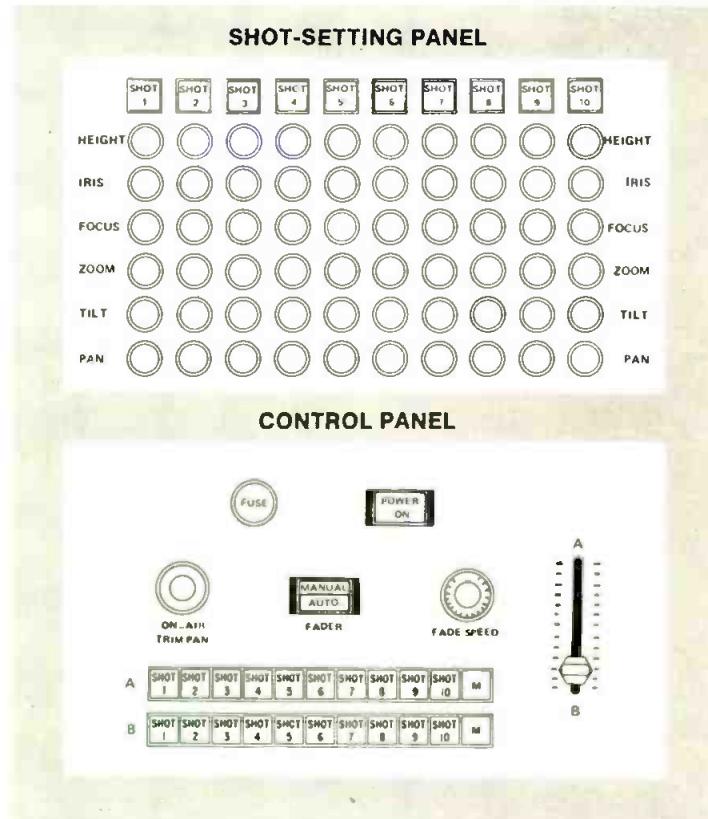
The Shot-Setting Panel provides for up to ten shots, each of which may be carefully pre-set in rehearsal under the complete control of a production staff.

The speed of the shot-to-shot transitions may be varied to suit the situation.

Each shot is recalled, on air, by simply pressing appropriate shot buttons. If a subject should move from prearranged pattern, on-air adjustments can be made at the Control Panel. The pre-set shots may be used in predetermined sequence or at will, depending on the nature of the production.

Investigate the P.O.I. Remote Control System as a production aid. It will open your eyes to unlimited possibilities, not only in production but in the economic aspects of automated camera control.

We invite inquiries on both the standard Remote Control System and The Computer-Supervised System. If you don't make it to NAB send for literature describing them.



POWER OPTICS, INC.

FAIRVIEW VILLAGE, PA. 19409 • (215) 539-5300 • TELEX 846429

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

Circle 120 on Reader Service Card



Sony condenser mikes are better for everyone. From \$34.50!

Now Sony offers both the hobbyist and the professional the most complete line of superior condenser microphones on the market

And if that sounds like bragging it is. Here's why:

Our \$34.50 condenser mike is superior to any competitive dynamic mike costing up to \$75.

Our \$54.50 condenser mike tops dynamics selling for as high as \$125.

Our \$99.50 condenser mike is better than competitive \$175 dynamic microphones.

*Our \$129.95 tie-tac mike is smaller and better than all other tie-tac or lavalier mikes...regardless of price.

*Our \$395 professional condenser mike is better than any other microphone at any price.

Wild claims? We've got the facts to prove it. Write for details to: Mr. Carl Mason, Sony, Superscope, 8215 Vineland Avenue, Sun Valley, Calif. 91352.

Put a Sony condenser mike in your act today.

SONY **SUPERSCOPE**

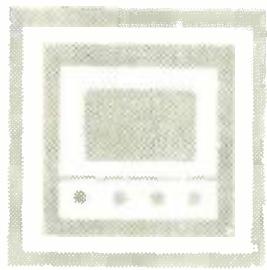
*This is a special application microphone sold only through selected professional audio dealers. For information write Special Application Products Division, at the above address.

Circle 121 on Reader Service Card

The Money Crisis In England: Independent TVs Face Another Bad Year

Levies, Taxes and the BBC are putting the squeeze on British independent TV stations; U.S. broadcasters better learn from the English—it might happen here.

By Alan Pearce



BRITISH COMMERCIAL TELEVISION is facing its biggest financial crisis since it began in September, 1955. Some of the smaller companies in Britain's Independent Television Network may be forced to merge in order to survive. By one estimate the number of commercial companies—there are now 15—might be almost halved. "In view of the changes in the pattern of costs and revenues, particularly as a result of the introduction of color television,"¹ the government commissioned an investigation into the economic structure of British commercial television. (See box, **Government Report.**)

In addition the Government has had to give some immediate relief to the Independents (commercial companies forming a regional network

Alan Pearce is a British economist currently researching the economics of broadcast news at NBC in New York City.

in competition with the publicly-owned British Broadcasting Corporation). In April, 1970, the advertising levy, a tax on advertising revenue, was reduced by \$14.4 million annually to give the commercial network some financial breathing space until a Government investigation was completed. However, even now that the investigation is completed no action has been taken by the government.

The Independents in Britain are hard up right now because they are being squeezed in four ways:

Advertising revenue in 1969 was \$3 million less than in 1968. Apparently advertising expenditure has leveled off, at least for the time being. Also commercial television has been claiming a smaller share of the total audience—growing competition from the BBC has cost the commercials some of their viewers.

High taxation is crippling the industry. The Independents have to pay a 42.5% corporation

Government Report on Cost and Revenues

For British Independent Television Companies
The Government inquiry into the costs and revenues of British independent television issued its report in October, 1970. The Prices and Incomes Board made the following recommendations to improve the situation:

1. The establishment of programming production indices to identify the best practices.
2. Better control over labor costs and better labor relations in some companies.
3. Joint union representation in all negotiations.
4. Better use of labor and quicker technical changes.
5. Revision of the job responsibility and wage structure.
6. More job security and an industry-wide pensions scheme.
7. A stronger employers' federation.

The report says that the financial effects of operating commercial television with only one company could be a saving of something like \$24 million a year, as well as large capital savings in studios and equipment. It does not recommend such a change but suggests that there should be a shift of balance from diversity and high costs to less diversity and lower costs. In other words, the number of network and regional companies should be reduced in an attempt to save money.

On the controversial advertising levy, the report says it is a disincentive to companies increasing their revenue and may deter small companies merging with larger ones. "It is difficult to find a method of assessing the levy which is clearly better than relating it to advertising revenue. Since, however, a levy attached to revenue is insensitive to shifts in profitability, we suggest that if it remains in this form it should be subject to a regular periodic review halfway through the lifetime of a franchise," the report says.

Unfortunately the suggestion of a nil levy was ruled outside the board's terms of reference, and many TV experts in Britain have likened this to asking for a review of an industry without considering profitability. However, the report found that, if there was to be a levy, a toll on revenues was better than one on profits, as otherwise it would be "a deterrent to the containment of costs." This seems to be a peculiar line of reasoning.

The National Board for Prices and Incomes, Report No. 156, "Costs and Revenues of Independent Television Companies," CMND. 4524, can be bought for \$1 from Her Majesty's Stationery Office, 49 High Holborn, London WC1V 6HB, England.



tax (on profits—just reduced from 45%) in addition to the levy on advertising revenue. While the levy has recently been reduced from \$69.6 million to \$55.2 million a year, it still amounts to about a quarter of the commercial network's total advertising revenue. For an example of the results, look at Thames Television of London, one of the biggest Independents. Out of \$36 million in advertising revenue, the Government took \$12 million in levy. The before-tax profit was \$2.4 million. After tax: \$1.7 million.²

Expensive investment in color television, introduced on the Independent Network in November 1969, has been necessary despite falling revenues. The conversion to color has cost the Independents something over \$48 million by now.

Other costs continue to rise, especially labor costs. The industry's most militant union, the Association of Cinematograph and Television Technicians, demanded a pay increase above the 4% raise they got in 1969, for "increased skills" needed to operate color equipment.

Started by ad levy hike

The current wave of financial unrest started in April of 1969, when Britain's Chancellor of the Exchequer (the Finance Minister) announced in his annual budget statement that the advertising levy would be increased in order to produce an extra \$7.2 million a year for the Government. Profits of the commercial network tumbled from \$65.6 million before corporation tax in 1968 to below \$24 million before tax in 1969. (Incidentally the 1969 profit level was lower than the profits made by the network in 1962-1963.) For 1970 profits are predicted to fall again to around \$12 million before tax and maybe even less than that.

Because of this dramatic slump in profits the Government decided to reduce the advertising levy in April, 1970, and to order the above-mentioned investigation into the financial structure of the Independents by the Prices and Incomes Board—a Government department which in effect controls prices and wages in key British industries. (For example if the Independents want to increase advertising rates, they have to go before the Prices and Incomes Board, make out their

case, and have the increase approved or denied.)

Here is a brief history of the troublesome advertising levy—introduced in 1963 as a fixed tax, but recently varied at will:

Advertising Levy scale up to June 1969	
No levy on the first \$3.6 million of advertising revenue.	
25% on the next \$14.4 million.	
45% on everything over \$18.0 million.	

Advertising Levy scale from July 1969 to mid-April 1970	
No levy on the first \$1.2 million of advertising revenue.	
7% on the next \$2.4 million.	
35% on the next \$14.4 million.	
47.5% on everything over \$24 million.	

New Advertising Levy scale from mid-April 1970	
No levy on the first \$4.8 million of advertising revenue.	
20% on the next \$9.6 million.	
35% on the next \$7.2 million.	
45% on the next \$9.6 million.	
50% on everything over \$38.4 million.	

Source: Independent Television Authority, London, England.

The first effect of the latest revision is that the five smallest regional companies—Border,

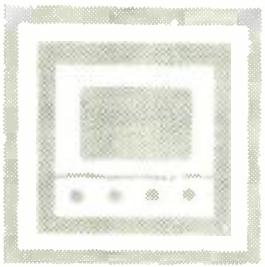
Taxing Broadcast Ad Revenues— Could It Happen In The U.S.?

It could happen in Iowa, according to a recent Iowa Law Review article which states: "There are no constitutional bars to at least some media taxation," which "would certainly include a levy on advertising receipts."

Such taxation could cover all mass media, and the article points out that even back in 1967, "a one percent gross receipts levy on the existing \$500 million pre-tax profits would add \$5 million to state and local budgets."

As for other states, the Review reports ten have gross receipt taxes applicable to publishing, 13 have such taxes applicable to broadcasting, five exempt printed media and four exempt broadcast media; Iowa exempts both under current legislation.

So it appears possible that all states could enact legislation to tax broadcaster ad revenues—unless the federal government pre-empts the field. And it seems Iowa, at least, is thinking of doing it.



Channel, Grampian, Ulster and Westward—pay no levy whatsoever. Border will save \$36,000 a year and Westward \$432,000—probably the difference between viability and bankruptcy for these small companies. The bigger ones gain, too. With an advertising revenue of just over \$15 million, Harlech saves \$1.44 million; London Weekend (\$28.8 million ad revenue) saves \$1.68 million; and Thames Television (\$38.4 million) saves \$1.92 million.

Ad revenue fell

After the first four months of 1969 advertising revenue began to slip for the first time in the history of British commercial television. The advertising revenues table shows what happened to advertising in the last eight months of 1969 compared with the same period in 1968. The cumulative percentage decrease in ad revenue over the eight-month period was 4.61%—and this includes August where a big increase was recorded because of the previous year's strike.

One reason advertising revenue has been falling: Increased BBC competition hurt commercial TV's performance in the ratings in 1969. Until last year the Independents used to regularly hold 60% of the audience or more; in 1969 this dropped to 53%. Advertisers do not take kindly

to seeing their audiences shrinking.³

Reorganization necessary

Television contracts in Britain are awarded by the Independent Television Authority—roughly equivalent to the Federal Communications Commission in the United States. In 1968 the ITA decided that it would reorganize commercial television. One regional Company, TWW serving Wales and the West, lost its license completely and was replaced by Harlech Television. Two other companies—Rediffusion and ABC—were merged to form Thames Television, serving the London area Monday to Friday. London Weekend Television, a new company, was awarded a contract for London from 7 pm Friday to Sunday. North of England, previously covered by Granada Television in Manchester, was split in two—half to Granada and half to another new company, Yorkshire Television.

The 15 Independents have a guaranteed life of six years and enjoy a complete commercial TV monopoly in their area for the term of the license. At the end of the period (July, 1974) their contracts will not necessarily be renewed. Because the whole structure of commercial television in Britain comes up for reassessment when the Television Act of 1964 (regulating all commercial

Advertising Revenue—All Companies

Month	1968	1969	% decrease	% increase
	\$	\$		
May	23,067,588	22,232,337	3.62	
June	18,708,809	16,581,199	11.37	
July	15,392,112	15,030,504	2.35	
August	12,312,098	13,615,632		10.59
September	19,040,397	18,037,939	5.26	
October	25,344,941	24,062,546	5.06	
November	24,717,446	24,225,804	1.99	
December	20,140,719	17,622,341	12.50	
Total	158,724,160	151,408,302	4.61	

Notes:

(i) "Advertising revenue" is the actual revenue received by all program companies before the levy but after deduction of agency commission and discounts.

(ii) The August returns for 1968 and 1969 are not directly comparable since August, 1968, was the month of a national industrial dispute resulting in a number of stoppages and makeshift programming.

(iii) The table is based on returns supplied by each independent television company to Deloitte, Plender, Griffiths and Company, Chartered Accountants, of London, England.

Source: Independent Television Companies Association, London, England.



TV in Britain) expires in 1976, there is talk that the licenses should be extended to them.

Following the ITA's 1968 decision to award contracts to two new major companies—Yorkshire Television and London Weekend—profits of the rest of the network have suffered something like a \$24 million loss.

Small companies flounder; some seek merger

Harlech Television serving Wales and the West of England well illustrates the difficulties facing smaller companies in the commercial network. The company is responsible for a bi-lingual area (programs are transmitted in both Welsh and English) with a commitment to produce far more indigenous material than produced by the bigger companies. The other companies last year broadcast an average of around 6.5 hours of local programs a week; Harlech's average was more than 12 hours a week. For the 12 months there was an operating profit of \$1 million before tax, but this was turned into a deficit of \$360,000 after taxes and other expenses had been paid.⁴

The companies are looking for ways to cut costs and naturally strenuously deny that the quality of programs is suffering. It is difficult to see how they can possibly avoid this, however—program companies need a fairly high return on their capital if they are to be adventurous or experimental.

Some companies feel that mergers would be a good way to save money. No change in the Television Act of 1964 need be made to allow for mergers of existing companies—in fact, there is a precedent. In 1963 Wales (West and North) Television could not survive financially and was taken over by TWW—Television Wales and West. In June of 1969 informal talks were opened between Yorkshire TV and Anglia TV about "some form of association." This was not a merger, it was stressed, but a sharing of facilities. This idea was abandoned and in August, 1970, Yorkshire Television and Tyne-Tess Television, with a joint viewing area of 2.5 million homes, formed an \$8.4 million holding company. The two companies won the approval of the ITA, but in return the ITA insisted that the separate identities of each company should be preserved. In other words, the companies will have to save money in areas other than joint programming. Tyne-Tess has been transmitting since January, 1959, and announced pre-tax profits of \$339,000 for last

year. Yorkshire, which went on the air in July 1968, made \$1,645,000 pre-tax profit in its last financial year.

Scottish TV and Grampian TV (Grampian has already had to close one of its studios as an economy move) joined sales forces May 1, 1970, in an attempt to produce savings.

Two other companies, Westward and Channel, set up a joint sales operation some time ago. Although the British Government might not be averse to mergers, the ITA is firmly against the idea, and the Authority is expected to win the battle unless the financial crisis gets out of hand.

One possible economy not talked about so far is cooperation in programming. Duplication and even multiplication persist among the 15 Independents, many of whom have expensive rival drama departments and documentary units which often need special studio facilities. Another economy could be made in manpower. Television production suffers from featherbedding; one response to the current financial difficulties should be to look for ways of getting better production out of the same manpower.

But little is being done

The Independents have so far been content to await the outcome of the Government inquiry. (See box, **Government Report**.) This has been the first inquiry since the Pilkington Committee Report of 1962 and, while things have obviously changed a great deal since then, the Independents continue to blame the Government and taxation for the current malaise. One spark of hope was generated in June, 1970, when the Conservatives won the General Election and formed a new Government. The previous Labor Government was believed to be anti-capitalist. The commercial TV bosses' lobbying group, The Independent Television Companies Association (the equivalent of the NAB in this country), now hopes for more financial relief from the more sympathetic Conservatives. But the Government report has come and gone and so far nothing has been done.

BM/E

References

1. House of Commons speech by Mrs. Barbara Castle, the Secretary of Employment and Productivity. House of Commons Debates, April 7, 1970.
2. Annual Report of Thames Television, London, October, 1969, p. 20.
3. ITV 1970, ITA, London, 1970, p. 13.
4. Second Report and Accounts of Harlech Television, year ended 31st July, 1969.

Meeting the Engineer Shortage

By R. H. Coddington

Competent engineers and operators are hard to find—broadcasting pays less than other areas of electronics and routine transmitter operation doesn't tax a man's creative skill. Third-Phone operators aren't the solution; automation and unattended transmitters are. Good First-Phone men will be well employed keeping such automation systems going, and the result will be better all-around operation.

IT PROBABLY CAME as a surprise to no one in the industry when the NAB recently petitioned the FCC for relaxation of the operator requirements in certain radio stations. After all, this is a natural—and somewhat justifiable—repeat of broadcasting history.

Specifically, the NAB wants modified those rules requiring a First-Class Radiotelephone operator to be in attendance during the operation of FM stations with transmitters over 25 kW, and AM stations over 10 kW or using a directional antenna. NAB contends that a Third-Class operator with a Broadcast Endorsement is competent to perform routine operational adjustments in such stations, just as they now do in low-power and non-directional operations.

Ostensibly, the reasons behind this petition are a shortage of available First-Class men, and a desire to open the industry to minority-group members who may have had small opportunity to become highly qualified. Basically, of course, the motive is economic. This isn't said disparagingly; broadcasting in the U.S. is a business enterprise and economic motives are valid if they can be justified in terms of social ethics and technical excellence.

I harbor serious doubts about materially aiding minority-group members through relaxation of operator rules. The number of potential openings this would create in all of broadcasting is infinitesimal in comparison to minority-group needs. Rather, it seems that broadcasters may be eyeing a new source of inexpensive personnel who, under relaxed regulations, might never be impelled to develop higher professional qualifications.

If broadcasters want to help the disadvantaged, even in small numbers, they will set up apprenticeship programs in their respective operations. This is the route to genuine long-range opportunity for disadvantaged persons.

Such training programs would also develop additional qualified engineers to meet the current shortage. However, there is a risk: As a technician

gains knowledge and experience, he may be attracted to the many opportunities outside of broadcasting where he can command more money.

Herein lies a vital clue to the present shortage of broadcast engineers: The industry has failed to maintain the competitive financial lead it once held. While broadcast technical pay scales have risen over the years, they have failed to keep pace with living costs and the enticements of other industries.

It's fair to say, then, that broadcasting has created its own engineer shortage. The prosperity of the industry in general suggests—on the surface—no economic justification for the present situation.

The engineer as baby-sitter

There is another consideration, however. As technology has evolved, the broadcast engineer has become less productive. Greatly improved equipment reliability has reduced the engineer's value as a crisis-breaker. Given good maintenance, the modern radio broadcast plant rarely fails in service. In those operations still requiring a First-Phone man on duty, the shift engineer is reduced to a log-keeping nursemaid. His knowledge is instantly available in the event of a failure, of course, but his professional pay becomes expensive insurance when the incidence of breakdowns approaches the vanishing point.

Thus, in management's assessment, the shift engineer is a financial liability. He commands skilled wages for many hours during which his productivity consumes only a few minutes. It's extremely difficult for the business-minded to equate that limited productivity with its inordinate cost.

The result is seen in the current NAB petition to relax the operator requirements. It is based less, I believe, on its purported concern for minority-group members and the engineer shortage, than on plain old business attitudes of cost vs. productivity.

But the broadcasters have a point. It must be conceded that the shift engineer in a modern radio plant is pretty much superfluous in terms of pro-

R. H. Coddington is the author of *Modern Radio Broadcasting*, 1969, Tab Books, Blue Ridge Summit, Penna.

duetivity, and his required presence is a costly anachronism. It is the proposed remedy with which I take issue. Reduction of the requirements to admit lesser-grade operators promises to degrade broadcasting's technical standards. This isn't because Third-Class operators *can't* deliver adequate transmitter supervision; it's because so many of them *won't*.

How we got where we are

Many persons in the industry today are too young to have benefited from radio's long history. It's been nearly 20 years since the first reduction of operator requirements was conceded by the FCC.

Previously, even the smallest of radio operations—and they were as small as 50 watts—was required to have a First-Phone man attending a live transmitter at all times. In that era, most licensed men were interested principally in the technical aspects, although there were some announcers who put forth the effort to pass the FCC exam. (These "combo" men commanded about ten dollars more weekly in combined operations than did unticketed announcers.) While technical operation in those days wasn't perfect, either, it generally received more attention by qualified operators than is true of many stations today.

As radio stations proliferated and sliced up market potentials among themselves, and as TV loomed on the horizon to lure audiences away, operating economies were anxiously sought. In operations where the shift engineer did little but log readings, and perhaps operate the audio console, management saw a chance to economize. Those duties could be performed by the announcer without overburdening him (remember that radio's on-air pace was considerably less frantic then), and TV would absorb the engineers who were displaced.

So came the trend toward combined studio-transmitter plants and a campaign to obtain relaxed operator requirements and—later—remote transmitter control. In due time the FCC capitulated to the extent of permitting the routine operation of certain stations by holders of Restricted Operator Permits.

The Restricted Permit was obtained through a simple application form and required no technical knowledge. This made it available not only to any announcer, but also to janitors, office girls, and even salesmen. Thus these stations were enabled to operate with a minimum of personnel. It seemed at the outset to be a workable and reasonable arrangement. The available services of a First-Class operator were required for maintenance and other than routine adjustments, as is the case today.

What developed from this relaxation, however, was a steady increase in the number of rule violations. After more than a decade, the FCC—in its usual tardy manner—concluded that an operator must possess some technical knowledge. Consequently the FCC adopted the present rules re-

quiring the operator to hold a Third-Class permit with Broadcast Endorsement for routine operation of most radio stations. Holders of Restricted Permits in the industry immediately began memorizing enough rules and formulas to pass the necessary exams.

Without resorting to statistics, one may safely conclude that the tighter requirements have not materially reduced the incidence of violations (although the more recent FCC power to fine operators may have). The underlying cause of operating violations lies in the makeup of the non-technical license holder of *any* grade.

You can't make a silk purse . . .

In general, this operator is primarily occupied with various aspects of production. His technical duties are merely formal, legal requirements and usually are beyond his area of interest. Despite his good intentions, he easily forgets his memorized parameter limits and corrective manipulations. He also forgets even to look at the meters in the press of today's fast-paced radio.

Consider an actual example: One announcer-program director, who is highly intelligent and fully capable in his principal duties, has operated with a Third-Class, Broadcast-Endorsed ticket for a half-dozen years—ever since his Restricted Permit was no longer acceptable. When an engineer recently pointed out to him that his transmitter was operating at excessive power and should be adjusted downward, this announcer responded with: "Now, what is it that I turn to do that?"

Under his license, this man is supposed to know how to adjust the transmitter power. He had been coached on that particular transmitter from time to time over a period of about seven years. There were typed operating instructions at his fingertips, had he elected to check them; and the

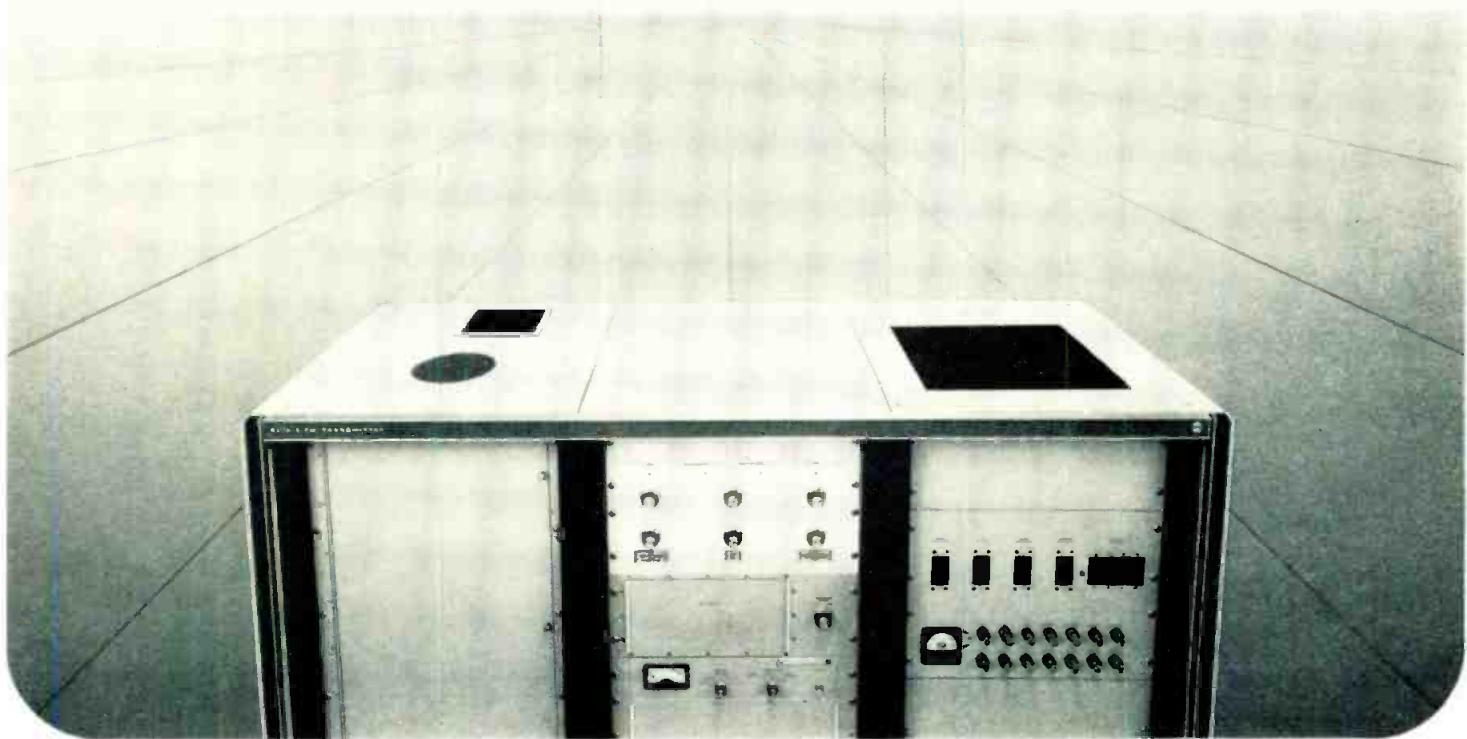
Continued on page 56

Automated logging equipment—with alarm for over-tolerance operation—can save a valuable engineer's time.



Collins FM transmitters have the best record for uninterrupted service.

**Meet our newest:
the 20-kW 831G-1**



Collins new 831G-1 transmitter gives the quality- and economy-minded broadcaster uninterrupted, dependable performance.

The 831G-1 uses solid-state on-off switching and is equipped with automatic power output control. It offers front panel tuning with complete metering and control facilities on the extended control panel. The direct FM all-solid-state exciter offers such options as stereo multiplex and an SCA generator.

For more information, contact your Collins representative or Collins Radio Company, Dept. 400, Dallas, Texas 75207. Phone: (214) 235-7863 (direct line).



COMMUNICATION/COMPUTATION/CONTROL

Circle 122 on Reader Service Card

A CARTRIDGE SYSTEM USING CASSETTES

By George Buck

You give up some sound quality, but you save time, money and inconvenience by putting your spots, jingles, IDs and what-have-you on cassettes instead of cartridges.

TAPE CARTRIDGE EQUIPMENT was our biggest need when we set about last year to improve and modernize our station's audio equipment. As a Class IV full-time 250 W AM, KONP wasn't in the market for unnecessary sophistication, however, and that's just what the cartridge systems we investigated offered: Cue tones we didn't need at all; 7½ ips tape speed was faster than we needed; cartridges were bulky and costly, especially those holding over ten minutes playing time; using cartridges on portable equipment outside the station seemed impractical. It seemed we would be paying plenty for extras of little value to KONP and would have to put up with some inconvenience, to boot.

So we took a look at some Norelco-type cassettes, running at 1⅞ ips, reel-to-reel with provision for fast forward and rewind. They are compact (2.5 by 4 inches) and easily portable, snapping in and out of the recorder without tape threading or handling being necessary. It ap-

George Buck is general manager of KONP (AM), Port Angeles, Washington.

KONP's control room features two cassette decks mounted on standard rack panels at right, and a third deck on a plywood stand located between console and rack cabinet.

peared we could get from cassettes some of the advantages cartridge and reel-to-reel systems offered, plus some added benefits—and at low cost.

So we bought five Concord F-98 portable recorders, and five Wollensak 2515 AV decks. The Wollensaks are monaural record-playback decks, designed for audio-visual use in schools, and are the most rugged mechanically of any cassette machine we found. We mounted two Wollensaks as our control room decks on aluminum panels in our rack cabinet, the third on a plywood stand. The other two decks we installed on a plywood stand in our production room.

The F-98s held their speed accurately, both on 120 VAC and on battery power, so we used our cassettes interchangeably on all ten recorders.

From our jack panels in the control room and production room (all balanced circuits) to the 2515 AV microphone inputs (unbalanced), we installed 500-ohm line-to-line transformers and 40 dB T-pads. From the 8-ohm output jacks (unbalanced) to our jack panels, we installed 23 dB minimum loss T-pads and 500-ohm line-to-line transformers.



From the three decks in our control room we brought out separate 120 VAC motor leads, so that we could leave the amplifiers operating throughout our broadcast day. This avoided the problem of warm-up time (about two seconds) for the amplifier, and permitted a fast start, remote controlled from our console program-monitor switches.

Each of these decks has adjacent to it a toggle switch to provide motor power. This permits recording, playback and cueing independently of our console.

Mechanical and electrical performance of these decks has been excellent. The manufacturer's specifications claim a frequency response of 50-11,000 Hz, wow and flutter 0.25 per cent rms, and signal-to-noise ratio greater than 46 dB.

How we use them

Of course, a major problem in using cassettes is cueing. We decided to record copy on both sides of each cassette, and to cue simply by inserting the cassette in the deck and rewinding until tape motion stopped. This may appear to be a crude way of cueing but, with a little care in recording our starts, we have found it to be quite satisfactory.

All our cassettes can be opened by removing screws which hold the sides together. This permits us to wind cassettes to our own specifications, and to replace worn or damaged tape easily. We wind all our cassettes with Scotch brand "Dyna-range" tape. We wind them without leader, making it possible to start play without delay. We put a spot of white acrylic paint at each end of the tape on each cassette, so that the operator can tell at a glance whether the cassette is properly

cued, or whether it needs to be rewound before play.

Standard playing times per side on our cassettes are 80 seconds, five minutes, 15 minutes and 30 minutes. Each playing time has its own color and block of numbers for easy and quick identification. The ends of each cassette are numbered with label tape of the proper color. And the sides are marked similarly, showing the cassette number and side identification ("A" or "B").

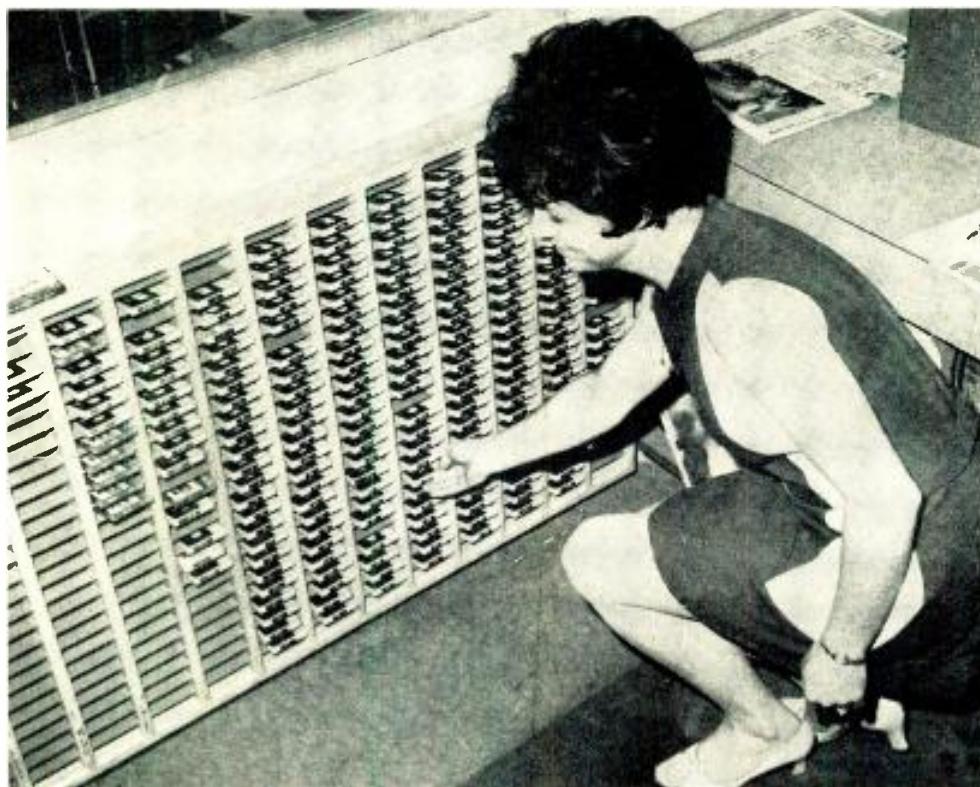
We store our cassettes in a rack 30 in. by 60 in., mounted on the back wall in our control room. This provides a capacity of 384 cassettes (768 sides) within easy reach of the operator from his regular operating position. Such compact, convenient storage is impossible with standard cartridges.

Cassettes are so inexpensive and versatile that we use them lavishly, in preference to most live copy and to other means of tape recording wherever possible. We have retired our Gates 101 Spot Recorder and now find relatively little use for our reel-to-reel tape recorders.

We record on cassettes most of our commercials, promos, IDs, public service announcements, speculative advertising copy, local special events, local newscasts—even some of the singles on our music playlist.

Our sports announcer sometimes takes taped commercials to games for broadcast. He patches the output of one of our Concord F-98s into the bridging input on one channel of our remote amplifier-mixer (a Shure M-67). When it is time for a recorded commercial, he simply inserts the appropriate cassette into the Concord and depresses the play button.

We expect to continue finding new uses for



Room for 384 cassettes, mounted within easy reach of the control room operator's desk, in KONP's 30-by-60-inch cassette rack.

New

Now showing...the Reliab*les*

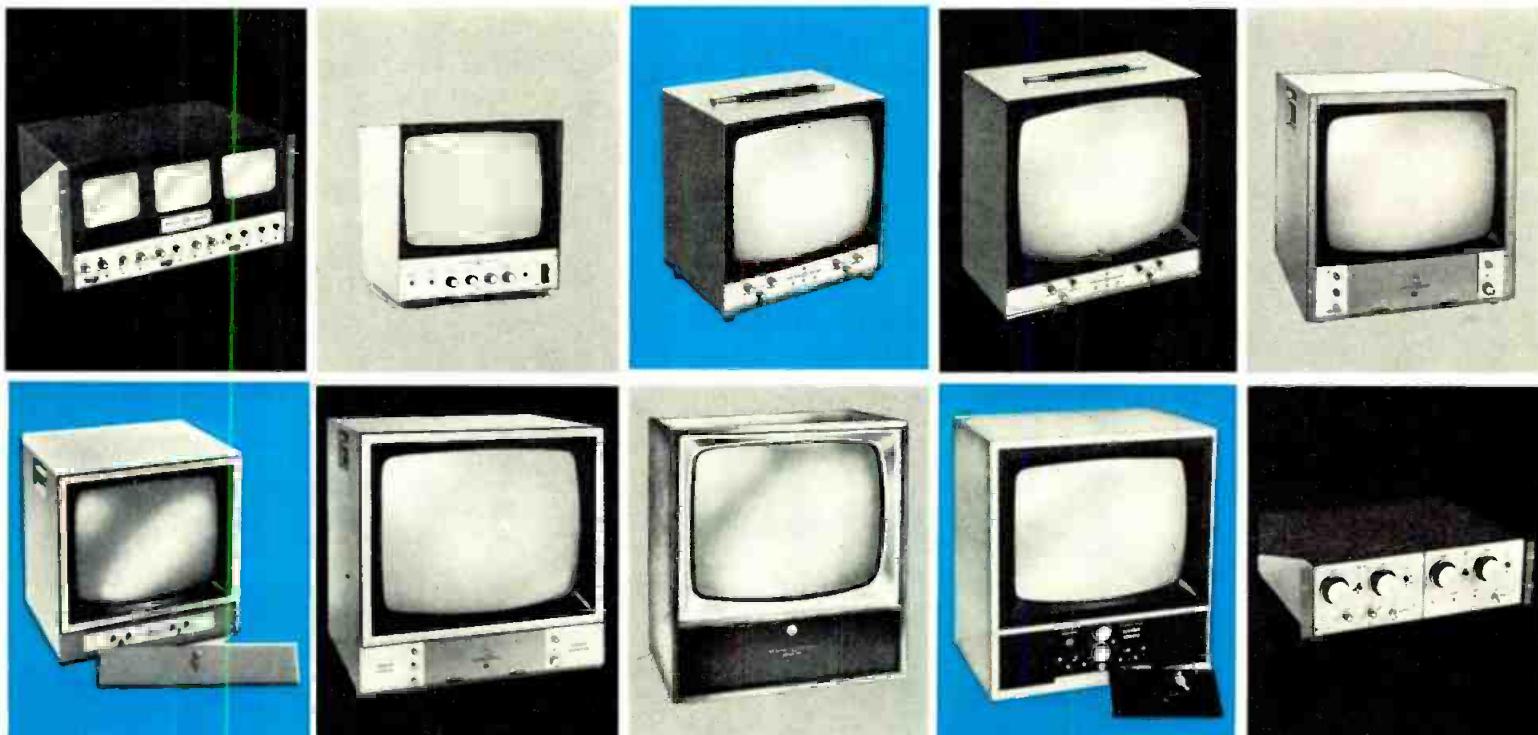
Five inch monochrome assembly features three 5" units in rackmount configuration. Small size requires less rack space than similar units and permits monitoring of 3 separate video signals. High quality, all-purpose monitors with Setchell Carlson UNIT-IZED® plug-in circuit modules.

New 10" monochrome video monitors offer horizontal resolution of 640 lines or better plus 100% solid-state circuitry for long-life reliability. Unit is available in rackmount or in attractive metal cabinet. A 12" model is also available.

In addition to 640-line resolution, the 16" monochrome monitors have all major operating controls located on the front panel for ease of operation. Front-panel screwdriver adjustments for vertical linearity, vertical height, and focus provide protection against accidental misadjustment.

Nineteen inch monochrome video monitors offer traditional Setchell Carlson quality, including exclusive UNIT-IZED® plug-in circuit modules for easy maintenance. Horizontal resolution is 640 lines or better. Available in rackmount or attractive cabinet models.

Professional quality 19" color video monitors offer broadcast quality at a modest price. Horizontal resolution is 300 lines (color) and all set-up controls are located behind a hinged front panel to prevent accidental misadjustment. Also available in 25" model.



The 23" monochrome video monitor offers excellent picture quality and attractive styling at a modest cost. Circuitry is 100% solid-state and the horizontal resolution is rated at 640 lines or better. Monitor has a variety of applications due to multitude of professional-quality features.

Regulated circuitry in the 25" color monitor provides extremely stable operation and prevents raster size or brightness deviations due to line voltage fluctuations. Horizontal resolution is 300 lines (color). Set-up and operating controls are front-mounted for ease of operation.

"Educator" Monitor/Receiver, 23" monochrome model, is designed specifically for educational and training applications. Controls are front-located. Tamper-proof control compartment door with lock is optional. Horizontal resolution is 600 lines or better with video signal input. Also available in 25" color model.

The Color "Educator" is a 25" model offering big-screen, sparkling color — 300-line (color) resolution — plus big-room audio. Designed specifically for educational and training applications, the "Educator" series Monitor/Receivers offer the utmost in reliability, flexibility, and ease of operation.

Setchell Carlson's solid-state UHF/VHF television receiver and RF demodulator provides a high-quality composite video signal and separate audio signal, assuring excellent monochrome and color picture quality. It is ideal for video recording and as a signal source for video monitors.

The quality and reliability of Setchell Carlson products is legendary. SC Electronics pioneered the concept of modular circuit construction. Every Setchell Carlson product features this concept in our UNIT-IZED® plug-in circuit modules, assuring operating dependability and maximum ease of maintenance. One hundred percent solid-state circuitry means maximum stability, long-life, low power drain, and a minimum of heat. Every feature in a Setchell Carlson product is meticulously designed to give you outstanding performance at a modest cost.

For many years, people involved in many different facets of broadcasting, closed circuit television, medical training, industrial TV applications, custom remote installations, and in the field of education have been able to depend on Setchell Carlson quality and reliability. It has become a tradition. We know that whatever your application, you will find a product to fit your need in the Setchell Carlson line.

Let your SC Electronics dealer give you a showing of . . . The new Reliab*les*. Or, write to us for more information. Remember SETCHELL CARLSON, where quality is a tradition.



SC ELECTRONICS, INC.
A SUBSIDIARY OF AUDIOTRONICS CORPORATION
530 5th AVE. N.W. ST. PAUL, MINNESOTA 55112

Circle 123 on Reader Service Card

our cassettes as we gain more experience with them. It will not surprise us to find cassettes gradually replacing discs as a source of music to be aired. Such a trend will be accelerated if the record industry begins marketing one-dollar recorded cassettes with the same type of music now provided on 45 rpm discs.

Expenses

Total cost of our five cassette decks and five portable recorders (all are record-playback machines) was about the same as the price of a single top-grade standard cartridge record-playback machine. Costs of our cassettes range from about \$1.00 for our 80-second (per side) units, to about \$1.80 for our 30-minute (per side) units. Costs for standard cartridges range from about \$2.25 for a 70-second unit to about \$12.00 for a 30-minute unit.

We have found it necessary to take special care in keeping the cassette tape, the erase and record-playback heads clean. Other than this, mechanical and electrical maintenance costs throughout three months of use have been negligible. With our good tape transport mechanisms, slow (1 1/8 ips) speed, and solid state circuitry, we anticipate continued low maintenance expense.

Probably the greatest advantage of our cassette configuration is the extreme simplicity of

recording almost anything at any place, coupled with the ability to put that same recording on the air without the necessity of dubbing or transcribing. An important corollary advantage is the ability to play any cassette recorded at the station at any place outside the station, for example in the office or store of an advertiser.

We believe that time will bring onto the market improved and more sophisticated cassette recorders and players. Already Schafer Electronics has developed a cassette recorder which will permit the use of control tones for automatic cueing. Before long we expect to see good quality cassette machines providing automatic reverse, automatic stop, automatic eject, etc. (Ed. note: Advent Corporation has come up with a cassette deck, Model 200, which uses the Dolby Noise Reduction System and chromium dioxide tape to get optimum performance on a cassette. Also, the NAB has taken an interest in broadcast use of cassettes. It has formed a committee to develop standards for cassette tape recorders to make them compatible for broadcasting.)

But even with the equipment we now use, we believe we have available to us a flexibility and versatility, combined with low cost, which are difficult to beat. We recommend the cassette route to any broadcaster who is considering the purchase of new tape cartridge equipment, or who wishes to update present equipment. **BM/E**

STRIP-LINE CIRCUITRY IS THE BEST TRANSMITTER INSURANCE YOU CAN BUY

Strip-line non-moving contacts end pitting and burning. Our 20 KW FM model 620 uses Strip-line. This reduces maintenance up to 60% and insures longer component life. If an overload occurs, our exclusive "tally light" system remembers the fault and where it was.

The 620 also has a VSWR sampling system which turns off the power if VSWR is excessive, and an automatic power output control. These features are offered at no greater cost than ordinary transmitters.

There's a Sparta Transmitter to fill every Broadcast need.



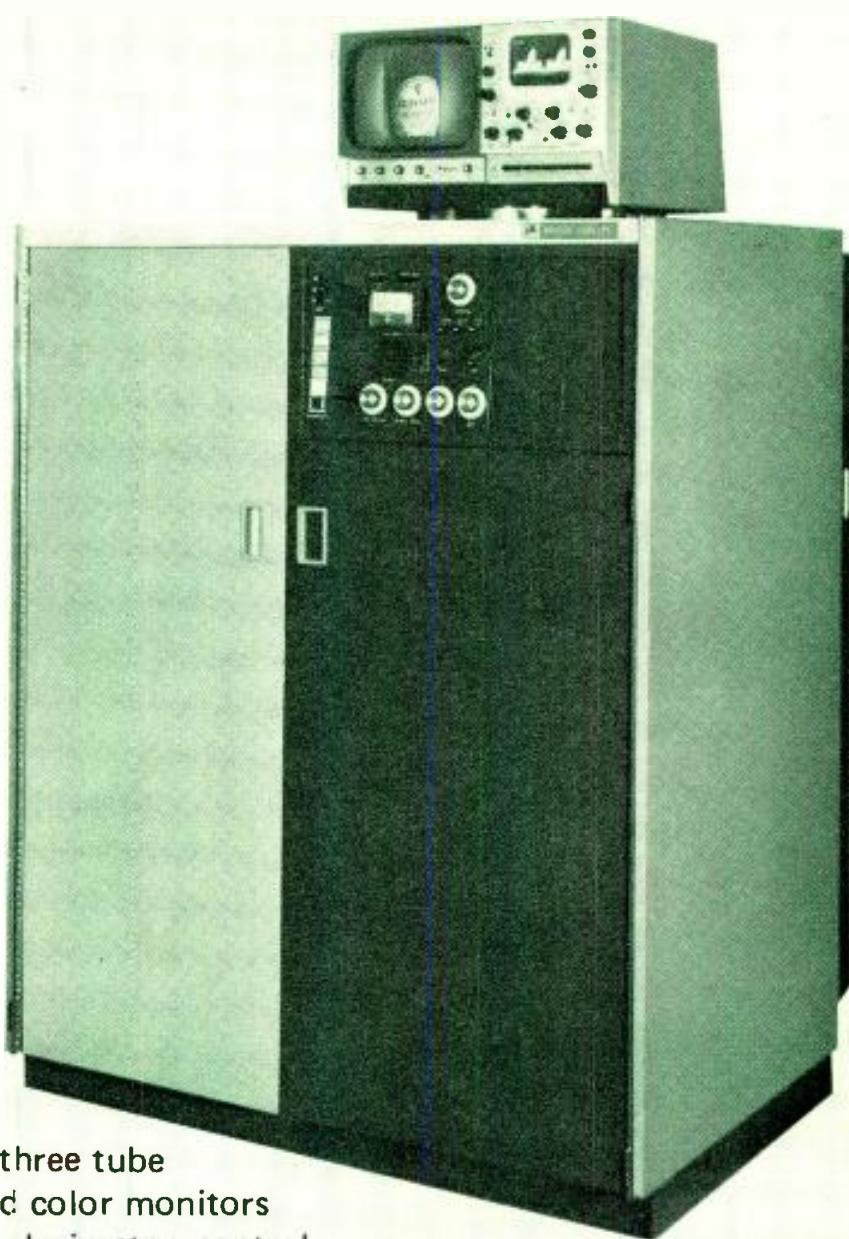
SPARTA ELECTRONIC CORPORATION

5851 FLORIN-PERKINS ROAD SACRAMENTO, CALIFORNIA 95828 (916) 383-5353

14616 SOUTHLAWN LANE, ROCKVILLE, MARYLAND 20850 (301) 424-2920

A DIVISION OF COMPUTER EQUIPMENT CORPORATION

Circle 124 on Reader Service Card



Rank Cintel's New
Photoconductive Telecine. A three tube
film chain with illuminated and color monitors
plus manual and automatic colorimetry control.

at **NAB** see us in Booth 317, and our live demonstration at the Essex Inn,
Chicago, Ill. We will be at the Inn's Park East Walk.



RANK PRECISION INDUSTRIES, INC.

New York

260 N. Rt. 303
West Nyack, N.Y. 10594
(914) 358-4450

Illinois

411 Jarvis Ave.
Des Plaines, Ill. 60018
(312) 297-7020

California

5926 E. Wash. Blvd.
Los Angeles, Calif. 90040
(213) 685-8590

Canada

1111 Finch Ave. W.
Downsview, Ontario, Canada
(416) 630-4514

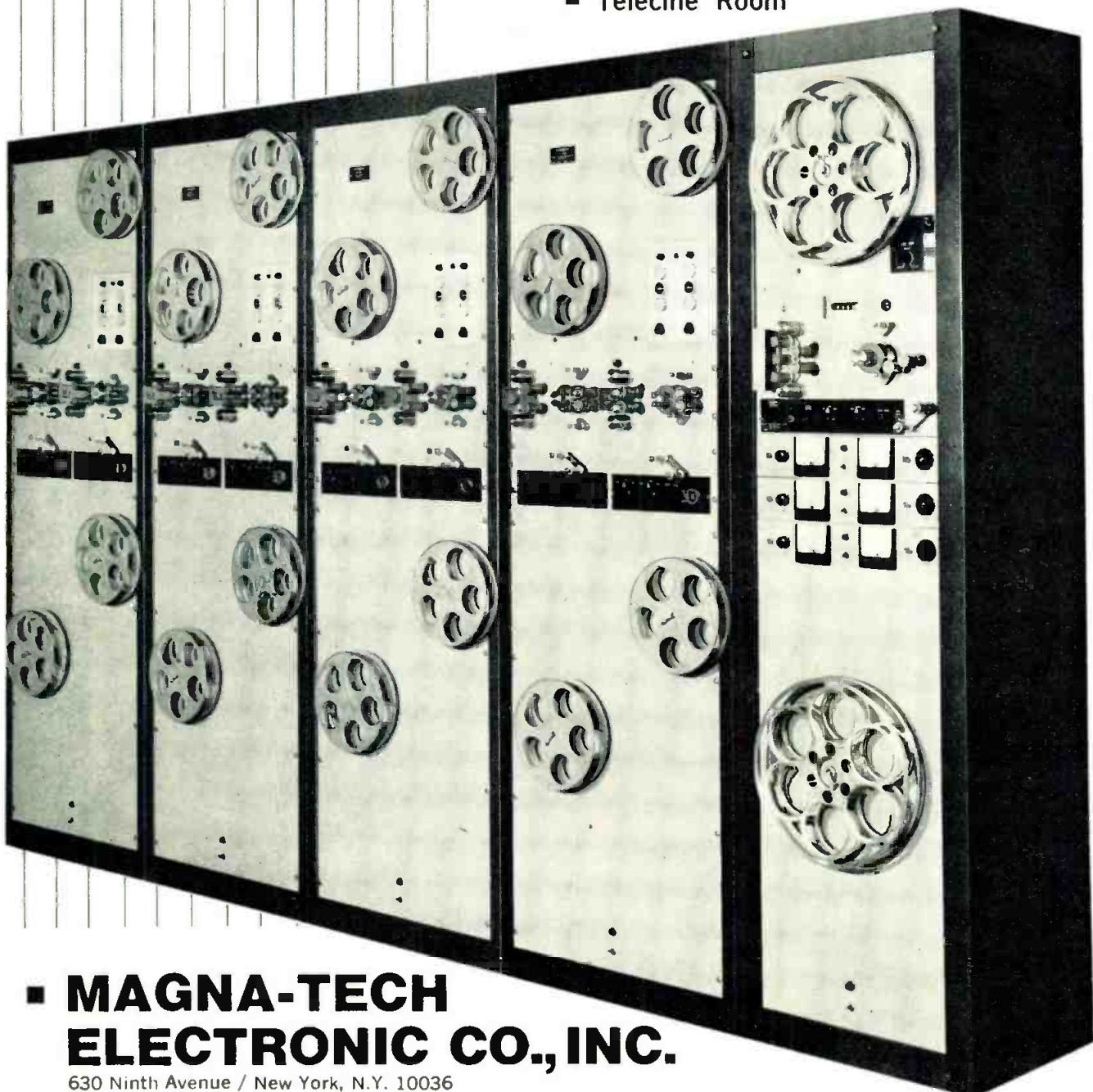
Circle 125 on Reader Service Card

M T E

FILM RECORDING & PROJECTION EQUIPMENT

- SYSTEM ENGINEERING
- AUTOMATED TECHNIQUE
- REVERSIBLE SYNC-INTERLOCK OPERATION

- FOR ■ Transfer Room
■ Sound Studio
■ Screening Room
■ Telecine Room



■ MAGNA-TECH ELECTRONIC CO., INC.

630 Ninth Avenue / New York, N.Y. 10036

- QUAD EIGHT — MAGNA TECH
11810 Vose Street, North Hollywood, California 91605
- MAGNA-TECHTRONICS (AUST) PTY. LTD.
49 Whiting Street, Artarmon, N.S.W., Australia 2064
- CINESOUND INTERNATIONAL LIMITED
Imperial Studios, Maxwell Road, Borehamwood, England

Circle 126 on Reader Service Card

AM Stereo: Just Around the Corner?

Good old dependable AM broadcasting hasn't had a consumer-oriented technical innovation in years. How can you compete with instant replay, satellite relay, color and stereo FM. Why not compatible two-channel AM?

FOR 50 YEARS conventional AM radio has provided dependable entertainment and information to the public. Today almost everyone in the U.S. has an AM receiver, yet the medium is considered old-fashioned by some. Stereo FM is supposedly tops in aural broadcasting.

If FM goes four-channel, can two-channel AM be far behind? That question was raised last year when *BM/E* heard a demonstration of compatible two-channel stereo transmitted by a single AM station. The so-called lo-fi medium never sounded so good, and even with noise, directionality came through to enhance the music.

Inventor is Leonard R. Kahn, of Kahn Research Laboratories, Freeport, N.Y. (He brought you Symmetra Peak and Voice-Line, both speech-processing devices.) Kahn explained his system and played airecheck tapes at a meeting of the Radio Club of America in New York. One tape had been made through two ordinary receivers tuned to a flea-powered transmitter in Kahn's lab. The other tape was recorded in Seattle from a regular broadcast of station XETRA, Tijuana, Mexico. It's the first AM broadcast station to go two-channel in normal programming (*BM/E*, June 1970, page 8). XETRA operates with 50 kW at 690 kHz and can be heard in San Diego and Los Angeles. The Seattle tape had interference due to long-distance reception, but clearly indicated that channel sep-

aration isn't lost or even obscured by noise.

Kahn's prototype transmission went to Mexico because AM stereo hasn't been approved by the FCC. However, Kahn said he plans to petition the Commission soon for a rule change.

Advantages

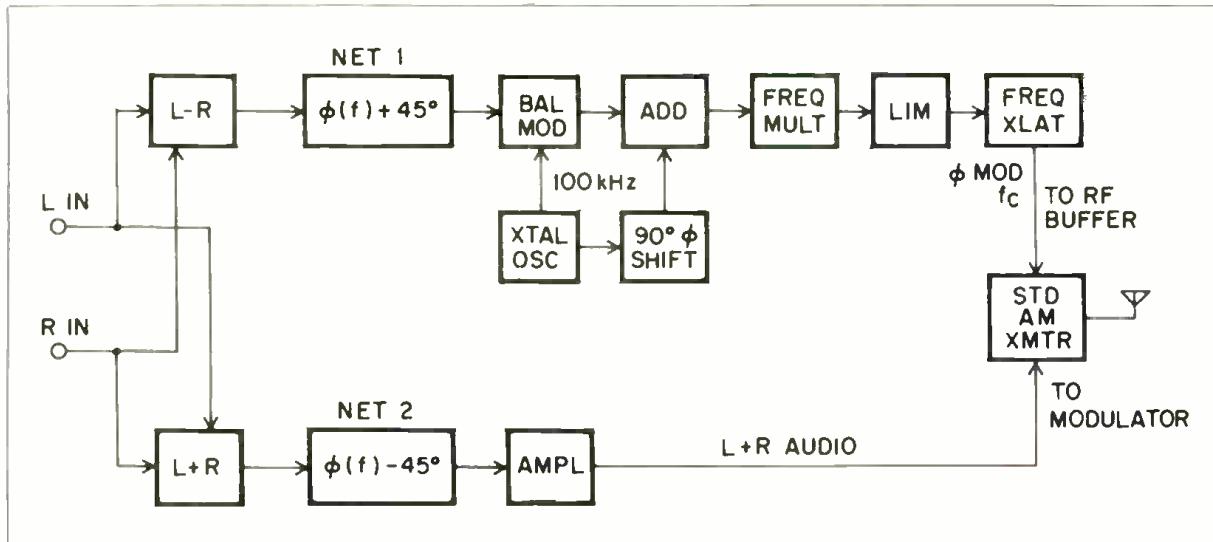
Supporting his contention, Kahn explained that his split-channel transmission system is perfectly compatible in two ways: A transmitter adaptor plugs into an existing rig, requiring no modifications. Existing receivers then get a normal mono signal.

But there's an instant added attraction: Many persons have two AM receivers, with which they can get instant stereo from a Kahn-equipped station. In essence, his system puts the left channel on the upper sideband, and the right channel on the lower. Thus you tune one receiver off-frequency upband, the other downband. Put the receivers about six feet apart and you've got stereo.

Two receivers aren't the ultimate solution, however. Kahn's chief engineer Bob Gordon has designed a single receiver that will do a better job, using ceramic filters. While there are no plans to produce it yet, Kahn is willing to talk about licensing with manufacturers.

There are still more advantages to the Kahn

Fig. 1. Kahn's stereo generator uses familiar sum-and-difference technique.



system. Channel separation isn't degraded by noise and static. Unlike FM stereo, separation in this AM stereo system isn't a subcarrier function. Rather, it's inherent in the two sidebands. That means AM stereo will work where FM stereo won't—in autos and rural homes. In cars, FM multipath distortion causes the subcarrier to drop out frequently, thus eliminating stereo. Also, the useful range of FM stereo is often limited to urban and suburban areas. Rural listeners may have a hard time getting listenable FM stereo.

Furthermore, many AM stations cover a much wider range than most FM stations. Most listeners in that wider area can get AM stereo with the Kahn system.

How it works

Fig. 1 is a block diagram of Kahn's transmitting adaptor. Incoming L and R signals are combined in the L+R matrix, then fed into Network 2, which delays the audio phase by 45°. The phase-shifted audio is then amplified and fed to the modulator in the existing AM transmitter. Thus listeners to ordinary receivers tuned to the center of the channel get an L+R signal.

Meanwhile, the same incoming L and R signals are fed to a subtractive L+R matrix and thence to Network 1. This network advances audio phase by 45°. The shifted audio is fed to a balanced modulator, where it modulates the RF from a 100-kHz crystal oscillator. Output from that stage consists of the two sidebands minus the carrier.

But the 100-kHz RF signal is also fed to a 90° phase-shifted network, then combined with the sidebands in an adder stage, producing phase modulation. The following stages are a frequency multiplier, which increases the small amount of phase modulation, and an amplitude limiter which removes any residual AM. Finally, a frequency translator heterodynes the phase-modulated RF up to the carrier frequency of the station. The signal is then fed to a low-level RF stage (such as the buffer following the oscillator) in the existing transmitter.

At the final RF stage in the transmitter, the amplitude and phase modulation components add vectorially, putting the L channel on the upper sideband and the R channel on the lower.

Receiver tuning

In Fig. 2(a) you see how a single AM receiver receives the sum of the L and R sidebands, producing a mono signal. In Fig. 2(b) you see the situation with two conventional receivers. Each receiver is tuned off-carrier by about 1000 Hz, and responds chiefly to either the L or the R sideband. Both receivers get mixed low frequencies, but this is no drawback as there's little stereo separation for low frequencies anyway.

Kahn claims specifications of less than 1% harmonic distortion from 50 to 13,000 Hz, fre-

quency response to match, stereo separation of 30 dB, and bandwidth no greater than conventional AM. Each channel suffers a 3-dB loss compared with a mono signal, but mono loses nothing. It's also less than an FM subchannel loss of more than 20 dB, according to Kahn.

The system has been demonstrated (at Kahn's Long Island lab) to several broadcasters, including executives and engineers from New York area AM stations. All were impressed.

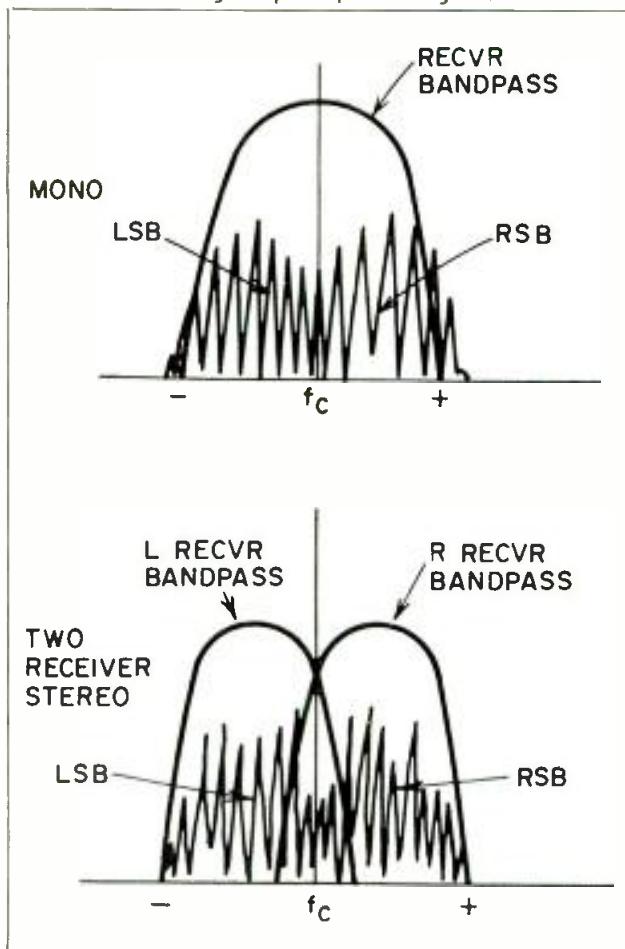
Back in 1958 both RCA and Philco separately proposed AM stereo to the FCC, which rejected the idea. Kahn said the Philco system was a hybrid with noise problems, but he admitted the FCC action then was to "give FM stereo a break." While FM stations were paupers in 1958, the situation today is considerably different.

Will AM stereo sell?

The answer is a qualified yes. FM will probably get into four-channels soon, strengthening the argument for two-channel AM. With the FCC's separate-but-equal AM-FM and one-to-a-customer rules looming overhead, broadcasters are wondering what the future of AM is. The all-talk format isn't everybody's answer, and stereo FM in cars has bombed: The 1970-71 windshield FM antennas in cars are turkeys. Multipath distortion due to auto motion wrecks stereo separation and causes severe distortion, and stereo FM covers

Continued on page 66

Fig. 2. A mono listener receives sum of L and R sidebands, while two receivers get separate, stereo signals.



Set it and forget it...

Let Soladyne show you the smallest and most reliable microwave communications systems available today... portable systems that one man can transport. It will operate unattended from its own battery power... or for six or more months from a thermoelectric generator.

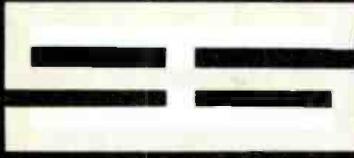
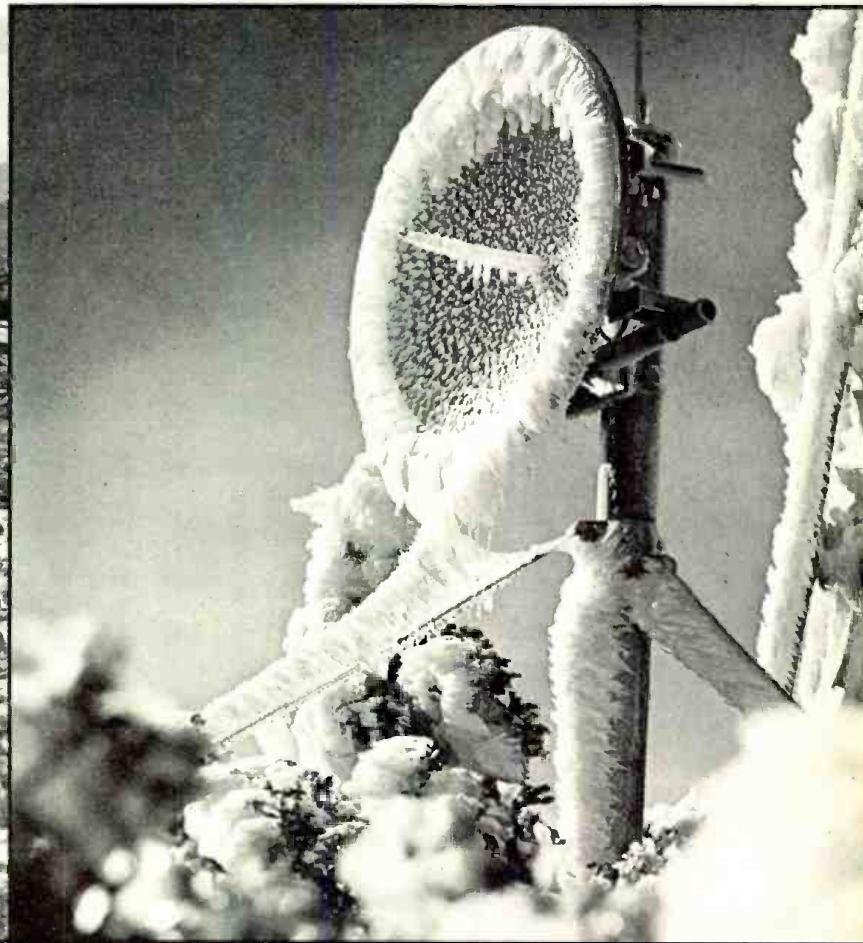
Designed for 10-13GHz band television, voice, or data transmission, Soladyne's microwave systems use the same all solid state circuitry and packaging techniques that go into space vehicle communications equipment.

Use Soladyne microwave equipment for STL links, remote broadcast pickups, emergency communications restoration, short haul, low density links for unattended remote sites, portable terminals... or for numerous other applications limited only by your imagination.

You can forget the problem of available power, easy access and excessive maintenance with Soladyne's 1501 Series Systems... for that matter, forget about the limitations of accepted techniques associated with microwave installation and start planning with systems that open a new era of total communication.

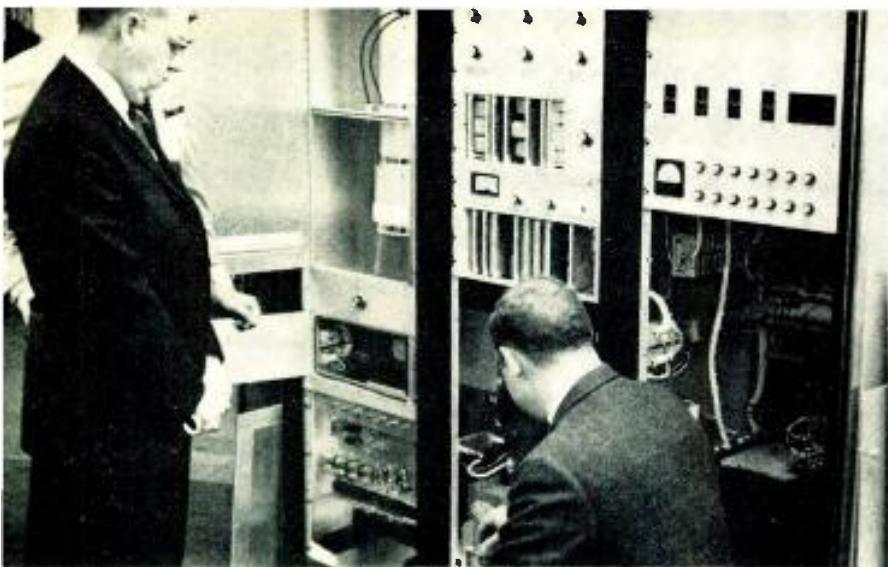
Get the facts on our precision stripline and microstrip fabrication service employing Teflon and ceramic dielectrics... as well as our component line including IF amplifiers.

For further information write Department 101, Soladyne International, Inc.



SOLADYNE INTERNATIONAL, INC.

7455 CONVOY COURT, SAN DIEGO, CALIFORNIA 92111 • (714) 279-7872 • TELEX 69-5496 • CABLE: SOLADYNE



Troubleshooting equipment—not operation—is the real value of a competent broadcast engineer.

Engineering Shortage

Continued from page 45

appropriate knob on the transmitter was clearly labeled **OUTPUT LOADING!**

Further, this announcer hadn't even realized that he was operating at excessive power. He had neglected one of the most fundamental responsibilities imposed by his license, one in which he had been intensively instructed.

This man was not guilty of willful neglect. His primary interest in production and the demands it made on his attention, coupled with a natural disinclination toward things mechanical and technical, combined to produce an individual who simply should not have been charged with the operation of a transmitter. To some degree this probably applies to most holders of lesser-grade licenses in the industry. It also extends to many who have spent a few hundred dollars and as little as three weeks of intensive cramming for a First-Class license to supplement their non-technical qualifications.

This is not to give bona fide technicians a perfect score, by any means. Certainly many engineers are guilty of violations, too—but their percentage must be much smaller, if less excusable. Most of them at least *know* proper operation, and it usually receives their primary attention.

Apart from legal technicalities, are the rule violations committed by nontechnical operators of

(Advertisement)

**How fast
can you set up and cue
a tape commercial?**

See page 26.

real consequence? Some of the common ones are. Operation outside power tolerances, incorrect modulation levels, and other measurable malfunctions are among the frequent offenses. Such conditions, when widespread, inevitably degrade radio's technical performance. Further, the very frequent offense of improper logging—while not a direct cause of inferior performance—clearly suggests that the operator has neglected to find out the actual operating parameters at sufficiently frequent intervals. If they should happen to have drifted, he would have failed to note the fact and to have made corrections. This certainly breeds potential degradation of performance.

That's the way it is today in many radio stations where lesser-grade operators are permitted. Try as he may, the supervising First-Class operator cannot guarantee top technical and legal performance at all operating times.

It seems logical to expect that, if the NAB petition is granted, similar deterioration will come to many 50-kW and directional AMs. The old-line powerhouses, traditionally the technical flagships of the AM industry, may come to sound no better than some of the marginal smaller operations to be found on every dial.

Reliable and stable though it is, modern radio broadcast equipment does need *some* supervision. If those who hold licenses as a matter of convenience, rather than of technical interest, cannot be relied upon to perform this supervision adequately, what are broadcasters to do? Is there a choice only between unrealistic, costly personnel requirements or sacrificed technical standards?

The solution: automation

Modern technology suggests an additional alternative: *automated* supervision. This is the superior solution, requiring neither inferior performance nor unproductive personnel.

It is well within the scope of the electronic art today to achieve effective and complete supervision through automatic devices. The vital parameters can be sequentially monitored as frequently as desired—several times per second if necessary. Should they drift too close to their respective limits, the supervising monitors can immediately initiate corrections—or shut the transmitter down and sound an alarm if a fault makes correction impossible. In the meantime, those parameters can be logged accurately and—again—as frequently as may be required.

This automatic, total system would provide far more intensive supervision and accurate logging than can the most conscientious engineer. Further, it can do so completely unattended, with periodic maintenance and calibration being the only demands upon technical (not operating) personnel. Once approved, this system eliminates the need for shift technicians or licenses of convenience in radio stations of all classes.

Some engineers will greet this proposal as a
Continued on page 75

You enabled us to decrease prices in the midst of inflation.

(Thanks.)

That's right. Effective March 1, many of DYN AIR's 200 television products have been reduced substantially in price. Not because labor costs are down . . . they're up. And not because of reduced parts costs either . . . they've skyrocketed!

How did we do it? Well, increased efficiency and marked decreases in overhead have helped. So have tightly controlled computerized cost accounting methods. But the primary key to reduced prices has been you.

Your faith in DYN AIR has been substantiated by a solid increase in our sales, particularly in certain product areas. Since manufacturing costs are directly related to quantity, this has enabled us to decrease our price to you.

It works both ways though, and we were also forced to raise a few prices. Not much . . . just enough to allow a fair profit in the face of drastically increased parts costs. Only a few items are affected, with the increases being very moderate.

We have refused to play the inflationary game of blanket price increases. We have also refused to price an item based upon what the market will bear. We look carefully at costs on each particular product and establish a price which is compatible with normal profit considerations. Our continued growth, even during the past year when so many corporations failed, is indicative of your agreement with our philosophy of high quality products at competitive prices.

Request a copy of DYN AIR's new price list today. We think you'll like what you see.

TYPICAL PRICE REDUCTIONS

PRODUCT	OLD PRICE	NEW PRICE
MINI-3 Video Switcher, 3-input	\$ 65	\$ 55
MINI-6 Video Switcher, 6-input	85	70
MINI-DAV Video Distribution Amplifier	255	200
MINI-DAP Pulse Distribution Amplifier	255	200
DA-30C Video Distribution Amplifier	325	275
DA-60C Video Distribution Amplifier	425	375
PD-81C Pulse Distribution Amplifier	425	375
DA-1060C Video Distribution Amplifier	180	150
DA-1064C Video Distribution Amplifier	250	200
PD-1041C Pulse Distribution Amplifier	185	150



DYN AIR Electronics, Inc.

6360 Federal Blvd., San Diego, Calif. 92114
Telephone (714) 582-9211

Please send me a copy of your new price list and short-form catalog.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

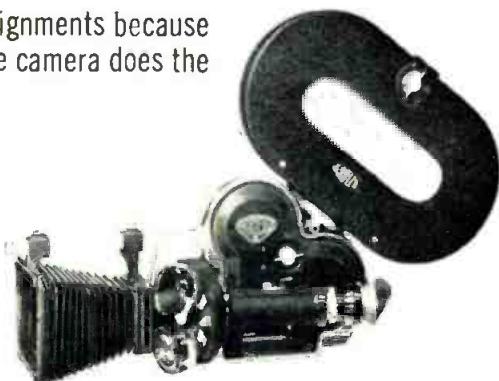
CITY _____ STATE _____ ZIP _____

Circle 128 on Reader Service Card

the most economical 16 you can buy!

"because it's the most versatile"

The Arriflex 16S/B can handle the widest range of assignments because it's part of a complete accessory system. And when one camera does the work of many, you're saving big on equipment costs.



ask any
pro about the
ARRIFLEX® 16S/B

ARRIFLEX
COMPANY OF AMERICA

P.O. Box 1050, Woodside, N.Y. 11377 • 1011 Chestnut Street, Burbank, Calif. 91502



Write for
16 page brochure
and get the
complete story.



March, 1971—BM/E

New and significant

Strobe light freezes rapid image motion, is designed specifically for B&W or color video systems, has flash duration of 50 μ s at vertical sync rate (interlocked with house sync). Videostrobe 800 furnishes 175 fc over 100 sq ft with color temp of 6000 K, has light pattern of 70° \times 90° and requires 10 A at 117 Vac. \$1995. UNILUX. 252

Digital AM freq monitor operates in three modes. TBM-8000 normally uses 10-second gate, displays deviations to ± 39 Hz with modulation. One-second gate permits precise freq adjustment of transmitter without modulation. Wideband mode uses 0.1-second switching and increases range to ± 390 Hz. Indicator lamps operate for deviations more than 10 and 20 Hz, with relay closures available for external alarm. Uses front-accessible plug-in cards, with optional cards available for analog remote metering or with parallel BCD output for automatic logging. \$975. McMARTIN. 253

Portable 14-in. VTR is battery-operated, self-contained. Model VT-100 helical recorder system uses 5-in. reels, provides 20 min recording time. System includes camera, zoom lens, microphone, optical viewfinder, inbuilt automatic light compensator, recorder with 3-in. video monitor, battery charger, rechargeable batteries. Resolution 200 lines, video S/N ratio better than 40 dB, audio freq resp 100-10,000 Hz. \$1295. AKAI AMERICA. 254

Color TV projector displays 30 \times 40-in. picture, including screen, speakers, requires only antenna, as inbuilt tuner covers 83 channels with AFT. Resolution 320 lines (center), 280 lines (corners). Wireless remote control of tint, hue, VHF channel selection, volume, on/off. Uses three projection CRTs, dichroic mirrors, has image throw of 8 ft. \$3700. Made by DISPLAY SCIENCES, distributed by TELEMA-TION. 255

Quiet lavalier mike minimizes friction and clothing noise by use of two separate cases, one inside other, shock mounted in rubber. Outer case has smooth finish, cable also smooth to minimize friction. Model RE85 weighs 8 oz, is 2 $\frac{1}{8}$ in. long, has freq resp 90-10,000 Hz, matches low-Z inputs. Comes with 30 ft cable, neck cord, tie clip, belt clip. \$133. ELECTRO-VOICE. 256

BROADCAST EQUIPMENT

Test gear

Logarithmic loss meter makes low-level VSWR measurements of -80 to +20 dBm with accuracy of -0.3 dB $\pm 1\%$. Readout is inbuilt meter for CW, external oscilloscope for swept frequency measurement. Model 501A range 5-500 MHz; Model 501 available for any RF band with external amplifier. WILTRON. 246

RF test system finds bad connections, cracks, other discontinuities in waveguide systems and narrowband coaxial equipment up to 18 GHz. Model 1580A narrowband time-domain reflectometer is useful for finding trouble in antenna feed systems of microwave communications repeaters, can identify impedance differences as low as 1%. \$6000. HEWLETT-PACKARD. 247

Triggered-sweep oscilloscope, Model 1460, has fixed-switchable sweep positions for line and field TV waveform display. Vertical amplifier bandwidth to 10 MHz, horizontal to 800 kHz, writing speed to 0.1 μ s/cm (with X5 magnification). Has FET input stage, includes combination direct and 10:1 probe. \$389.95. B&K. 248

Short locator, Model LO-1, indicates faults in connector cabling, conduits, wiring harnesses, PC boards, etc. Sends VLF signal down line, reads out via tone in headset. Also detects open line. \$495. CONCEPT ELECTRONICS. 249

Envelope delay measuring set, Model D-700, covers range 50 kHz-50 MHz with sweep or single-frequency measurements. Delay measurement range ± 2000 ns, has automatic 10-50-90% APL cycling for video equipment measurements. Self-contained sync and blanking, measures both absolute and relative delay. \$3250. DATATEK. 250

Audio gear

Electronic switch is transient-free, has freq resp 10 Hz to 50 kHz, with insertion loss 6 dB, open-circuit isolation 97 dB at 1 kHz. THD less than 0.1%, input 8 k, output 10 k. Both remote and local control. \$330. MACAN. 257

Signal/noise squelch circuit operates

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

directly on audio signal, compensates for background noise, is insensitive to false triggering. Heart of device is signal analysis computer which monitors channel to determine if information or noise is present. KAHLN. 258

Tweeter accessory adds to AR or KLH speaker system to extend HF range. Microstatic tweeter freq resp 3.5-22 kHz ± 2 dB, dispersion 180° with 0.45% THD, requires 15-60 W rms. \$77. MICRO/AcouSTICS. 259

Telephone scrambler provides privacy with any phone. Battery-powered device fits against handset, scrambles voice for all but similar device at other end of call. SIGNATRON. 260

Tape head cleaner is aerosol spray for cassette and reel-to-reel decks. Designed to remove dirt, film, and tape oxide building up on tape heads and capstans. Includes 6-in. spray extender. CHANNEL MASTER. 261

Transmitting gear

Carrier generator uses rubidium frequency standard to stabilize visual and aural carriers of TV transmitters. Inherent drift rate less than 2 parts in 10^{11} per month. Model 6500 generator provides frequency accuracy within .025 Hz for 100-MHz carrier over one year period. TRACOR. 272

Air-dielectric coax cable has copper corrugated outer conductor, solid polyethylene non-collapsible helix covering center conductor. Cufil is 50-ohm type available in $\frac{7}{8}$ -, 1 $\frac{1}{8}$ - and 3 $\frac{1}{8}$ -in. diameters with peak power ratings of 49, 160, 352 kW. All operate at TV broadcast and microwave frequencies. PHELPS DODGE. 273

TV microwave system covers 10.7-12.95 GHz, is portable, has 50 mW transmitter output, 12 dB noise figure at receiver. Model 1501-TV handles color with diff gain of 0.5 dB, diff phase $\pm 1.0^\circ$ at 90% APL. Freq resp *Continued on page 74*

NAB '71

Continued from page 36

panels. Modules mount in EIA RS-310 enclosures. Also see audio-visual system controlling sound, slide, light show.

Circle 373 on Reader Service Card

Joseph M. Soll Inc. (Booth 339)

See high-power RF control panel for switching transmitters between antennas—AM, FM, or TV. Get advice on transmitter installation.

Circle 374 on Reader Service Card

Sparta Electronic Corp. (Booth 225)

A fully functioning radio control center will be featured, using Model 1052 Automatic Program Controller and Sparta-mation Control Center. Program controller provides control and audio switching for 10 regular sources plus network and fill music. Capacity is 52 events, expandable to 260. Other products exhibited: AM and FM transmitters, including 20 kW FM rig with stable Strip-line tuning.

Circle 375 on Reader Service Card

Spindler & Sauppe (Booth 312)

Line of front, rear, slide projectors.

Circle 376 on Reader Service Card

Standard Electronics (Booth 110)

Transistorized (except for final) transmitters for FM and TV.

Circle 377 on Reader Service Card

Stanton Magnetics (Booth 208)

Hear demo of Model 500AL rugged professional phono cartridge for rough-duty DJ use. Also on tap: High-quality cartridges for disc/tape transfer use.

Circle 378 on Reader Service Card

Systems Marketing Corp.

(Booth 220)

Watch demo of Sono-Mag digital programming equipment for radio automation.

Circle 379 on Reader Service Card

Systems Resources Corp.

(Booth 108A)

New line of Chiron character generators will be introduced. Graphics I features high-resolution characters (24 X 20 point matrix), all-around edging, word-by-word color, automatic centering. Graphics II allows selection of various type fonts. Model D-500 Colorizer Mixer accepts color control and edge key inputs, produces video output with edged color matted titles.

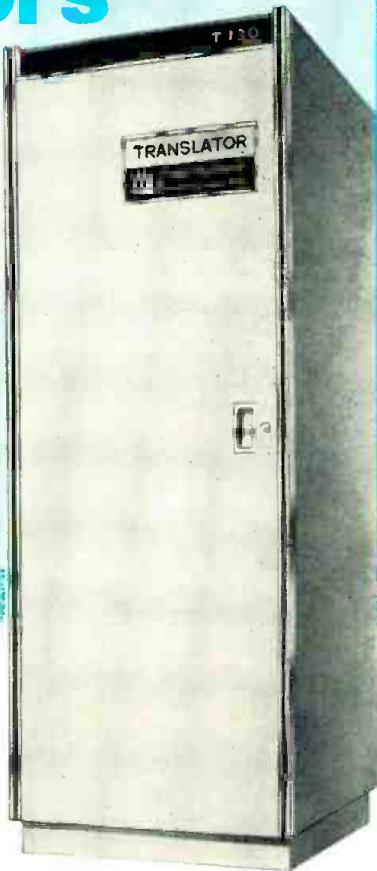
Circle 380 on Reader Service Card

Sarkes Tarzian (Booth 104)

You'll find several new TV products:

the new acrodyne Television Translators

- solid-state integrated circuits
- standardized modular construction
- virtually maintenance-free
- and priced to compete!



SEE THE NEW
ACRODYN
TELEVISION
TRANSLATORS,
BOOTH #316
AT THE NAB SHOW!

For full information—mail this coupon today!

acrodyne
industries inc

Please send details of ACRODYN T130 TRANSLATORS to:

Name _____ Position _____ Affiliation _____

Address _____ Zip _____

Prime Area of Interest _____

21 Commerce Drive, Montgomeryville Industrial Center, Montgomeryville, Pa. 18936
215-368-2600 TWX 510-661-7265

1809M-BME

Circle 135 on Reader Service Card

New production switching concept including production effects equipment designed around digital logic computer techniques; live demo of STARCOM data-processing system allowing computerized management for less than \$2000 per month, expandable into full TASCOM data processing; new three-tube color studio/film camera; master control automation; single cable distribution of all six sync feeds for color plant.

Circle 381 on Reader Service Card

Tape-Athon Corp. (Booth 236)

Broadcast music system with spot intermix will be introduced. Completely automated, Channel-Caster has minimum of two R-R transports, can be expanded up to six inputs for music and spots. Find out about the updated Model 900 audio logger tape machine, with dual capstans, automatic reversing, and self-seeking playback.

Circle 382 on Reader Service Card

Tapecaster TCM (Booth 227)

Audio cartridge tape equipment.
Circle 383 on Reader Service Card

Tektronix Inc. (Booth 102)

First pix monitors from this company will be demonstrated—Model 650 color version uses Trinitron CRT for simpler setup. Model 630 B&W monitor works on 525 or 625 lines. Check out new video test generator, Type 147. It furnishes both full-field and VITS output. Lots of other TV test gear here.

Circle 384 on Reader Service Card

Tele-Cine Inc. (Booth 116)

Zoom in on this booth and see the Schneider 11.2:1, f/2.1 manual/servo zoom lens. Then check out the new line of color camera special-effects optics including a behind-lens image rotating device which allows simultaneous rotation and zoom. And don't forget to look over the Tele-Tec videotape editing programmer.

Circle 385 on Reader Service Card

TeleMation Inc. (Booth 127)

Big news here is debut of completely new and different broadcast color TV camera. Stop by for a live demo. Then look over new TCG-1425 full-page titling generator which puts out 14 lines of 25 characters each, with such features as copy up, hop left, hop right, and flashing action.

Circle 386 on Reader Service Card

**Telemet Div. Geotel Inc.
(Booth 211)**

For TV people, a line of sync generators, video and pulse distribution amplifiers, signal generators, switchers, etc.

Circle 387 on Reader Service Card

can the same lens:

zoom from 18 to 270mm? *
angénieux 15 to 1 can

change extenders by
pushing a button?
angénieux 15 to 1 can

focus down to 25"?
angénieux 15 to 1 can

have adjustable back focus?
angénieux 15 to 1 can

have a geometric *
aperture of f/2?
angénieux 15 to 1 can

fill a full screen with an
object less than 1/2" high?
angénieux 15 to 1 can

be lighter than
a standard 10 to 1?
angénieux 15 to 1 can

* for standard plumbicon

angénieux

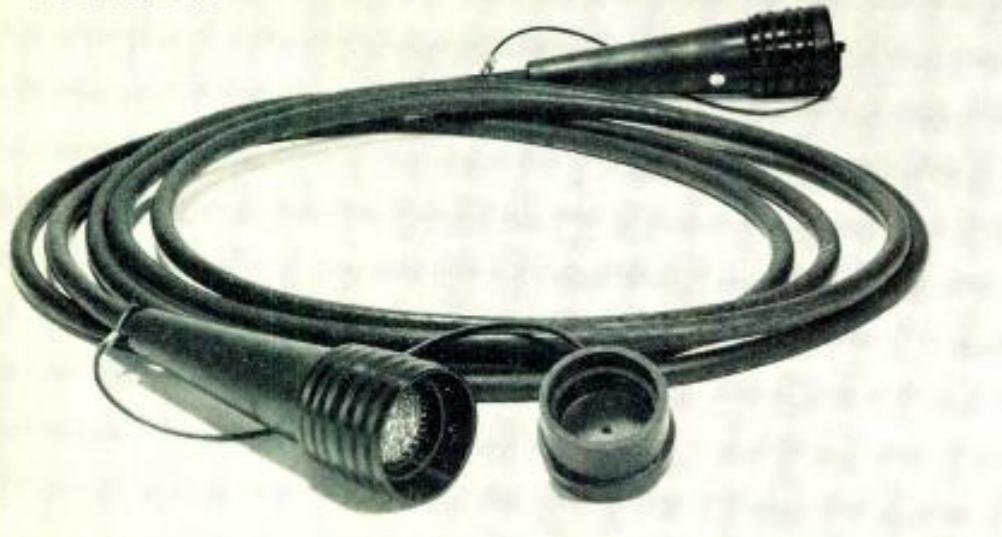
fine optics with imagination

angénieux service corporation of california
13381 BEACH AVENUE
VENICE, CALIFORNIA 90291
(213) 821-5080

angénieux corporation of america
440 MERRICK ROAD
OCEANSIDE, NEW YORK 11572
(516) 678-3520

Circle 132 on Reader Service Card

From BIW —



New, slim design — New TV-81 MiniCable is only about half as thick as standard cable. Weighs less. Easy to handle.

NEW, easy-to-handle "mini-cable" assembly for color TV cameras



New TV-85C MiniConnector — Smaller. Lighter. Shorter. Mates with all existing 85-pin connectors.



New color coding — Connectors color-coded to show length at a glance. Another BIW exclusive.



New BIW guided pin entry — Assures fast, positive connections.

. . . and you get all these proven BIW connector features:

- Outer sleeve protects mating threads from physical damage.
- Outer sleeve design assures positive alignment, pins cannot be damaged by mismatching.
- Connector parts machined 7075-T6 aluminum.
- Rubber compression gland seals against cable at rear of connector.
- All pins and sockets crimp to cable conductors.
- All pins and sockets front release, rear removal.
- Woven cable grip and molded rubber boot provide bend relief and protection against cable pullout.
- Complete with protective molded rubber dust cap.

BIW "mini-cable" assemblies for color TV cameras are available from stock for prompt delivery. Write: Robert Fanning, Product Mgr.

VISIT OUR NAEB BOOTH NO. 244



Boston Insulated Wire & Cable Company

65 Bay Street, Boston, Mass. 02025 • Tel: 617-265-2104
El Segundo, California 90245; Hamilton, Canada;
Kingston-upon-Thames, U.K.; GEDEBIW, S. A. - Clichy, France

Circle 133 on Reader Service Card

Telestrator Industries (Booth 337)

Try out unique Telestrator system—using probe, write or draw on picture monitor and thereby insert graphics electronically into video. Graphics may be recorded, played back via audiotape.

Circle 388 on Reader Service Card

Telesync Corp. (Booth 226)

See demo of video prompting equipment. Retro-Reflective front projection, and horizontal-vertical crawl.

Circle 389 on Reader Service Card

Television Equipment Associates (Booth 105)

Try on new Astrolite headsets that weigh under 8 oz. have optional ventilated ear cushions. See Magnetek videotape cleaner for both 2- and 1-in. tapes. Clean Air Shower eliminates dust at VTR transport. Other features: Cuemaster audio tape cart machine; HERN low-cost music synthesizer.

Circle 391 on Reader Service Card

Telex Communications Div. (Booth 309)

Listen to new 1325 stereo broadcast headphone, which uses audiometric-type transducers. Ask about RP-84, new mono record/playback tape preamp for decks with two or three heads, equalization from 1½ to 15 in/s. See and hear demos of recorders, headphones, cartridge gear and cassette equipment.

Circle 392 on Reader Service Card

Thomson-CSF Electron Tubes (Booth 110A)

Need high-power transmitting tubes? See new line of power-grid tubes such as TH 360 12-kW tetrode for Class B operation in FM; TH-491H 25 kW peak video power in UHF-TV service; UHF translator tetrodes with 400 W, 1 kW peak video power. Also shown: video storage pickup tube, flying spot scanner.

Circle 393 on Reader Service Card

Time and Frequency Technology (Booth 404)

New and different is TFT 701 monitor for UHF or VHF television; off-air digital readout of aural and visual frequency, per cent aural modulation. Uses internal oscillator or accepts external rubidium standard feed. Find out for yourself.

Circle 394 on Reader Service Card

Utility Tower Co. (Booth 231)

Stop by and learn about towers for radio and television broadcasting, cable headends, microwave.

Circle 395 on Reader Service Card

Varian Associates (Booth 246)

Line of integral cavity klystrons for



We've got your lens!

Broadcast or CCTV, manual or motor, 1" or 1½" plumbicon or 1", 2½" vidicon—Canon's almost sure to have just the size and performance you need, plus extra features you can't afford to pass up.

There are good reasons why the big names use Canon lenses when they build their cameras—and it's not just price or range. It's also to get the optimum in clear, sharp images for any TV need.

Check our new pride, for example: Canon TV Zoom Lens P17X30B2. Even with a zoom ratio of 17X, the relative aperture at maximum focal length is F2.5 (440-500mm). At 30-440mm it's an impressive F2.2.

This lens is most suitable for telecasting in dim light conditions, providing ideal pictures for field events in huge open areas like race tracks and athletic fields.

Here are a few examples of the whole Canon line.

	Manual	Servoized/Motorized
1½" plumbicon	P17X30B2 P10X20	P10X20B4
1" plumbicon	PV10X16 PV10X15B	V10X15R(DC) V6X16R(AC/DC) V4X25R(AC/DC, EE)
1" vidicon	V10X15 V6X16 V5X20 V4X25	
2½" vidicon	J10X13 J6X13 J5X15 J4X12	

For 1" vidicon cameras, try the Canon fixed focal length lenses; they range from 100mm to 13mm.

Professional 16mm movie photography takes on a new simultaneous sound recording dimension with the Canon Sound Scoopic 200 (200 ft. film magazine).



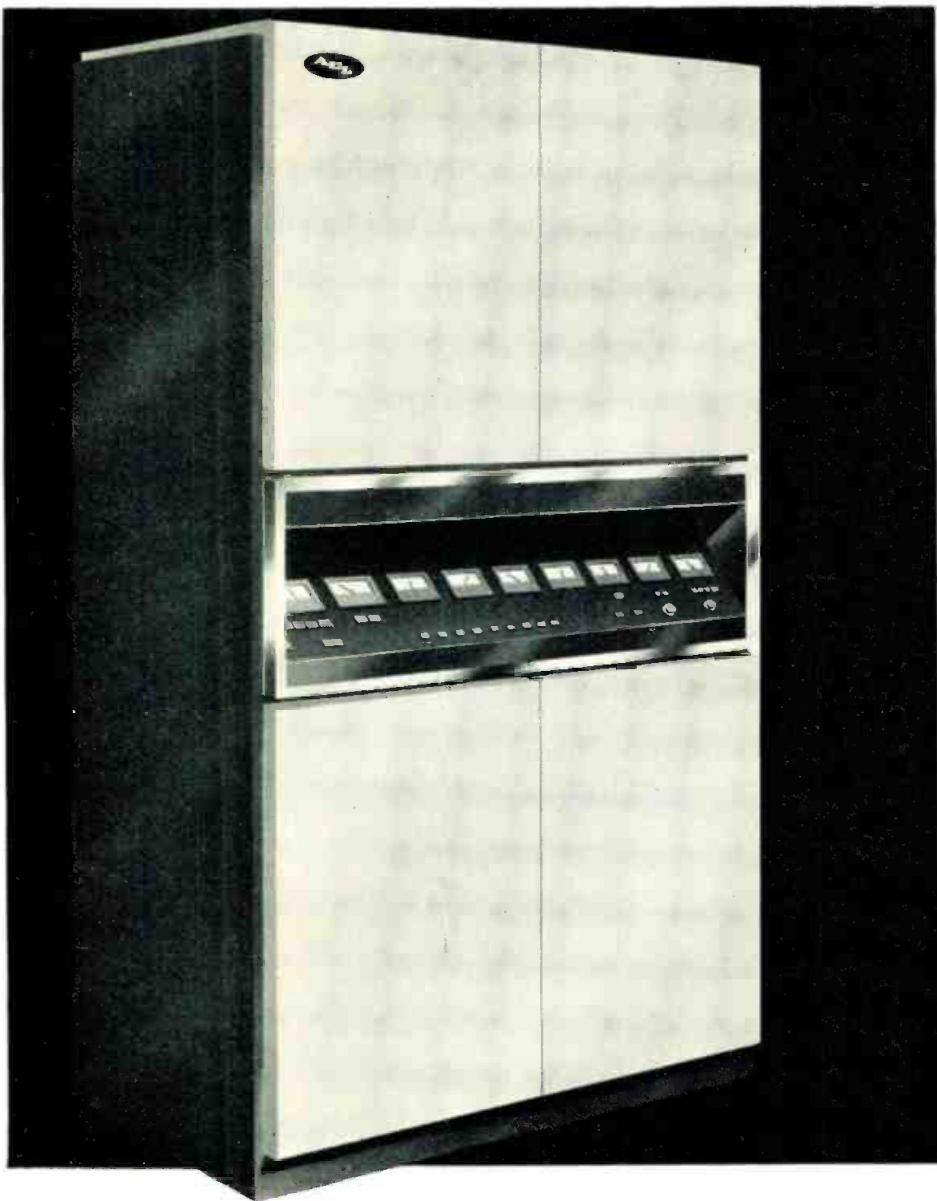
Sound Scoopic 200

CANON U.S.A., INC.: 64-10 Queens Blvd., Woodside, New York 11377, U.S.A. (Phone) 212-478-5600 **CANON OPTICS & BUSINESS MACHINES CO., INC.:** 3113 Wilshire Blvd., Los Angeles, California 90005, U.S.A. **CANON AMSTERDAM N.V.:** Gebouw 70, Schiphol Oost, Holland **CANON LATIN AMERICA, INC.:** Apartado 7022, Panama 5, Panama **CANON INC.:** 9-9, Ginza 5-chome, Chuo-ku, Tokyo 104, Japan

Circle 134 on Reader Service Card

March, 1971—BM/E

Canon



Advanced design capabilities is one reason why the AEL FM-25KD, 25KW is the transmitter for the 70's.

The FM-25KD, 25KW's all new functional design makes meter-reading easier and operation simpler while it updates your station.

We made sure that the FM-25KD was 100% right before telling you about its designed-in quality, capabilities and easy access cabinet, filled with the latest in efficient and reliable components:

Contact AEL and we'll also tell you all about our FM-12KD, 12KW transmitter.

- Full 25KW power output
- Two tube design
- Filament voltage control
- Automatic power output control
- Solid state control circuitry for improved reliability
- Designed for automatic operation
- Solid state exciter & power supplies

Advanced
Equipment
Line

AMERICAN ELECTRONIC LABORATORIES, INC.

P.O. Box 552 • Lansdale, Pa. 19446 • (215) 822-2929 • TWX: 510-661-4976 • Cable: AMERLAB

Circle 131 on Reader Service Card

UHF color television transmitters.
Circle 396 on Reader Service Card

Vega Electronics (Booth 225)
Walk around and try the professional wireless microphone system with freq resp ± 2 dB 40-15,000 Hz. Options include automatic recorder start pulse, remote control.

Circle 397 on Reader Service Card

Vikoa Inc. (Booth 321)
Cable amplifiers shown will be Futura 300 line with expanded range of 40-300 MHz to handle Super High Band (individual amplifiers), with lower second-order distortion and silicon transistors. Also see Chromadyne headend systems.

Circle 398 on Reader Service Card

Visual Electronics Corp. (Booth 301)

In the video area upgraded video switcher will be shown as well as the company's full line of character generators. Audio equipment to be shown includes new custom console, Rapid-Q carts and an AM transmitter.

Circle 399 on Reader Service Card

Vital Industries Inc. (Booth 203)

Operating equipment will include video switching systems, proc amps and special effects generators.

Circle 400 on Reader Service Card

Ward Electronic Industries (Booth 202)

Punch up patterns on new VPM-2006 production switcher with six busses, three mix-effects amplifiers and faders, four-direction pointer, sync comparators, 30-pattern effects generator, optional Chroma-Key. See other switchers too. Ward's theme: "Tour with the pro's."

Circle 401 on Reader Service Card

Westinghouse Electric Corp. (Booth 108)

Stop by for an array of power transmitter tubes, TV camera tubes, and similar devices.

Circle 402 on Reader Service Card

Wilkinson Electronics (Booth 201)

Hear new peak limiter, gain-control amplifier, and combination of both, all in mono or stereo. See new eight-channel console with straight-line faders. Other goodies: new 10-kW FM transmitter, stereo generator, field meter, new four-channel remote amplifier/mixer.

Circle 403 on Reader Service Card

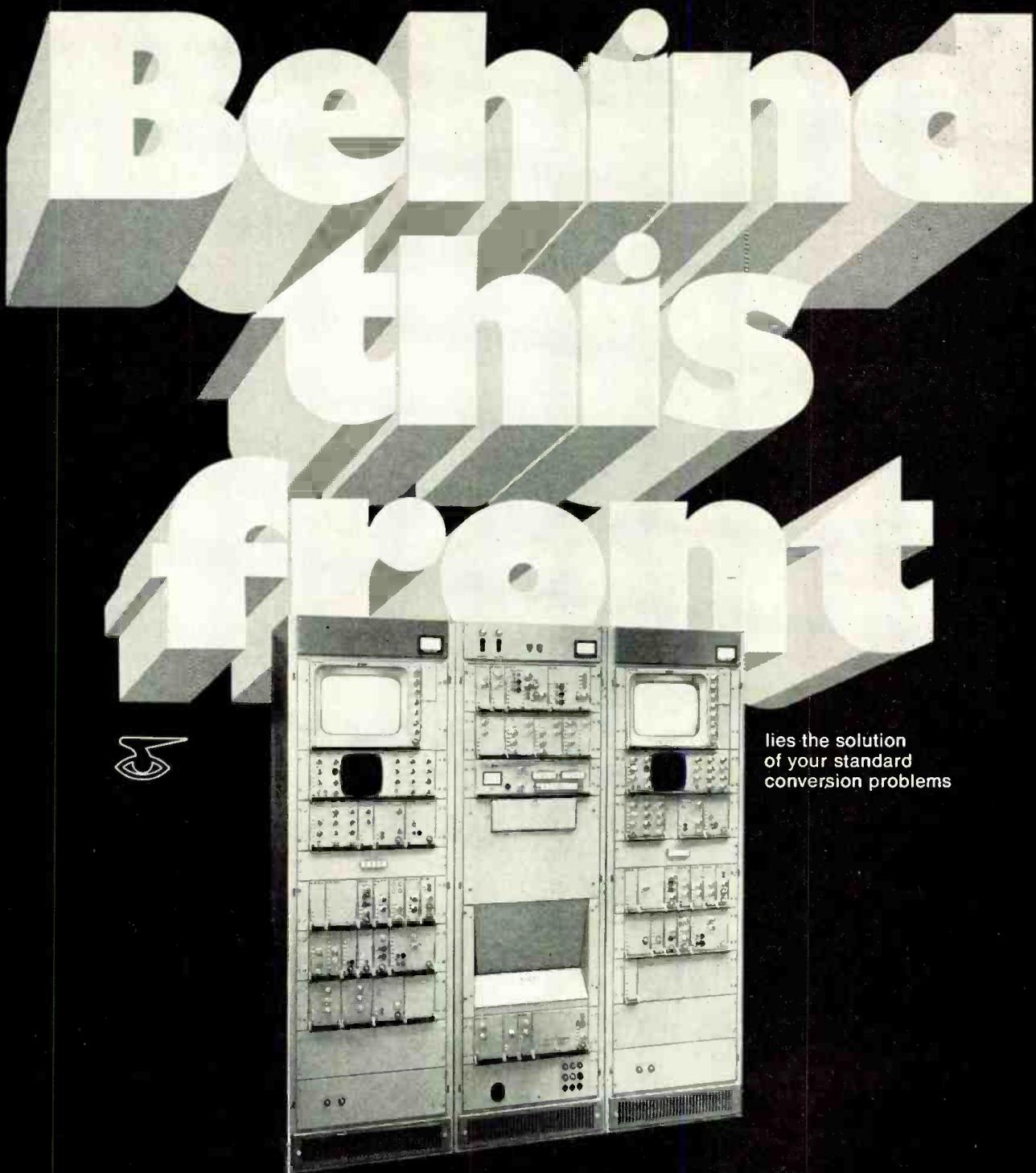
World Video Inc. (Booth 322)

Highlighting the exhibit will be all-new CB6200 one-gun color picture monitor, with 12-in. rectangular CRT, keyed back-porch clamp, A/B switchable inputs.

Circle 404 on Reader Service Card

See us at
the NAB show.
AEL BOOTH #243





lies the solution
of your standard
conversion problems

when selling TV program material to Europe or other non-FCC colour standard countries
Check the advantages of the FERNSEH electrooptical converter with all its capabilities, at NAB Show, Booth 306 A, Continental Room

- conversion of different scanning standards (525 lines/60 Hz; 625 lines/50 Hz)
- conversion of diffent color systems (NTSC, PAL, SECAM)

- push-button changeover for selecting conversion direction
- interlocked luminance and chrominance converter integrated in one
- optimum definition and high S/N ratio of "output" picture
- high operating stability, no readjustment over long periods.

FERNSEH
BOSCH-Gruppe

Robert Bosch Corp., 2800 S. 25th Ave., Broadview, Ill. 60153

AM Stereo

Continued from page 54

only metro areas, ignoring many small-town and rural listeners.

Furthermore, the current AM freeze seems permanent—there just isn't much spectrum space left to shoehorn any more new AM stations into—and this means no AM expansion in markets. AM owners won't give up facilities if there's a chance of competing with FM. They need the enhancement AM stereo offers. And AMs have sole possession of rural and drive-time metro audiences.

What about AM—does it really have to sound bad compared to FM? Not really. The bottleneck

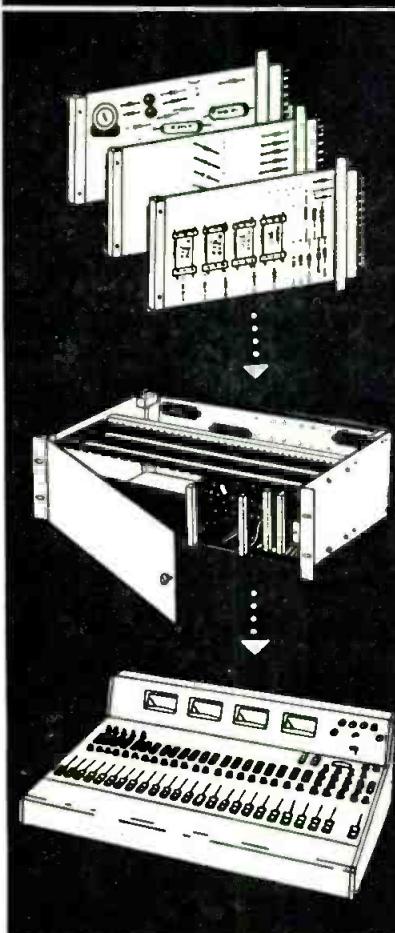
in AM fidelity is the conventional cheap receiver with 5000-Hz IF bandpass and audio response. Though few hi-fi AM receivers exist, H. H. Scott recently introduced three AM-FM chassis with 9000-Hz AM frequency response.

Transmitter fidelity is no problem; most AM stations can transmit 10- or 12-kHz audio. WABC New York uses microwave STL to achieve 15-kHz system response. Most modern transmitters have harmonic distortion figures approaching that of FM.

The one-knob AM stereo receiver proposed by Kahn would have wide frequency response, good separation, and cost about 30% more than a mono receiver, he estimates.

BM/E

NOW! TOTAL CAPABILITY WITH THE **FAIRCHILD** **INTEGRA II SYSTEM!**



Capability No. 1: Easily integrated audio components.

Capability No. 2: Simple and efficient construction.

Capability No. 3: Practically any complex audio system can be designed.

Capability No. 4: Remote control of audio functions (optional).

Capability No. 5: Solid-state technology provides compact, efficient, convenient and economical audio control.

Capability No. 6: Unmatched convenience in maintenance.

Capability No. 7: Advanced light-controlled technology.

Capability No. 8: Complete freedom from contact noise, distortion, frequency discrimination and mechanical problems.

Capability No. 9: Noise-free and bounce-free perfect switching.

Capability No. 10: Space-age standards of component design and manufacture assure highest reliability.

Capability No. 11: Complete line of accessories.

Capability No. 12: Compatible with your existing equipment.

For complete details and new colorful Integra II brochure write to:

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

Circle 137 on Reader Service Card

NEW LIT

For copies of these literature offerings, circle numbers for appropriate items on Reader Service Card.

Professional audio products are shown in eight-page catalog A-397. Includes tape recorders, duplicators, amplifiers, mixers, used in broadcasting and recording. Ampex. **201**

Video cartridge system is described in eight-page Instavision brochure from Ampex. **202**

Video sweep and marker generator is described in bulletin. Model 1054A generator covers 30 kHz to 110 MHz in single range, has twin variable pulse markers and crystal comb calibrators. Kay Eleometrics. **203**

Video delay module applications are outlined with block diagrams and specs in four-page data folder MCA-5.04. Uses include vertical enhancement, dropout compensation, stop motion. Corning Glass. **204**

Video/audio remote switching systems are described in brochure. Low-cost expandable systems use dials, with 10 composite V/A inputs per unit. Rust. **205**

Coax cables in four-page tech bulletin with complete specs for 11/U, 59/U and solid seamless aluminum sheathed CATV/CCTV/MATV cables, and 100% shielded 59/U and 6/U cables suitable for direct burial or aerial installations. Plastoid. **210**

Video data processing instruments from Colorado Video, Inc., in four-page short-form catalog. **212**

CCTV catalog covers GBC's entire line of industrial TV cameras, viewfinders, monitors, etc. **213**

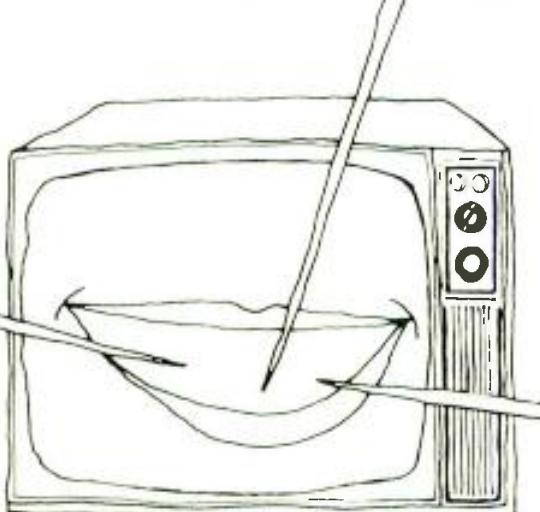
COLOR MONITORING FOR UNDER \$400 ...AND THE QUALITY SPEAKS FOR ITSELF!

Listen to what Otto Claus, Chief Engineer, WBAL-TV, Baltimore, says about general purpose monitoring with RCA'S low-cost commercial color receiver:

"Every one
of our 17 units
has operated perfectly
from original
turn on."

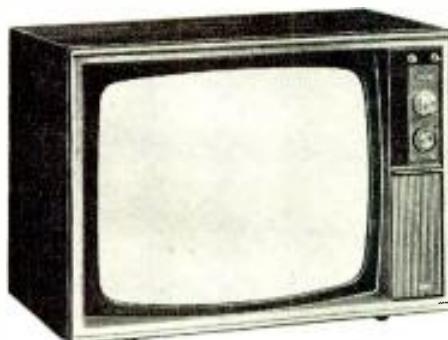
"Our only
regret is that
these units
were not
available
sooner."

"The quality
of reproduction
of these
receivers...is more
than adequate
for all but the most
exacting monitoring
functions."



Broadcast Engineers all over the country are raving about this special model. Unlike color sets intended for home use, this receiver is equipped to accept RF or bridged direct video and audio line feed without the need for costly adaptors. For under \$400, you get every non-critical monitoring function you can ask for — picture, sound, live or tape, color or monochrome. It's especially suitable for monitoring needs backstage, for the band, for the audience, and similar applications.

For complete details, send the coupon. We'll show you cold cash reasons why RCA's commercial color TV is your best answer.



RCA Commercial
Products

Circle 138 on Reader Service Card

RCA Service Company

P-143

A Division of RCA

Commercial Products Sales, Bldg. 203-3

Camden, N. J. 08101

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

Name _____

Title _____

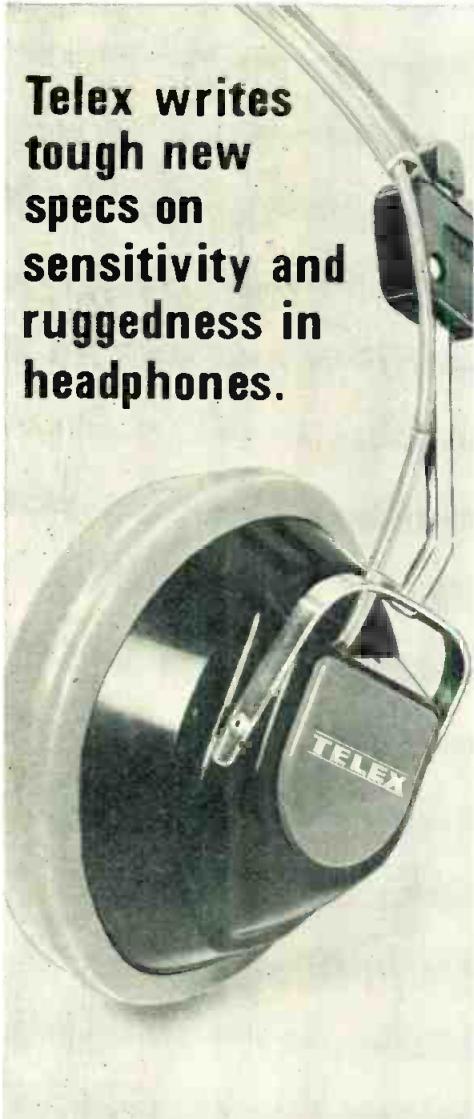
Station _____ Phone _____

Address _____

City _____

State _____ Zip _____

Telex writes tough new specs on sensitivity and ruggedness in headphones.



Communications Series 1320

HIGH SENSITIVITY AND LOW OPERATING POWER. Communications Series 1320 headphones are designed around a dramatic new driver that requires only minimal operating power. This added efficiency makes the 1320 Series the most sensitive and versatile headphones available today.

RUGGED, CONSISTENT PERFORMANCE. The 1320's rugged new cone provides peak performance without being affected by temperature or humidity. You get consistent, high quality performance, day in and day out, under the most demanding communications conditions. Contact your nearest Telex dealer or write.



TELEX
COMMUNICATIONS DIVISION
9600 Aldrich Avenue South
Minneapolis, Minnesota 55420

Circle 139 on Reader Service Card

68

SALE OF THE MONTH

Local station's leverage helps

*Si Willing, President
Radio KMAR, KCRF-FM
Winnishoro, La.*

The Challenge: With the right leverage you can lift the world—or at least you can go on the offensive with a disgruntled customer. By taking advantage of their own consumer power, local stations can offer advertisers *service without servitude*—which might save loss of a good account when disagreements occur. I found this out when one of my good sponsors asked me to advertise a lottery contest he was running. I quoted from the FCC Rules and Regulations forbidding broadcast of information on contests requiring participants to buy something before they can win. But he was upset at my refusal to air the lottery—and he was adamant about maintaining his purchase requirements. So the customer cancelled his schedule. When I reminded him of my station's 30-day rate protection, he exploded: "More people listen to (a competitive station in a town 40 miles away) than they do to your station. I'll just give them the schedule and you can your increased rates!"

The Solution: I kept my temper (no one else wanted it), said a polite goodbye and returned to my station. Polling my staff I discovered that *my staff alone was spending over \$1000 a month with that sponsor*. His monthly schedule with us was about \$400. Checking his prices over the past few months I found that he had raised prices dozens of times. He was strictly cash and carry, also. With this information I returned to his office, carrying a load of packages—now *I was his customer*. He was in a better mood and listened quietly while I told him:

"Mr. Jones, now that I am YOUR customer, please let me give you a few facts and figures. First, my staff spends over a thousand dollars a month with you—cash on the barrelhead. Second, you spend about \$400 a month with us so you have about a 250% return on your investment from the advertising medium alone. Third, I'll bet, you get no revenue at all

from staff members of the other station because they're located forty miles away. Fourth, you raise prices overnight and never give us price protection. Fifth, you take thirty and sometimes sixty days to pay while we pay cash as we go and never get excited when you have an overnight price increase." I paused and then said, "Mr. Jones, we hope that you will consider these facts and then let us know what the final decision is about your schedule."

Jones thought it over for about 30 seconds and asked that his schedule be allowed to continue. He even helped me to the car with my packages.

THE LEADER IN CATV TOWERS

**"Quality—Service
and Price!"**

Yes, quality, service and price on CATV systems are the reasons for Fort Worth Tower's position as the industry's leading supplier. Experience gained as a pioneer supplier of CATV enables Fort Worth Tower to provide you with a quality product at a price that is reasonable and attractive.

Take advantage of our experience. For assistance in systems planning, engineering and complete systems quotations . . .

CALL OR WRITE TODAY

Fort Worth Tower
COMPANY, INCORPORATED

P.O. Box 8597, Fort Worth, Texas
(817) JE 6-5676

—Associated Companies—
Tommy Moore, Inc.
Big State Engineering, Inc.
Tower Construction Finance, Inc.

Circle 140 on Reader Service Card

March, 1971—BM/E

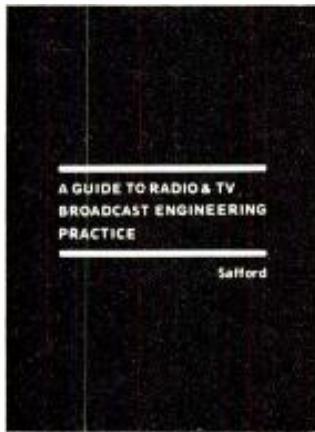
THE FIRST NEW BROADCAST ENGINEERING BOOK IN YEARS!

SAVE \$3.00
on this Special
Prepub Offer!

A Brand-New, Practical Handbook for Broadcast Engineers & Technicians

A GUIDE TO RADIO & TV BROADCAST ENGINEERING PRACTICE

By E. L. Safford, Jr.



- BRAND-NEW & ORIGINAL
- COVERS BOTH RADIO and TELEVISION
- MONEY-BACK GUARANTEE
- 288 Fact-Filled Pages
- Handsome Hardbound Volume
- ONLY \$9.95 (if you order now)

CONTENTS

PART ONE: RADIO

- Operator Qualifications
- Broadcast Equipment & Maintenance Philosophy
- Case Histories
- Antenna System Test & Maintenance Procedures
- Shunt-Fed Antennas
- Directional Phasing & Matching Networks
- Multi-Station Towers & The "Galloping" Guy Wire
- Maintenance Procedures
- Most Common FCC Violations
- Consulting Engineers

PART TWO: TELEVISION

- Introduction to TV
- The Television Station
- Special Equipment Needs & Technical Problems
- TV Maintenance Procedures
- TV Case Histories
- What Should Your Salary Be?

A modern, up-to-date, comprehensive handbook on all phases of broadcast operation, maintenance and troubleshooting.

Here's a book long needed by the radio and TV engineering profession—in fact by anyone with an interest in radio and TV broadcasting, since it covers all aspects of the subject from personnel qualifications to proof-of-performance measurements.

This invaluable volume is divided into two parts—Radio and Television—and begins with a discussion of personnel qualifications. Here you'll find useful suggestions on how to classify various levels of technical competence and how to encourage improvement at each level. Preventive maintenance is given thorough treatment, including how to set up a schedule based on analysis of failure rate and probability, and how to determine tube replacement and spare parts requirements. Also, a number of actual case histories provide answers to tough or unusual problems. Extensive attention is given to AM antenna systems: how to measure antenna reactance, impedance, and resistance; the use of shunt-fed towers; the design and operation of directional phasing and matching networks; and multi-station towers. The television section also includes a complete description of a model station, plus practical engineering suggestions supplied by stations all over the country. You'll be fascinated by a "tour" of what is considered to be one of the finest TV operations anywhere. You'll see their layout, equipment setup, and gain valuable insight from reading the philosophy behind the design and construction of this

And, this engineering manual is as valuable to management as it is to technical personnel. It not only involves the daily nuts-and-bolts aspects, but also covers those phases of vital interest to administrative personnel (including those who hope to move into administrative positions). For those perplexed by the "operator" situation, the author offers poignant suggestions for solving present problems and working toward more equitable arrangements within the organization. In fact, some of the ideas could well be the basis for revolutionizing the entire field of broadcast engineering.

While an in-depth consideration of equipment was not intended to be a part of this work, there is enough information, both descriptive and pictorial, to acquaint any uninitiated reader with typical equipment used in radio and TV stations. Also suggested is a maintenance philosophy based on proven calculated probabilities of failure. You'll see how a preventive maintenance program can practically eliminate lost air time and cut overall maintenance costs to

the bone. The most prevalent (and some not so prevalent) technical problems are described, along with suggested solutions and appropriate comments. There's a good chance that the solution of some of your persistent problems are included. An entire Chapter is devoted to directional antenna systems—how to use vector diagrams in designing the necessary phasing, power-dividing, and matching circuits. You'll also read about common-tower systems and the problems encountered when several AM stations use the same tower. Covered also is the design of shunt-fed antennas which are becoming increasingly popular with many stations.

An analysis of existing radio and TV maintenance procedures indicate what is being done and what should be done in broadcasting operations. By comparison, you'll see why some methods fail and why preventive maintenance is so important. For those who are continually "hung up" on tests—both routine and special—the author tells how to avoid the common pitfalls. You'll be amazed at the attitude some have regarding response tests, and you'll see why radio and TV proof-of-performance checks are so important (aside from meeting FCC requirements).

Also of vital concern is a list of most frequent FCC violations. Most broadcasters should find a perusal of the list most revealing and helpful in looking at their operation. To those who have not had personal dealings with the "professional," the discussion of the consulting engineering profession should be helpful, particularly in cases where it's necessary to rely heavily on outside assistance and for those in the lower engineering rank who aspire toward professional advancement. You'll find this one of the most interesting and informative books ever printed. 288 pages, over 140 illus. Hardbound.

"A Guide to Radio & TV Broadcast Engineering Practice" is published to sell at \$12.95. But, if you order now, you can save \$3.00. The Special Prepublication Price of \$9.95 prevails through April 15th, 1971.

Order today at our risk for FREE Examination. SEND NO MONEY! Simply fill in and mail the handy, NO-RISK coupon below to receive your own copy of this helpful volume!

Other Helpful Books On Broadcasting For Every Station!



VIDEO TAPE PRODUCTION & COMMUNICATION TECHNIQUES
By Joel Efrain. A complete how-to-do-it handbook on video production, direction, and program creation for broadcast, CATV, educational, and industrial applications. Finally, here is a handbook that covers video tape production techniques for those who want to learn the art from scratch. The author has taken a down-to-earth, how-to-do-it approach to clearly explain every aspect of the subject. It is a practical text on techniques, with emphasis on production, beginning with the basics, the rudiments of putting a program together, and finally the direction of the complete undertaking. 256 pps., 125 illus. Hardbound. Order No. 541 only \$12.95



AM/FM BROADCAST STATION PLANNING GUIDE by Harry A. Etkin. A comprehensive guide to planning, building, and operating a radio broadcast facility—AM, FM, or combined operation. Based on a lifetime of experience and intimate association in broadcasting, the author details how to find a frequency, apply for it, and how to plan and build a new station, or update and remodel an existing facility. Included are numerous floor plans, studio and transmitter building construction guidelines, tower and equipment specifications (including automation), preventive maintenance—plus thorough treatments on preparation of Form 301 and making proof-of-performance measurements. 160 pps. 8½ x 11" Vinyl Cover. Order No. 500 only \$12.95

PUBLISHER'S GUARANTEE

Put the information in these books to work for you for 10 days. If they don't prove to be worth several times their cost, return them and we'll cancel invoice.

NO RISK COUPON—MAIL TODAY

I TAB BOOKS, Blue Ridge Summit, Pa. 17214
Please send me _____ copies of "A Guide to Radio & TV Broadcast Engineering Practice" at the Special Prepublication price of only \$9.95 (10% additional discount on 3 or more copies).

I Also send me No. 541 No. 500
 I enclose \$_____ Please invoice on 10-day FREE trial

I Name _____

I Company _____

I Address _____

I City _____ State _____ Zip _____

I SAVE POSTAGE by remitting with order.

B-31

Circle 141 on Reader Service Card



THE CB6200

ONE-GUN COLOR BROADCAST MONITORS
BOOTH NO. 322 N.A.B. SHOW

SALES OFFICE

BOX 263, CORNWELLS HTS., PENNSYLVANIA 19020
Circle 142 on Reader Service Card

PHONE 215-639 1094

EVERYTHING YOU EVER WANTED IN AN RF WATTMETER

BIRD THRULINE* High Power Directional Wattmeters are the standard of the industry for accurate high-power measurement of CW, AM, FM and TV signals. Forward or reflected power indication during normal system operation is selected by rotating the Plug-In Element. Many variations are available, such as dual-element Line Sections, instruments for reading Peak Envelope Power (as in TV), WATTCHER Control Units for protection from VSWR damage, etc. Write for catalog.



Model 460
3½" EIA Fig.

SPECIFICATIONS

LINE SIZES:
7/8", 15/8", 31/8", 61/8", 9"

IMPEDANCE:
50 or 51.5 ohms, flanged
or not

POWER RANGES:
1W - 250kW

FREQUENCY RANGES:
0.45 - 2300MHz

ACCURACY and VSWR:
±5%, 1.05 max.

PRICE: From \$165

BIRD

ELECTRONIC CORPORATION

Cleveland (Solon) Ohio 44139 • 30303 Aurora Road
Ph. 216-248-1200 • TWX 216-248-6458 • Cable BIRDELEC

See Us At The IEEE and NAB Shows
Circle 143 on Reader Service Card

CROSS-TALK

Reader comments and queries are always welcome on BM/E articles and broadcast industry matters. Just address your letters to:

Crosstalk
BM/E Magazine
820 Second Avenue
New York, N.Y. 10017

Quality now . . . or pay later
Dear BM/E:

As a career engineer who has never signed the front of a pay check, may I address some thoughts to station owners?

Generally, managers are remunerated on a commission or other incentive basis. Naturally, when they feel that purchases of major equipment items are coming out of their own pockets, said purchases tend to be deferred "until next year."

Over the years you end up with a deteriorated plant that you can't afford to rehabilitate and can't peddle to anyone else. Your accounts are taking their spots to your competition because they sound crisp and clear over there instead of muffled and blurry as they do on your station.

There should be an orderly system of replacing equipment, with due regard to tax considerations, and it should be outside the manager's incentive program.

Also, *someone* around the place should listen to the station with a critical ear and keep up on advancements in the audio art. (Example: there have been at least three generations, now, of stereo pickup cartridges.)

Incidentally, the weakest link in most stations' equipment chains is the last—the monitor speaker. Generally it is a four dollar model in a three dollar box. Nobody knows where it came from or when. This is a good starting place when upgrading your station sound. Check some of the hi-fi shops. Your eyes and ears will be opened.

Finally, the degree of compression and limiting to be used is a matter of major importance which should be decided at the highest management level, in consultation with your engineer and with due thought to the kind of programming involved.

Name withheld
upon request

Editorial policy

Dear BM/E:

On page 50 of your preview issue six years ago, you published my response to BM/E's initial inquiry on

the need for such a magazine. I was then general manager of a small market station in Mauston. Six years later, I am news director for a medium market station in West Bend, but my thoughts remain the same—that articles published in *BM/E* have definitely been a welcome addition. Many of them I have placed on file for reference material, while others I have read and hoped to remember.

You speak (in *From the Editor*, January, 1971) of a new goal in the coming months. I wish you well in achieving that particular objective. My one hope, however, is that you continue to provide the type of information you have in the past six years with the fine variation between engineering and management problems. Some of your recent articles have been especially good.

Once again, congratulations on your past efforts; and good luck on the future ones. I hope you always will be able to continue—and thus, provide that needed addition to our profession.

John Schaller
News Director, WBKV
West Bend, Wisconsin

WFMT's s/n

Dear *BM/E*:

We were especially interested in the recent article on WFMT (December 1970 *BM/E*, page 12), as we at KPEN have also built a four-channel console using ICs as well as a sophisticated modulation controller (also using ICs and FETs).

However, lest anyone else try to duplicate Mr. Antlitz' s/n specification of 86 dB, he should first be advised that this achievement is more the product of high-output microphones than of console design. —131 dBm is the equivalent noise generated by a 600-ohm resistor; in other words, noise levels lower than this cannot theoretically be obtained. As a practical matter, the best circuit designs yield figures of —129 dBm or —130 dBm.

Thus under optimum conditions microphone output level must be at least —44 dBm in order to achieve signal to noise ratio of 86 dB. Many broadcast microphones, such as the RCA ribbons, have an output level more on the order of —60 dB. Often the FCC's requirement for 60 dB s/n is difficult to achieve with these microphones since the noise of many microphone pre-amps is scarcely better than —120 dBm.

While there is some room for improvement in typical console design as far as microphone pre-amp noise, it is impossible to attain the degree of improvement ascribed to the WFMT consoles by console design alone.

Lawrence Gahagan
Co-General Manager, KPEN
Mountain View, California
Continued next page

If Viscount Video's new-generation routers made sense for MOL—maybe you should take a look...

(after all, we designed them for you in the first place)

When Viscount developed routers incorporating "IsoSwitch" solid-state integrated crosspoints, we knew we had a breakthrough in simplicity and rugged reliability.

First we found we could eliminate expensive plug-ins and sockets and rely on the intrinsic reliability of the components. Second, we no longer needed one selector per crosspoint. Now we only needed one per input and one per output . . . and one control wire for each input bus and one for each output bus.

"At last," we said, "we'll be able to offer every school . . . every industrial user . . . every TV-oriented institution of **any size**, the type of simple, low-cost, push-button circuitry that's been built into giant computers. Truly, a space-age breakthrough."

Guess who heard about it before we even had a chance to talk to you? A prime U.S. Air Force contractor. "We'll need this kind of simplicity and dependability for the Manned Orbital Laboratory launch complex", they said. And they asked us to supply them.

Naturally we were very proud. But the point is . . . these routers were really designed with **you** in mind . . . not MOL. So may we send you more information on VVS routers? (When you find out how reasonable priced they are you'll also have new respect for the Government's ability to get full value for a dollar).



VISCOUNT VIDEO SYSTEMS LTD.

105 East 69th Ave., Vancouver 15, B.C., Tel. (604) 327-9446, Telex 04-507623

Eastern Region: 107 Penny Lane, Michigan City, Ind., 46360 (219) 872-2211

Western Region: 6815 Bristol Drive, Berkeley, Ca., 94705 (415) 549-3608

Southern Region: 3286B Covington Drive, Decatur, Ga., 30032 (404) 284-4102

(Dealerships established in Europe and the Far East)

Circle 144 on Reader Service Card

If you want a tube distributor who knows your business, give it to him.



**He's your RCA Broadcast Tube Distributor.
No. 1 in tubes for all broadcasting applications.**

What made him No. 1? Emergency service is one reason. It's like money in the bank.

For example:

You're on the air. It's late, a tube fails. You're low on replacements. Too low for comfort. So you call your RCA Broadcast Tube Distributor. To keep you on the air, he'll get out of bed to fill your order!

There are more reasons.

Experience. He talks your language, knows your needs. Some of our distributors have been in the business of supplying broadcasters for as long as we have—40 years!

Engineering service. He has a "hot line" to RCA's Field Engineers. Call him any time you need their services. Call even if you need help in servicing our competitor's equipment!

Quality. You know the story. He stocks the finest.

In power tubes, for example, brand preference studies by leading electronic publications have listed RCA as the first choice of professional designers year after year!

Inventory. The widest. Power tubes, rectifiers, vidicons, image orthicons. Think of his establishment as your tube warehouse. For all practical purposes, that's what it is!

Need more reasons? Call your local RCA Broadcast Tube Distributor. For starters, ask him for the new 1971 Guide to RCA Industrial Tube Products, or write: RCA Electronic Components, Commercial Engineering, Dept. 21C Harrison, N. J. 07029.

P.S. Your RCA Broadcast Tube Distributor is also the man to call for RCA Starmaker Microphones.

The Action Team
RCA
Industrial Tube Product Guide

1971
Guide

RCA

More on hiring engineers

Dear BM/E:

Now about your Editorial for August, 1970 (*Fine the Engineer? Why Not Fire Him?*) I, and most of the few broadcast engineers I know, got my start in AM broadcasting—engineering a small market operation. Let me tell you about my station.

When I became Chief Engineer (at age 18), the stockholders had decided to fire the General Manager and their contract engineer. (The contract engineer has since lost his First Phone because of his devious dirty deeds not related to the station.) One of the executives who owned a small shop across the street from the station was appointed Manager. He admittedly knew nothing about broadcasting, but he was always available. This was in June.

On the desk among the piles of papers and in the various drawers also filled with rubbish, we found *Notices of Violation* for FCC Field Inspections for the previous September, December, and February. Also in the former General Manager's desk, we found numerous *Warning Notices* for not having responded to the original *Notices*. Also there were more *Notices of Violation* citing us for failure to respond to *Notices*, and *Warnings* referring to other *Notices* which could not be found. That is not to mention the various unopened certified letters from the FCC.

As I was the only one around with a First Phone and a slight knowledge of FCC Rules and Regulations (but luckily, personal copies of parts 73 and 74), I sat down and typed up a response to the FCC for the new manager to sign. Next, I tried to correct some of the problems for which we were cited and in the process I found many more for which we had not been cited.

The station was operating five figures in the red. When I left a year later we were almost in the black. I know that the station could not afford an Engineer at more than \$2.00 per hour. For that, they got a lot of engineering and I got a lot of experience.

My point is this: Because the station could not afford spare tubes, should I have been fined? Or after trying unsuccessfully to get the station to buy the tubes, should I have supplied them out of my own pocket (which I did) to keep from being fined? I discovered that because of a farmer's plow and because of excessive salt in the soil, we were operating without a ground system. I told manager, but the station could not afford to lay a new set of radials. Should I have been fined?

I finally got an ulcer and had to quit. Since that time, I have moved on to bigger and better things. But I honestly believe that I couldn't have gotten a start any other way. Fine the Engineer? That depends.

What happened to the station? The new manager responded to a *Notice of Apparent Liability* for \$500 thirty-two days after he received it. The fine finally got paid a couple of years later. The old General Manager is back in power and the station is still on the air. It is a daytimer in the middle of the desert on the Mexican border.

As a sidelight, my first duty when I went to work for them before becoming the Engineer was when the Contract Engineer was performing his occasional pre-experimental period (just after sun-down) tests. "Go back to the studio and when I turn on the transmitter, you put on the Tijuana Brass. And don't say anything unless you speak Spanish." Fine the Engineer? That depends.

Raymond C. Strackbein
Cathedral City, Calif.

Stereo comments

Dear BM/E:

Congrats on "Stereo for Everyone," p. 48, October '70 issue. Your points are certainly valid. Possibly the advent of AM stereo would bring about the introduction of wider IF'd AM receivers, although I think a lot of manufacturers are worried that co- or adjacent-channel interference would be blamed on the receiver rather than on a crowded band.

We're currently finishing a 50-kilowatt stereo-SCA FM here, with a projected use of 4 SCA's (by 1974). By the way, those articles were well written, too.

Leonard C. (Len) Watson
Technical Director, WMKY
Morehead, Kentucky

Dear BM/E:

Concerning your editorial "Stereo for Everyone:" In paragraph six you state that FM does not need a break anymore. Well, this may be true in some areas, but not in all. Most FM stations have to struggle to make ends meet. Stereo is one of the only features that many FM independents have to sell to the public. You say that quad stereo could put FM still ahead of AM. How many persons in the average home owners have the room or money for four high quality speakers and two power amps? How many class A FM stations have the money or signal to use quad stereo. Stereo with three thousand watts is bad enough, but quad would cut signal strength down even more. It is impossible to get an AM frequency anymore. The channel conditions are so crowded that most AM signals are weak and covered with crosstalk. The exceptions being the clear channels, of which there are very few.

We have no objection to stereo in television. The television signal audio is on FM anyway and the sound quality could be very good. Stereo audio on TV would be a good thing, but why push stereo AM? If you

and your magazine want to push for something push for an all-band receiver law on the broadcast band. Televisions have to be able to tune both vhf and uhf so what is the hold up on all radios having both AM and FM? This has to be the biggest injustice in all of broadcasting.

It's people like you that could cause FM to die again. Please think before you talk. And if you decide to talk again—please talk about an all-band receiver law. Thus far I have not been able to find anything out about this bill or its fate.

Bruce Higgins
Manager
Progressive Broadcasters
of Arkansas
Paragould, Ark.

Production board needed

Dear BM/E:

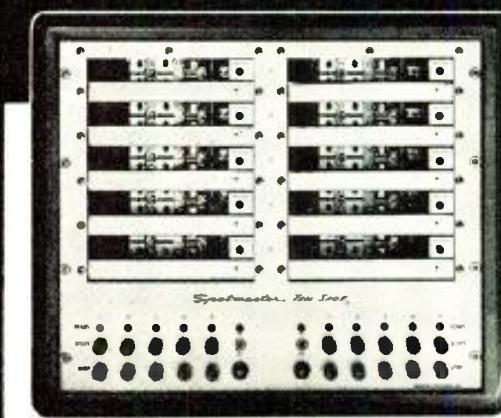
We are looking for a production board to use in our public relations program. Perhaps, someone who subscribes to your magazine has a used board they would like to donate to our small college.

We hope to set up a production board for recording tapes and to help our students who are interested in going into radio-television careers.

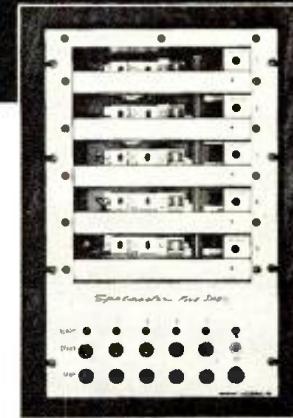
Your help will be appreciated.

Loren D. Haugen
Student Affairs Office
University of North
Dakota
Williston, North Dakota
58801

Spotmaster Multiple Cartridge Playback Units



Ten-Spot Model 610B



Five-Spot Model 605B

...bringing a new dimension to pushbutton broadcasting

Spotmaster Ten-Spot (holding 10 cartridges) and Five-Spot (holding five) will reproduce any NAB Type A or B cartridge instantly at the push of a button . . . at random or in sequence. They may be operated manually or incorporated into programmed automation systems, using one, two or three NAB standard electronic cueing tones.

The Ten-Spot is designed for 19" rack mounting while the Five-Spot is available either in an attractive walnut-finished case or with a 19" front panel containing a cartridge storage cubicle. Both are backed by Spotmaster's iron-clad full-year guarantee.

For further information about these and other Spotmaster cartridge tape units, call or write today. Remember, *Broadcast Electronics is the No. 1 designer/producer of broadcast quality cartridge tape equipment . . . worldwide!*

BROADCAST ELECTRONICS, INC.

8810 Brookville Road, Silver Spring, Maryland 20910; Area Code 301, 588-4983



Perfect your CCTV system with COSMICAR® lenses



B2514 EM AUTOMATIC DIAPHRAGM LENS

The EM-type lenses are new fully automatic diaphragm lenses specially developed for ITV cameras. The new DC motor activates the automatic diaphragm mechanism with freely adjustable driving torque without restriction of the size and shape of diaphragm blades.

- Higher precision and durability.
- Complete close down of diaphragm when power is turned off.
- Least effect to camera due to motor noise.
- Ease of operation.
- Instantaneous change around subjects do not activate diaphragm.

Be sure to get the finest image recording results with quality Cosmicar lenses.



COSMICAR OPTICAL CO., LTD.

424, Higashi-Oizumi, Nerima-ku, Tokyo, Japan Cable Address: "MOVIEKINO TOKYO"

Circle 145 on Reader Service Card

McMartin SCA Multiplex Receivers

"State of the art" design. Exclusive UNI-STRUCTION™ provides high quality reception, minimum maintenance, field-proven reliability. Meet FCC Rules, Part 15.

TR-66B

Most advanced SCA receiver on the market.

Accommodates plug-in amplifier modules plus balanced mike input.



TR-55

McMartin's unequalled combination of high performance and economy. Available with matching 10.25 and 75 watt (RMS) amplifiers.

McMartin Industries, Inc.
605 North 13th Street
Omaha, Nebraska 68102
• Broadcast
• Background Music
• Commercial Sound

For complete information including details on new TR-E1 educational receiver write:

Circle 146 on Reader Service Card

Broadcast Equipment

Continued from page 59

10 Hz-5.0 MHz ±0.5 dB in video channel. Can be operated as simplex or duplex system. SOLADYNE. 274

UHF translators include front-end receiver, frequency conversion, AGC circuit, UHF 100-W amplifier. Models T130 U/U and T130 U/U are solid state except for output tubes. Output stage rated at 4000 hr MTBF. Translators have automatic on-off operation, RFI shielding, separate AGC for visual and aural carriers, automatic main breaker reset. ACRODYN. 251

251

TV equipment

Color cartridge VTR is made in two versions: playback unit which couples to TV receiver; record/playback unit built in receiver. Playback unit is adaptable for recording. Tape is self-contained in cartridge; deck uses automatic threading and rewind. Other features: automatic phase control, high-speed forward/rewind. Record time 60 min, horizontal color resolution 240 lines, video S/N ratio 40 dB. PANASONIC. 265

265

Lighting kit includes three Quartz D lights, barndoors, specular reflector, scrims, stands, poles, grips, gaffer tape, extension cables, water weight, flag frames and mats, cable clips and fiber case. Weight 62 lb. \$545. LOWELL-LIGHT. 266

266

Video signal enhancer increases horizontal resolution of video fed to TV projector for large audience use. Cris-Pic Image Impresser improves definition of low-bandpass TV signals from VTRs, off-air broadcasts, some cameras. \$675. KALART VICTOR. 267

267

Cleaning tool for magnetic discs produces metered flow of isopropyl alcohol through urethane wick covered with lint-free cloth outer jacket. Texwand releases alcohol or rotating disc, removing loose oxide, dust, debris. TEXWIPE. 268

268

Image-intensifier cameras are B&W for CCTV-CATV use. Model TC-177-L1 is single-stage type which produces usable picture with scene illumination of .05 fc. Model TC-177-L2 is two-stage type, works as low as .0025 fc. Both models include FET preamps, linearity better than 1%, separate-mesh fiber-optics vidicon, AGC. \$4950 (TC-177-L1) RIKER VIDEO. 269

269

Looking for
a way
to reduce
make-goods
drastically?

See page 26.

Engineering Shortage

Continued from page 56

scheme to put them out of work. This is not so; the qualified technicians this would displace have been virtually out of work for years. The natural evolution of broadcasting has reduced their function to a legal technicality that is, if you will, a little demeaning to professional pride. (How can one conscientiously seek skilled wages for performing a perfunctory and intermittent routine?) Sooner or later shift technicians will be dispensed with; the engineering fraternity must face this certainty with a realistic attitude. The future lies in a choice between the NAB proposal and automated supervision, with operating engineers losing out either way. Automated supervision is the preferable choice from the engineers' viewpoint, because the added equipment will require regular attention by bona fide technicians, thereby enlarging the scope of their productive duties.

Automated supervision as envisioned here is the logical answer to radio's dilemma. There is no degradation of technical performance; the opposite is the case. And the substantial investment in the automated equipment, amortized over the years of its life, is more than offset by eliminating the continuing cost of unproductive personnel. The risk of costly violations of the FCC's technical rules is greatly reduced. In short, automated supervision of radio broadcast transmitters is the

modern, economical, and superior way.

The one giant obstacle to realizing this concept is the FCC. Thus far, that august body has steadfastly refused to update regulations to conform to the present. The United States is virtually the only country in the world, I'm told, that still does not permit unattended broadcast transmitters—and here is where broadcasting began!

Of course the necessary rule changes will come eventually. But why wait? Why should broadcasters spend their efforts on a stopgap measure that is technologically detrimental to the industry, or else suffer unrealistic and unnecessary economic burdens for the indefinite future? *The eventual change should be sought now.*

The NAB and all radio ownership should abandon further efforts on the present petition, and concentrate instead on getting FCC sanction of automated supervision. The sophisticated electronics industry can be counted on to assist by bringing forth suitable equipment that would be strongly convincing to a skeptical FCC.

And that convincing may not be so difficult, either. The Commission is concerned more with consistent technical performance than with maintaining an artificial demand for engineers. Show its members the superior operation that today's technology provides—their reluctance may melt.

But broadcasters won't know whether the FCC can be convinced until they give it a concerted try. Today is none too soon to start! **BM/E**

TP-1B Tape Cartridge Winder



This rugged and dependable tape winder fills a need in every station using cartridge equipment. No longer is it necessary to restrict your cartridge operation to stock sizes, or to tie up your conventional tape equipment loading cartridges. The TP-1B handles all reel sizes (up to 3600' of 1 mil. tape), winds new or old cartridges in any length. Available with or without Spotmaster tape timer, providing precise minute and second calibration for creating exact-length tapes. TP-1B is \$104.50, with Tape Timer \$129.50. Lubricated tape and empty cartridges are also available.

BROADCAST ELECTRONICS, INC.

A Filmways Company

8810 Brookville Rd., Silver Spring, Md. 20910

Now-more T-Versatility!



**New Athena®
4000-TSM 16mm
TV film
chain projector**

- INSTANT STILL/RUN capability for picture and sound; no application bar, no change in light level, no audio roll-in.
- SLOW MOTION.
- UNLIMITED HOLD on single frame; no film damage, no loss of light.
- FLICKERLESS OPERATION at all frame rates—1, 2, 4, 6, 8, 12, 24 fps.
- INSTANT DIRECTION CHANGE at any frame rate.
- HEAVY-DUTY BASE for smooth, stable multiplexing.
- FULL COMPATIBILITY with vertical TV scan rate.
- PUSHBUTTON CONTROL.
- OPTICAL/MAGNETIC SOUND with magnetic record.

AND MORE—ALL AT A SENSIBLE PRICE

Some of the 4000-TSM's features you can find only on projectors selling for thousands of dollars more. Other features you can't find on any competitive projectors. For complete facts on the T-Versatile Athena film chain family, Models 1500, 1900 and 4000-TSM, WRITE OR CALL TODAY.



**L-W PHOTO,
INC.**

15451 Cabrito Rd., Van Nuys, Calif. 91406
Phone: (213) 781-0457 Cable: ATHENA

Circle 147 on Reader Service Card

BM/E CLASSIFIED MARKETPLACE

CLASSIFIED ADVERTISING RATES

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

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

BUSINESS OPPORTUNITIES

FRANCHISE DISTRIBUTORSHIPS FOR SEEBURG BACKGROUND MUSIC

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

Complete details forwarded on request: Address:

Joseph F. Hards, Vice Pres.
SEEBURG MUSIC LIBRARY,
INC.

1500 North Dayton Street
Chicago, Illinois 60622

or let's talk about it at the
NAB CONVENTION.

Seeburg Booth No. 241

HELP WANTED

WANTED SALES REPRESENTATIVES

Established company entering in open market with solid state SCA receiver. Over 6 years of engineering and field application, proved unit, beats competition. Most marketing areas are available. Please reply with complete details concerning your organization, including sales record, present lines and accounts.

G. G. Lundt, Gen'l. Mgr.
Permydine Electronics Corp.
2929 N. Southport Ave.
Chicago, Ill. 60657

Mature Chief Engineer with background in Broadcasting. We are 5,000 w daytime and 500 w DA-night. We operate via remote control 24 hours. If you are a qualified Broadcast Engineer, self-starter, and take pride in your work, let's get together. We offer five figures and a future to the right man. No phone calls please. Send complete resume and photo to—Bernie Barker, VP-General Manager, WDAK Radio, Box 1640, Columbus, Georgia 31902.

Chief technician of New York State Cable system. Experienced in all areas of CATV . . . system construction, system maintenance and supervise technical staff. Available immediately. Box 371-2, BM/E, Blue Ridge Summit, Pa. 17214.

HELP WANTED (cont'd)

Maintenance Engineer needed for a 5KW directional in Northern Virginia. No announcing required. Equipment and working conditions are excellent. Send qualifications and salary requirements to: General Manager, WPRW RADIO, P.O. Box 151, Manassas, Va. 22110.

POSITION WANTED

Talk show host-MOR d.j. unique, repeat, unique format, no hassles, no fights, makes friends for sponsors, station, northeast preferred, will relocate for right offer. Proven track record, references, major market calibre. M. Sandler, Smith St., Perth Amboy, N.J. 08861. Call collect (201) 442-3488.

Somebody needs me! In broadcasting since 1965. College graduate. Experienced in all phases of television production, news, film, radio, and cinematography (single and double system) I. Stuart Landa, #80 Pleasant Hill, Carbondale, Ill. 62901.

1ST Phone, Bill Wade grad, up-tempo MOR/top 40, tight board, draft exempt, dependable, will relocate: Howard Goff, Box 214, Cardiff, Cal. 92007.

Progressive rock announcer. BS degree in broadcasting. Experienced, 3rd endorsed, draft exempt, relocate. Let my music speak. Donald Gott, Jr., 877 Elm, Winnetka, Illinois. 312-446-0042.

EQUIPMENT FOR SALE

V. A. S.

VIDEO ACTIVATED SWITCH

Senses Presence of Video With Sync.
Performs Unmanned Program Switch
Dual Programming on Single Channel
R. W. BROWN, P.O.B. 216 Malta, Ill. 60150

G.E. Transmitter Type TT-42-A, modified—(Ch. 2) used by WBBM-TV as its main transmitter until October 1, 1969. Equipment still installed at 33 North LaSalle, Chicago. To be sold as is. Buyer to remove. \$25,000.

RCA Transmitter type TT-5, water-cooled—(Ch. 2) used as a spare at the above location until Oct. 1, 1969. Equipment still installed; to be sold as is. Buyer to remove. \$5,000.

L. A. Pierce, Dir. Tech. Oper. 630 McClurg Court, Chicago, Ill. 60611.

SCULLY TAPE RECORDERS: Mono, 2, 4, 8, 12, & 16 track models plus 270 automatic players. Some models in stock now. W.A.L. custom audio control consoles & console modules. Solid state 120 Watt power Amps. We buy and rebuild Scully lathes. WIEGAND AUDIO LABORATORIES, INC. 3402 Windsor Road, Wall, N.J. 07719. Phone 201/681-6443.

SOLID-STATE AUDIO PLUG-IN OCTAL (1" Dia x 2" H) modules. Mic preamps, disc & tape preamp-equalizers, tape bias osc. & record ampl., power amps & power supplies. Send for free catalog and audio applications. Opamp Labs., 172 So. Alta Vista Blvd., Los Angeles, Cal. 90036.

RCA TS 40 solid state switching system with effects in good working condition, available in April 1971 at an attractive price, four years old. Contact Vital Industries, Inc., 3614 S.W. Archer Rd., Gainesville, Fla. 32601—or phone 904-378-1581.

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

Bell & Howell Jan 614DB 16mm sound projectors—finest made, excellent condition, \$595.00. De-Vry Jan same as # above, excellent condition, \$295.00. \$150.00 list. Cameras, more will trade. Free test. S.K. Film Equipment Co., Inc., 6340 S.W. 62nd Terrace, Miami, Florida 33143.

EQUIPMENT FOR SALE (cont'd)

The complete and reliable source for new and used broadcast equipment. Request our free listings. Broadcast Equipment and Supply Co., Box 3141, Bristol, Tennessee 37620.

Any type tower erection finance. Bill Angle—Tel. 919-752-3040. Box 55, Greenville, N.C. 27834.

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

Ampex 300, 350, 352, 400, 450 users, for greater S/N ratio, replace first playback stage 12SJ7 with our plug-in transistor preamp. For specification write VIF INTERNATIONAL, PO Box 1555, Min. View, Ca. 94040.

For sale: Moseley PCL-2B S-T-L transmitter and receiver, 2 Collins AGC amplifiers model 26-U-1 and the superior Symmetra-Peak model SP-63-1A. All in good condition. Contact Russ Latiolais, Chief Engineer, KBBQ, Burbank, California 91502. Phone: (213) 849-3356.

Finest RF coils, contactors, switches, custom ATU systems built for customers or dealers. Write or phone for catalogue. Geleco Electronics Ltd. Thorncliffe Park Drive, Toronto C-7, Ont. Phone 416-421-5631.

Color Videotape recorders for sales. Four IVC Model 860. Almost new, excellent condition. Cost, \$7,800 each. Make a reasonable offer. Phone 904-354-2806.

SUPERTURNSTILE TV ANTENNA: Complete parts available from a RCA TF-12BH Channel 12 antenna. Complete inventory with instructions or individual parts for spares. McClanathan & Associates, 503/246-8080, P.O. Box 750, Portland, Oregon 97207.

For sale Gates type FMA4 four section FM antenna. Used 2 years, like new. Price \$800. GE type BM-1-A FM frequency/modulation monitor. \$200.00. KTRG Radio, Box 412, Columbia, Mo. 65201.

Heliax-styroxflex. Large stocks—bargain prices tested and certified. Write for prices and stock lists. Sierra Western Electric, Box 23872, Oakland, Calif. 94623. Phone (415) 832-3527.

PROGRAM SERVICES

DEEJAYS! 11,000 classified gag lines, \$10.00. Unconditionally guaranteed! Comedy catalog free. Edmund Orrin, Boyer Road, Mariposa, Calif. 95338.

Deejay Manual—A collection of one-liner comedy pieces for sparkling DJ's \$3.00. Write for free "Broadcast Comedy" catalog. Show-Biz Comedy Service (Dept. R) 1735 East 26 Street, Brooklyn, N.Y. 11229.

Command Comedy . . . The "best" deejay comedy collection available anywhere! You must agree—or your money back! Volume #1 — \$7.50. Command, Box 26348-A, San Francisco 94126.

TECHNICAL SERVICES

AMPEX HEAD ASSEMBLY

Relapping and replacement head service for all AMPEX professional studio model recorders. Our precision relapping extends head life for maximum use. Brand new shelf stock replacement heads of our manufacture available when relapping not advisable. Prices include thorough assembly cleaning, optical and electrical inspection and complete testing on Ampex equipment. Monaural assembly relapping . . . \$35.00 complete. Monaural assembly replacements . . . \$119.50 complete. "Loaner" assemblies available. For more data, contact LIPPS, Inc. 1630 Euclid St., Santa Monica, Calif. 90404 (213) EX 3-0449.

CUSTOM CARTRIDGE RELOADING and refurbishing. Fidelipac replacement parts and cartridges. Write us today for prices. PROFESSIONAL AUDIO SERVICES, BOX 1953, FT. WORTH, TEX. 76101.

INSTRUCTIONS

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

"FCC FIRST CLASS RADIOTELEPHONE LICENSE IN SIX WEEKS. Results guaranteed. Classes in Dallas, Atlanta, Chicago, Cincinnati, Denver, Fort Worth, Hartford, Houston, Memphis, Miami Beach, Milwaukee, Minneapolis, Nashville, New Orleans, Oklahoma City, St. Louis, San Antonio, San Francisco, and Seattle. For information, contact Elkins Institute, 2603 Inwood Road, Dallas, Texas 75235 (214) 357-4001.

American Institute of Radio, by encouraging students to attend both day & night classes can guarantee you a First Class License in 2½ to 3½ weeks. New classes start every Monday. Housing can be arranged for \$12.15 per week. Total tuition \$330. 2622 Old Lebanon Rd., Nashville, Tenn. 37214. 615-889-0469 or 889-2480.

"1971 Tests-Answers" for FCC First Class License. Plus Command's "Self-Study Ability Test." Proven! \$9.95. Command Productions, Box 26348-A, San Francisco 94126.

FCC LICENSE—by listening! Taped instruction for I and II only \$1250. Spectra, Box 356, State College, Pa. 16801.

USE BM/E'S CLASSIFIED MARKETPLACE TO REACH OVER 26,000 BROADCASTERS!

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

- 12 issues 6 issues
 3 issues 1 issue

Name _____

Station or Co. _____

Address _____

City _____ State _____

BM/E, Classified Advertising Department,
Blue Ridge Summit, Pa. 17214.

Sales Offices

SALES ADMINISTRATOR

Sally Ann Morley

NORTHEAST

820 Second Ave., New York, N.Y. 10017
Charles C. Lenz, Jr.

SOUTHEAST

Ken Fairleigh Associates, P. O. Box 3956,
Charlotte, N.C. 28203
Kenneth F. Fairleigh 704-366-1434

MIDWEST

612 No. Michigan Ave., Chicago, Ill. 60611
Thomas F. X. Carter 312-642-3774

SOUTHWEST

1245 East Walnut St., Pasadena, Calif.
91106. Los Angeles 213-684-0590
Pasadena 213-795-1528
Lawrence C. Papp
Burt Underwood

NORTHWEST

Thompson & Healey, Inc. 1111 Hearst Building,
San Francisco, Calif. 94130 415-362-8547
Jules Thompson
William J. Healey

JAPAN

Nippon Keisoku, Inc., P. O. Box 410, Central
Tokyo, Japan 535-6614
Yoshi Yamamoto

FROM THE EDITOR

Buy Now or Pay Later

Now is the time to buy that needed broadcast gear. President Nixon would like all broadcasters to do so. In fact he's made it attractive to act now: If you buy at the NAB convention (or within 90 days after the convention) you can claim in 1971 a full year's tax depreciation—that's a gain of a half year. Furthermore, Mr. Nixon has said that if you buy now you can shorten your write-down period by 20%. Or if you want a longer write-off period to offset heavy anticipated profits, you can take that option.

On top of this, we hear your banker is willing to loan you money at a new lower rate. So now is the time.

It looks as though buying from the convention floor will be a smarter move than buying 90 days later. Prices will never be so low. Many manufacturers will offer a discount inducement for convention action. Take it. It's likely to be a buyer's market for a long time, but it will also be a market where the price pressure is upward. RCA already announced a price increase averaging 5%. GE has raised prices on selected items. Equipment manufacturers are being forced to raise prices to compensate for lower sales volume. If you buy, you relieve that pressure and you may just keep your favorite supplier around for a little longer. Incidentally, you will not be paying for any exhibit extravaganzas this year. There will be fewer dancing models. The money saved is going into the hardware itself. It's a good year for a value purchase.

There is another reason to buy. Most of you have pared your staff to keep your profit levels from tumbling. You are running the risk of interrupted productivity due to increased downtime or nuisance malfunctions. Now is the time to stave off operating and maintenance problems by purchasing some automation equipment, a more reliable tape recorder, or a rock-stable transmitter. Ask manufacturers at NAB to demonstrate how a purchase now can be cost effective.

Almost anyway you look at it, it's buy now or pay later.

James A. Lippke, Editor



ADVERTISERS' INDEX

AEL Communications Corp., A Subsidiary of American Electronic Laboratories Inc.	CM/E 15
Acrodyne Industries Inc.	60
AKAI America, Ltd.	Cover 2
Altec Lansing, A Div. of LTV Ling Altec	31
American Electronic Laboratories, Inc.	64
Ampex Corporation	21
Anaconda Electronics, A Division of Anaconda Wire & Cable Company	CM/E 10
Angenieux Corporation of America	61
Arriflex Company of America	58
Belar Electronics Laboratory, Inc.	11
Bird Electronic Corporation	70
Boston Insulated Wire & Cable Company	62
Broadcast Electronics, Inc.	73, 75
CBS Laboratories, A Division of Columbia Broadcasting System, Inc.	3
Canon U.S.A. Inc.	63
Central Dynamics	14
Collins Radio Company	46
Conrac Corp.	25
Cosmicar Optical Co., Ltd.	74
Ditch Witch, A Division of Charles Machine Works, Inc.	9
Dynair Electronics, Inc.	57
Fairchild Sound Equipment Corp.	66
Fernseh Bosch-Gruppe, Robert Bosch Corp.	65
Fort Worth Tower Co., Inc.	68
Grass Valley Group, Inc., The	5
International Good Music	13
Jamieson Film Company	23
Jerrold Electronics Corp.	CM/E 2
L-W Photo, Inc.	75
Magna-Tech Electronic Co., Inc.	52
McMartin Industries, Inc.	74
Moseley Associates, Inc.	12
Phelps Dodge Communications Company	15
Power Optics, Inc.	37
RCA	14, 26, 27, 56, 72, 74
RCA Service Company, A Division of RCA	67
Rank Precision Industries, Inc.	51
SC Electronics, Inc.	49
Sarkes Tarzian, Broadcast Equipment Division	Cover 3
Soladyne International, Inc.	55
Sony/Superscope	38, 39
Sparta Electronic Corporation	50
Sylvania Electric Products, Inc.	33
Sylvania Electronic Components	CM/E 16
TAB Books	69
Tape-Athon Corp.	18
Tektronix, Inc.	7
TeleMation, Inc.	35
Television Equipment Associates	36
Telex, Communications Division	68
Time & Frequency Technology, Inc.	Cover 4
Vikoa	CM/E 9
Viscount Video Systems Ltd.	71
Wilkinson Electronics, Inc.	29
World Video, Inc.	70

PRODUCT INDEX

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

AUDIO	
64/403	Amplifiers/Wilkinson
32/342	Audio equipment/McCurdy
24/285	Audiotape recorder/Arriflex
28/298	Automation equipment/Broadcast Products
32/328	Automation equipment/IGM
30/318	Automation system/Fairchild
36/368	Automation system/Schafer
36/371	Background music library/Seeburg
61/383	Cartridge tape equipment/Tape-caster TCM
60/378	Cartridges/Stanton Magnetics
34/351	Cassette alignment tape/Nortronics
36/369	Cassette recorder-reproducer/Schafer
60/379	Digital programming equipment/Systems Marketing
62/392	Headphones/Telex
68/139	Headphones/Telex
62/391	Headsets/TEA
66/137	"Integra II" system/Fairchild
24/278	Microphones/AKG Div., North American Philips
36/372	Microphones/Shure
38/121	Microphones, condenser/Sony
64/397	Superscope
11/105	Microphones, wireless/Vega
24/289	Monitors/Belar
61/382	Monitors/Belar
60/375	Musix system/Tape-Athon
30/322	Program controller/Sparta
30/322	Program effects generator/Gotham
60/374	RF control panel/Jos. M. Soll
21/110	Recorders/reproducers/Ampex
12/106	Remote control system/Moseley
32/334	SCA multiplex/Johnson Electronics
74/146	SCA multiplex receivers/McMartin
32/340	STL system/Marti Electronics
28/297	Tape cartridge equipment/Broadcast Electronics
32/329	Tape cartridge equipment/Int'l Pateronics
34/357	Tape cartridge equipment/QRK
32/339	Tape cartridge, stereo/Marathon
18/116	Tape systems/Tape-Athon
36/366	Towers/Rohn
36/364	Translator, fm stereo/Rodelco
32/324	Turntables, pick-up arms/Gray
31/115	Various products/Altec Lansing
28/301	Various products/CCA Electronics
28/302	Various products/Central Dynamics
28/307	Various products/Collins Radio
30/313	Various products/Delta Electronics
30/320	Various products/Gates Radio
34/350	Various products/Moseley
29/114	Various products/Wilkinson
TELEVISION CONTROL & STUDIO EQUIPMENT	
28/309	Camera, color/Commercial Electronics
34/354	Camera, color/Philips
64/386	Camera, color/TeleMation
34/359	Camera mounts/Quick-Set
34/356	Camera, remote-control/Power Optics
34/348	Camera with zoom lens/Minolta
34/332	Cameras etc./Palliard
24/275	Cameras for color-encoded film/ABTO
37/120	Camera system, remote-control/Power Optics
3/101	Character display system/CBS Labs
5/102	Character generator/Grass Valley
60/380	Character generator/Systems Resources
35/118	Character generator/TeleMation
64/399	Character generator/Visual
58/304	Clock system/Chrono-Log
28/306	Control equipment/Cohu
24/294	Converter/Bosch (Fernseh)
65/136	Converter/Fernseh GmbH
24/283	Delay line/Andersen Labs
30/314	Demodulator/Dynair
34/347	Dropout compensator/Mincom Div., 3M
51/125	Film chain/Rank
75/147	Film chain projector/L&W Photo
32/326	Film conditioning gear/Lipsner-Smith
32/325	Film inspectors & editors/Harwald
23/111	Film processor/color/Jamieson
62/388	Graphics inserter/Teletlator
61/132	Lenses/Angeenieux
28/299	Lenses/Canon
63/134	Lenses/Canon
74/145	Lenses/Cosmicar
61/385	Lenses/TeleCine
24/284	Lenses, zoom/Angeenieux
24/289	Monitors/Belar
49/123	Monitors/SC Electronics
61/384	Monitors/Tektronix
62/394	Monitors/Time & Frequency
26/113	Monitors, color/RCA
67/138	Monitors, color/RCA Service
64/404	Monitors, color/World Video
70/142	Monitors, color/World Video
25/112	Monitors, monochrome/Conrac
C4/149	Monitors, UHF-VHF/Time & Frequency
32/343	Monitors, VHF/McMartin
32/327	Pedestals, tripods/Innovative TV
32/337	Projectors/Listec
60/376	Projectors/Spindler & Sauppe
34/358	Prompting device/Q-TV Sales
62/389	Routing switcher/Viscount Video
71/144	Special effects/Sarkes Tarzian
C3/148	Switchers/Ward Electronic Ind.
64/401	Switching equipment/Grass Valley
30/323	Switching systems/Vital Industries
64/400	Sync generators/Telemet
36/363	Tape evaluator/Recotec
36/360	Telecine/Rank Precision Industries
32/330	Time base corrector/Int'l Video Translators/Acrodyne
60/135	Various products/CBS Labs
28/300	Various products/Central Dynamics
14/107	Various products/Dynair
57/128	Various products/Potomac Instruments
34/355	Various products/Rohde & Schwarz
60/381	Various products/Sarkes Tarzian
36/362	Videotape cartridge system/RCA
24/281	Videotape equipment/Ampex
34/344	Videotape equipment/Memorex
TRANSMITTER EQUIPMENT	
28/288	FM SCA system/Broadcast Facsimile
62/396	Klystrons/Varian Associates
36/361	Microwave systems/Raytheon
55/127	Microwave systems/Soladyne
34/346	Relay repeater/Microwave Assoc.
64/131	Transmitters/AEL
46/122	Transmitters/Collins
50/124	Transmitters/Sparta
60/377	Transmitters/Standard Electronics
24/280	Transmitters, AM/AEL
30/311	Transmitters, AM/Cont'l Electronics
36/367	Transmitters, remote control/Rust
30/317	Transmitters/translators/EMCEE
64/402	Tubes, power/Westinghouse
62/393	Tubes, power grid/Thomson-CSF
ANTENNAS, TOWERS & TRANSMISSION LINES	
32/332	Antennas, diplexers/Jampro
36/341	Antennas, FM/Shiveley Labs
24/279	Antennas, FM-TV/Alford
30/319	Towers/Fort Worth Tower
62/395	Towers/utility
CATV (See also: Components, Wire & Cable)	
*Appears in CM/E (CATV supplement) only	
*9/151	Amplifier, expanded range/Vikoa
64/398	Amplifiers/Vikoa
32/333	CATV equipment/Jerrold
32/335	Coax cable/Kaiser, CATV Div.
*15/153	Systems/AEL
*2/150	Systems/Jerrold
68/140	Towers/Fort Worth Tower
*16/154	Transmission equipment/Sylvania
9/104	Trencher/Ditch Witch (Charles Machine)
TEST EQUIPMENT	
7/103	Vectorscope/Tektronix
24/292	VSWR meter/Bird Electronics
70/143	Wattmeters/Bird Electronics
PHOTOGRAPHIC & LIGHTING EQUIPMENT	
30/315	Color balance slide/Eastman Kodak
24/291	Dimmer package/Berkey-ColorTran
28/305	Film processing equipment/CinTel
52/126	Film recorders & projectors/MagnaTech
33/117	Krypton-halogen replacement/Sylvania
36/373	Lighting control system/Skirpan
24/287	Lighting equipment/Bardwell & McAlister
28/303	Lighting equipment/Century Strand
34/349	Lighting equipment/Mole-Richardson
32/336	Lights & accessories/Kliegl
32/331	Processor, color film/Jamieson
COMPONENTS	
34/353	Cable, coaxial/Phelps Dodge
15/108	Cable, coaxial/Phelps Dodge
28/295	Cable, mini color/BIW
62/133	Cables, connectors/BIW
MISCELLANEOUS	
69/141	Books/TAB Books
24/293	Cabinets/Borg-Warner, Ingersoll
28/296	Computerized systems/Broadcast Computer Services
30/316	Consulting services/Effective Communication System
24/276	Copying system/Addressograph-Multigraph
30/312	Log-verification system/Cybris
36/338	Sign-embossing equipment/Reynolds
30/321	Various products/General Electric

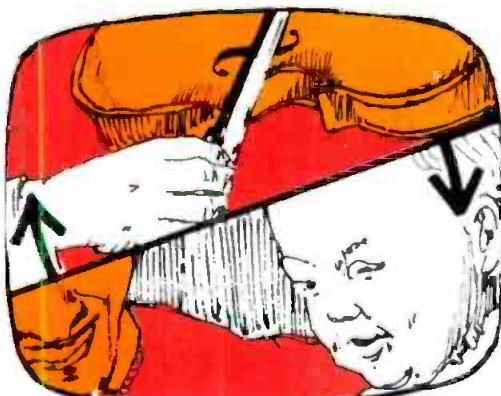
ROTEC EXTRA SPECIAL

EFFECTS

TRULY NEW
PRODUCTION
TOOL
BE 1ST IN
YOUR MARKET!



ROTATING 4-WAY SPLIT



ROTATING 2-WAY SPLIT



SUPER FEATURES



4-way and 2-way split can
be rotated



Center of rotation can be moved
off center creating asymmetrical
quadrants.



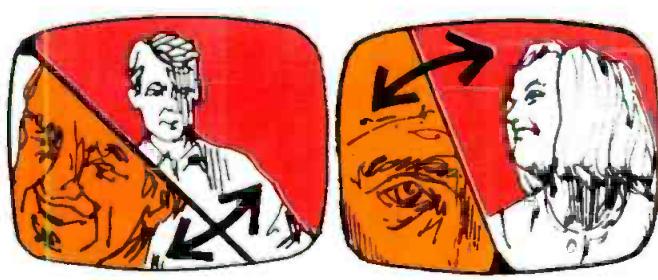
Unusual wipes never seen before—
demarcation line pivots from any
corner or any midpoint.



1 3/4 " rack space



Self-contained power supply



FAMILY OF WINDSHIELD WIPES



Can be used
with your present switcher.

PRICE \$2,900



Bloomington, Indiana

(812) 332-7251

Sarkes Tarzian, Broadcast Equipment Division

Circle 148 on Reader Service Card

3rd generation TV monitor:

**UHF & VHF
off-the-air monitoring,
up to 18 months
between calibrations**

Remote capability, exceptional stability, operating convenience. These are what make the TFT 701 the most advanced monitor you can buy.

With the 701, you get off-the-air monitoring of aural and visual frequency, and per cent aural modulation, with digital readout: even at transmitters up to 30 miles away.

What's more, the 701 uses frequency synthesis in its design. As a result, it needs calibration only every 6 months for UHF and only every 18 months for VHF.

Even greater stability is available with an optional super-stable oscillator (Model 703). It keeps the monitor in frequency for an estimated 12 years in VHF use and for an estimated 4 years in UHF use.

When frequency calibration is needed, TFT's exclusive Oscillator Exchange Program makes it easy. Because the 701 uses an independent, plug-in oscillator, you can buy an extra standby unit, factory calibrated and ready for use. Then, when the original is at the factory, just plug-in the standby for continuous, in-frequency operation.

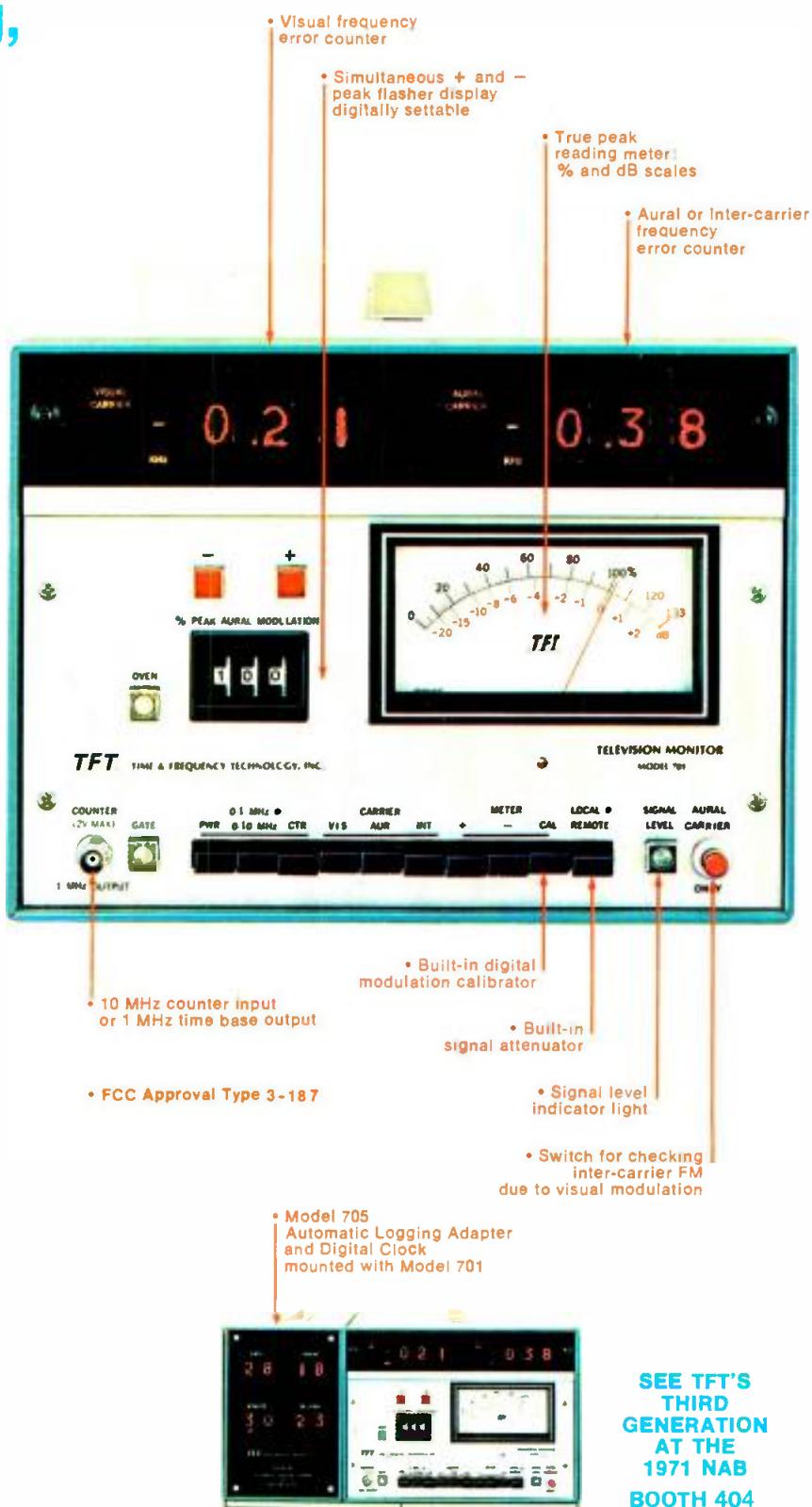
Or, if you have a rubidium standard available, just feed it into the rear panel connector on the 701 and forget about frequency calibration.

Versatility is another advantage of the 701. By merely depressing a single button on the front panel, you can convert the two frequency error counters to a general purpose, 6-digit frequency counter.

You can also have automated logging. Outputs are provided on the rear panel. All you do is hook up a TFT Model 705 Automatic Logging Adapter and Digital Clock, right alongside the 701.

Other options and accessories include an off-frequency and over modulation alarm and the Model 712 Tracking Audio Oscillator/Distortion Analyzer. The 712 mounts on top of the 701 to give you a complete system for off-the-air measurement of aural transmitters. Or, you can use the 712 as an independent instrument.

For complete specifications on TFT's 3rd generation TV monitor and/or a demonstration, call or write:



SEE TFT'S
THIRD
GENERATION
AT THE
1971 NAB
BOOTH 404

TFT TIME AND FREQUENCY TECHNOLOGY, INC.
P.O. BOX 2072, SUNNYVALE, CA 94087 (408)245-2536

Representative inquiries invited

Circle 149 on Reader Service Card