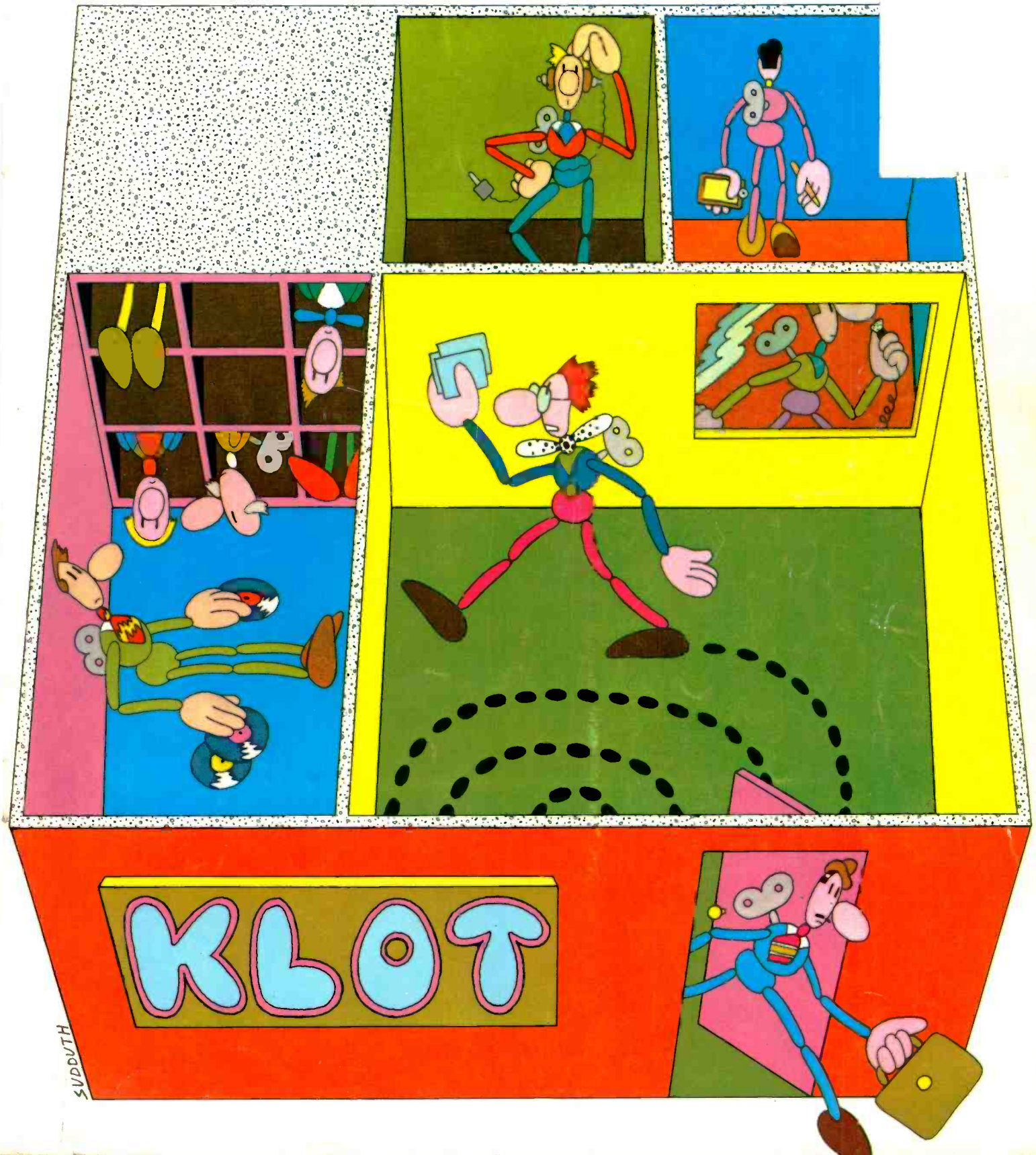
A MACTIER PUBLICATION APRIL 1971

BM/E

BROADCAST MANAGEMENT/ENGINEERING

4 35

Management Challenge: Better People Programming



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

(Thanks.)

That's right. Effective March 1, many of DYNAIR'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 DYNAIR 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 DYNAIR'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

DYNAIR

DYNAIR 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 100 on Reader Service Card

A product of aerospace research...now improved for you!

Imagine a microphone that never leaves your lips, no matter what you do. Now E-V has a family of five dynamics, each tailored to the specific needs of broadcasters, dispatchers, announcers, pilots, and other constant users.

Light Weight

Less than 1/2-ounce in weight, these microphones can be clipped onto most eyeglass frames, or onto their own special headband. A slender adjustable tube leads from the microphone element to the user's mouth, and is easily positioned a fraction of an inch away, yet out of the main airstream. This insures maximum volume without annoying "pops" typical of normal close-mike operation.

Hands-Free Operation

Wearing an E-V personal microphone quickly becomes second nature, leaving both hands free for paperwork, driving, flying, holding scripts, or any other chores. Because you are never "off-mike", signal-to-noise ratio is always optimum and volume never varies. And because there is no bulky microphone close to the mouth, fidelity is greatly improved.

Radio-TV Model

Based on designs created for the U. S. aerospace program, E-V personal microphones have been proven in years of extensive field testing. The Model RE51 has already proved itself for sports and general announcing on several major radio and TV networks. Response range is from 80 to 10,000 Hz. and mixes perfectly with all other E-V broadcast models. A transistorized preamp (normally worn on the belt) includes push-to-mute "cough button", on-off switch, battery test light, and cable connector. Balanced Lo-Z output adjusts to maximum of −56 dB to match any standard input. $134.00 list complete with microphone, headband, and preamp.

Model 651 is similar in design but with choice of Hi-Z or Lo-Z (unbalanced) at cable end. Ideal for lecturing, paging, dispatching and general use. Response 80 to 8,000 Hz. $100.00 list complete as above.

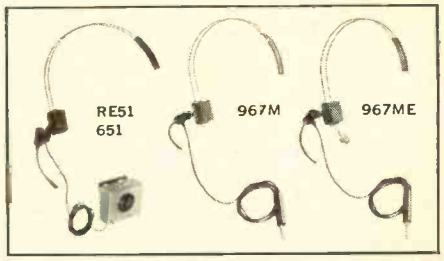
Communications Types

Special aircraft communications Model 967M matches carbon mike inputs and provides transistor amplifier built into PJ-068 type plug. Audio quality superior to magnetic types, and much less susceptible to shock damage. No battery needed. Response 300 to 4,300 Hz tailored for highest intelligibility. $122.00 list complete with microphone, headband, carrying case. FAA approved (TSO C-58).

Model 967ME combines microphone and FAA approved (TSO C-57) earphone. Five ear tips furnished. Standard 1/4" phone plug for earphone (no special connectors needed). $140.50 list. (*NOTE:* Model 967TR similar to 967ME above is specially modified headset for major airline use. Write for details and quotation.)

Model 367 Push-To-Talk switch adds on-off facility to Models 967M/967ME. Has strap for mounting on steering post for any aircraft/mobile installation. 3-pole momentary switch energizes microphone and relay. $25.00 list.

Electro-Voice personal microphones and headsets introduce a new era of flexibility to communications. They are easily adapted to most RF transmitters and receivers for hands-free, wire-free communications. And they permit the user to concentrate on the job at hand, rather than on the microphone. And each can be serviced in the field if needed, without sophisticated tools.



Put an E-V personal microphone to work today. You'll see, hear, and feel the difference. For more information write us today, or call your E-V microphone headquarters.

ELECTRO-VOICE, INC., Dept. 411EM,
614 Cecil Street, Buchanan, Michigan 49107

high fidelity systems and speakers • tuners, amplifiers, receivers • public address loudspeakers • microphones • phono cartridges and stylii • aerospace and defense electronics

Electro-Voice®

a GULTON subsidiary

Circle 101 on Reader Service Card

APRIL 1971/VOLUME 7/NUMBER 4

BM/E

BROADCAST MANAGEMENT/ENGINEERING

Sudduth's cover: Today you can't afford to waste your human resources with static policies, stifling routines.

MANAGEMENT:

Today's station planning involves best use of human and other resources. For one way to do this, see **page 24's** article discussing an automation system that's efficient and inexpensive. Even more efficient is a new system for packing lots of words into a small amount of air space—and not losing meaning or emphasis in the process. See **page 26** for this lesson in speed hearing. On **page 28** is a story of video professionalism blended with academic standards in producing classroom TV that's interesting to students and encouraging to educational television efforts across the country.

ENGINEERING:

Something new this month: Audio File, **page 8,** a column aiming to disseminate the expertise of audio engineers, along with their gripes and problems. A slow-motion videodisc recorder is described and its operation detailed on **page 18.** And a clever design development, discussed on **page 22,** eliminates troublesome phase error in stereo tape cartridges. To keep up to date on new products available, don't miss checking our Broadcast Equipment section, **page 35.** And the New Literature, **page 47.**

Editor:
James A. Lippke
Managing Editor:
Thomas Whyatt
Associate Editor:
Clifford L. Forbes
Technical Consultant:
Thomas R. Haskett
Art Director:
Karen Weinstein
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

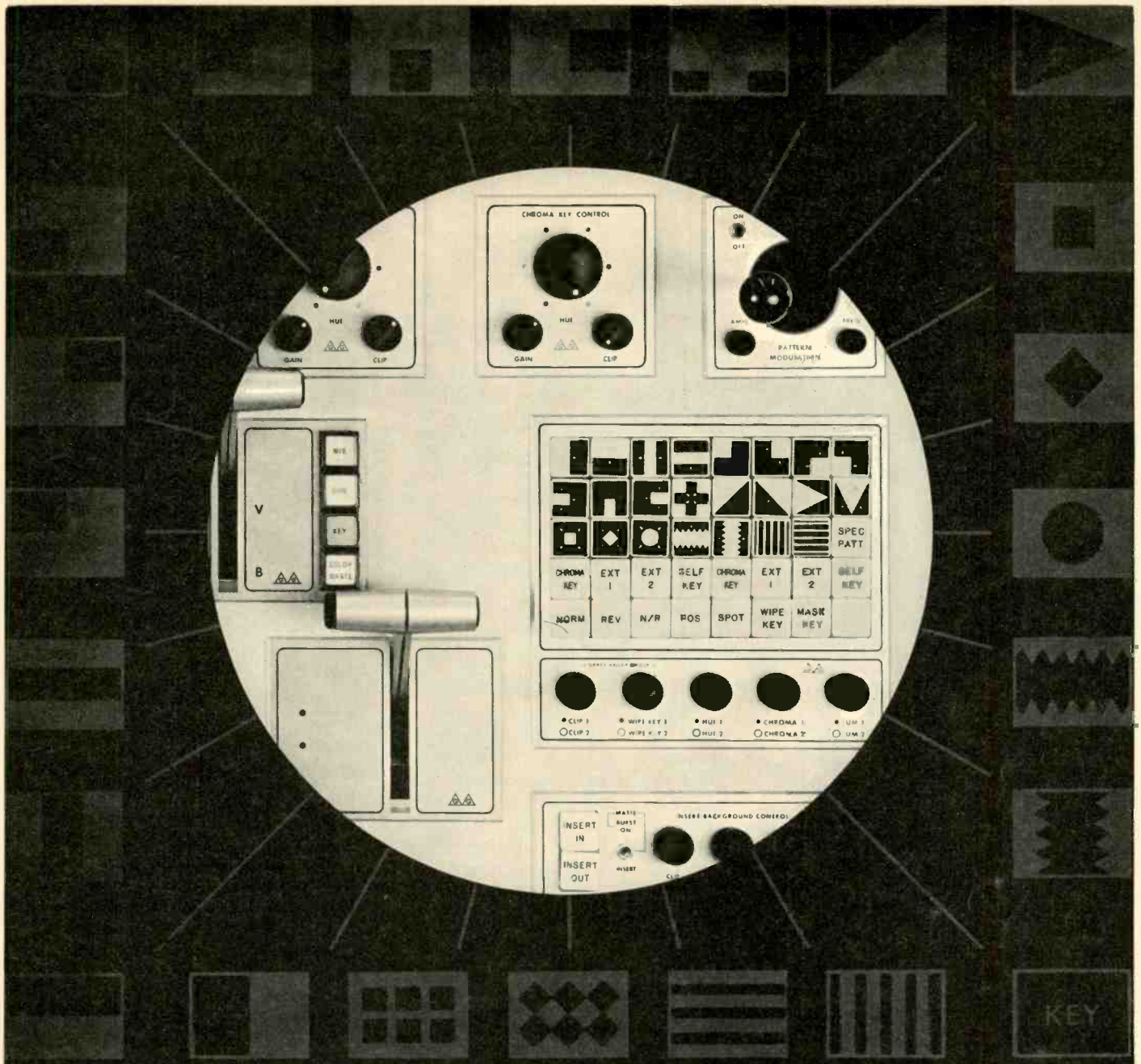
Mactier Publishing Corp.
820 Second Ave., New York, N.Y. 10017
212 661-0450

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

BPA

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

Controlled Circulation postage paid at Duluth, Minn.



GVG SPECIAL EFFECTS SYSTEMS

FOUR BASIC MODELS TO CHOOSE FROM

CHROMA KEY, COLOR MATTE, POSITIONER AND OTHER OPTIONS AVAILABLE

THE GRASS VALLEY GROUP, INC.

FOR ADDITIONAL INFORMATION, CONTACT GRAVCO SALES, INC.

6515 Sunset Blvd. LOS ANGELES, CALIF. (213) 462-6618	Station Plaza East GREAT NECK, N.Y. (516) 487-1311	1312 West Northwest Highway ARLINGTON HEIGHTS, ILL. (312) 394-1344	2626 Mockingbird Lane DALLAS, TEXAS (214) 352-2475	1644 Tullie Circle, N.E. ATLANTA, GEORGIA (404) 634-0521

Circle 102 on Reader Service Card

Videotapes on the spot—from AKAI

Worried about the TV salesman who has to go through a tedious procedure every time he shows prospective clients a sample ad (see page 46) for their products or business? Well, on-the-spot video recording is a lot handier now, thanks to a new portable VTR just introduced by AKAI America Ltd. The $1295 Model VT-100 audio/video recording system includes in 20 lbs a camera with zoom lens, optical viewfinder and inbuilt mike, a battery-operated ¼-in. VTR with twin rotating heads in a helical-scan format (which gives 20 minutes recording time per 5-in. reel), a video monitor with 3-in. tube, and an AC adapter/battery recharger for the system's 6V batteries. To start the action, AKAI is offering a free videotaping service for national associations wishing to send a videotape message out to local chapters.

FCC highlights: New primer; drug warning

The Commission has now tried to resolve some of the questions raised by its requirements that certain broadcast license applicants must ascertain community problems of the area of license.

The Primer recently adopted is the Commission's answer. It attempts to show how this ascertainment should be done, and it is similar to the original Primer proposed for this purpose in December, 1969. Changes have been made as a result of comments filed in the last year on the subject by broadcasters and other interested parties.

Those expected to follow the standards set out in the Primer (see "Interpreting the FCC Rules and Regulations," this issue, page 10, for the first part of a series analyzing the standards and their application) include applicants for new facilities and for certain major changes in authorized facilities, proposed assignees and transferees, and, for the moment at least, applicants for license renewal.

Another major Commission output recently is simply a Notice, reminding licensees of their "long established responsibilities" in the area of "language tending to promote or glorify the use of illegal drugs such as marijuana, LSD, 'speed,' etc."

Apparently issued at the urging of Commissioner Robert E. Lee, the Notice has been interpreted by many as a warning that licensees should go easy on broadcasting music seeming to promote drug use. Commissioner R. E. Lee expressed his hope that the action would "discourage, if not eliminate" the playing of such music.

Concurring statements by Commissioners H. Rex Lee and Thomas Houser cited song lyrics as only part of a larger problem involved in drug abuse, exhorting broadcasters to assume greater responsibility in related areas, such as "advertisements which would have us believe life's problems can be solved by swallowing a pill." (Quoted from Commissioner Houser's statement.)

Dissenting Commissioner Nicholas Johnson, however, viewed the action as "an unsuccessfully disguised effort . . . to censor song lyrics that the [Commission's] majority disapproves of." Licensee reactions: How will the notice affect broadcast of "drug-promoting" popular lyrics? What actual effect do such lyrics have on youth? A study sponsored last summer by Commissioner R. E. Lee concluded: "There is not available today any data which supports the idea that listening to drug-oriented or pro-drug songs, even for an appreciable length of time, encourages or leads any listener to indulge in the use of pot, speed, 'ups,' or 'downs'; or any other drug."

BROADCAST INDUSTRY
NEWS

IN BRIEF:

Fifteen more trained minority-group TV news cameramen graduate in mid-April from the Community Film Workshop Council (see *BM/E*, January 1971, page 20) nine-week training session—ready to step into station staffs anywhere in the country. If you're interested, write Charles Jefferson at CFWC, 17 West 60th St., New York, N.Y. Or call (212) 247-3192.

The Capital Cities takeover of nine broadcasting stations owned by Triangle Publications has finally been approved by the FCC. For $110 million, Capital Cities will acquire stations WFIL (AM—FM—TV) Philadelphia, Pa.; WHNC (AM—FM—TV), New Haven, Conn.; and KFRE (AM—FM—TV), Fresno, Calif. Capital Cities will retain the TV outlets and "spin off" the six AM and FMs to separate buyers.

New film-transfer process is said to improve resolution 15% to 20% and reduce the overall video noise level. Marketed by Acme Film and Videotape Laboratories, Hollywood, Calif., the system is called Acmechromatek; it attaches to film recording units for both color and b&w film-transfer processing. The circuitry is all solid-state.

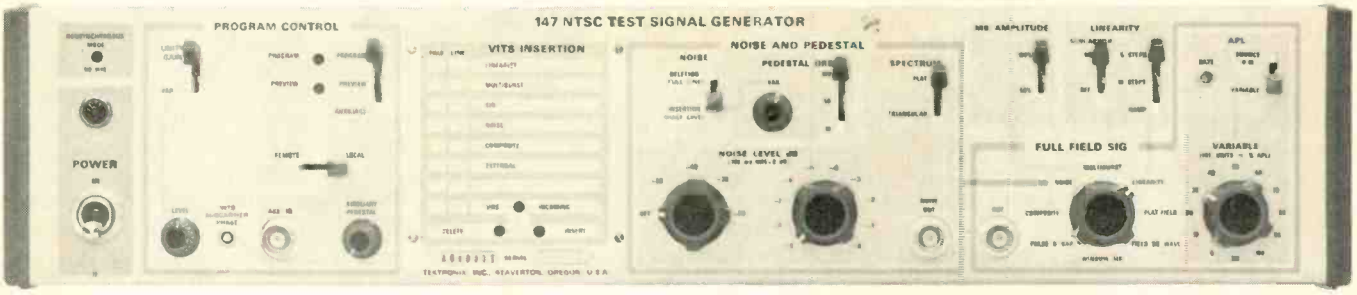
The New Jersey Public Broadcasting Authority has announced the erection of an antenna tower for the first of four public and educational TV stations it plans to operate in the state. WNJT-TV, Channel 52 in Trenton, will have an operating radius of 38 mi. and will provide coverage of news, sports, cultural events, as well as full-scale instructional programming.

Next month's BM/E will cover the excitement of the NAB show, the FCC hearings on CATV, the NAFMB meet, and new technological developments in audio and video.

Are you interested in helping such BM/E efforts as these to provide readers with the most useful information, consisely presented? Well, then, let us know. Write. Tell us about any technical hints, management aids, or sales ideas you think worthy of editorial write-up. Or, send us your problems. We'll see what our readers can do.

VITS and full field testing

VIRSatility



147 NTSC TEST SIGNAL GENERATOR

This new Tektronix signal generator is a complete and versatile source of all recognized vertical interval and full field test signals except color bars. In addition the 147 is the first commercially available source of the vertical interval reference signal (VIRS). All signals are produced with precision and stability by use of digital techniques that minimize adjustments and compensations. Test signals are easily modified by internal jumper changes to shift signal line, signal position on a line, amplitude and other characteristics.

Safe VITS insertion on program material is a major feature of the 147. For example: Insertion cannot occur in the absence of gen-lock. VITS are previewed before insertion. To further assure safe processing of program material, VITS insertion control can be remoted. Only those VITS preselected internally will be inserted and incoming VITS will be deleted before that insertion occurs. Even in the event of power failure fail-safe operation is assured by relay loop-through control.

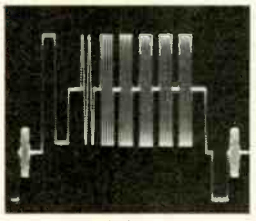
Eight full field test signals are available separately from program material and are produced with or without external synchronization or gen-lock. Full field output includes preselected VITS and a front-panel-selected full field signal. Each full field signal can be modified to meet specific requirements. For example: APL can be selected or automatically varied (bounced) in the flat field mode. In the linearity mode, five or ten steps or ramp luminance with 0, 20 or 40 IRE chrominance can be selected. Time position, amplitude and transition time of most signals can also be varied by internal jumper changes.

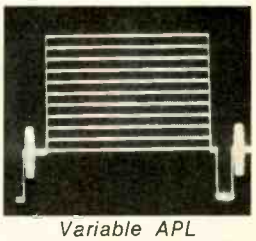
Some 147 test signals, but not all, are shown at the right. To complete its testing versatility there is even a provision in the 147 to insert signals from non-composite sources such as swept generators.

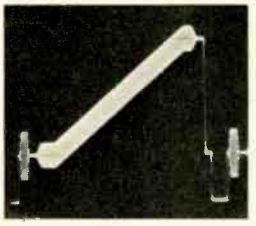
Ask your Tektronix Field Engineer for a demonstration of 147 Signal VIRSatility.

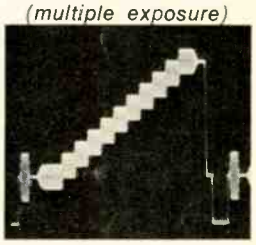
147 NTSC TEST SIGNAL GENERATOR $2700

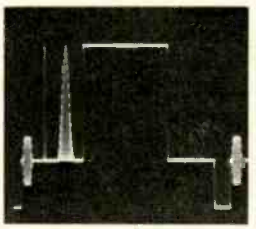
R147 NTSC TEST SIGNAL GENERATOR (including rackmount hardware) $2700

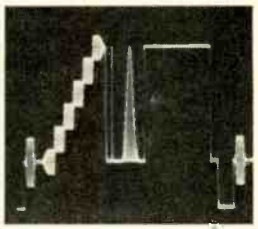

Multiburst

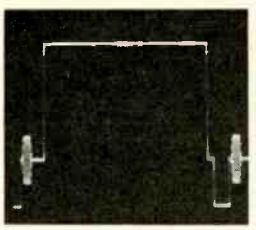

Variable APL (multiple exposure)

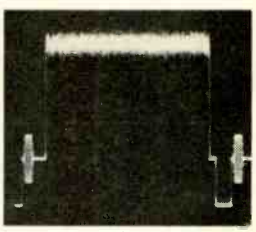

Ramp


Linearity


Pulse & Bar


Composite


Field Square Wave


Noise

TEKTRONIX®

committed to technical excellence

Circle 103 on Reader Service Card

AUDIO FILE:

FOR BETTER IDEAS
FROM AUDIO ENGINEERS

From console to transmitter: Do you protect your signal?

After all you've done to send a good audio signal from the console, why abandon it there? WNCN's (FM, New York) young chief engineer Eric Small sees a dozen ways that signal can get dirty along the line from console to transmitter. But many audio engineers, Small remarks, check out this stage of the operation practically as an afterthought. And their audio suffers—even the finest gear ahead of the console won't compensate for signal deterioration in the line to the transmitter.

Small's recommendations: Follow good operating practice and make proper adjustments—using the most elaborate equipment isn't the answer.

The basic audio chain after leaving the console output terminals, he explains, generally includes a compressor, a limiter and the telco line to the transmitter. Also, there are whatever other line amplifiers and fixed attenuators are needed to maintain proper signal level. If you have more gear tied along the line, this makes proper adjustment that much more essential.

Keep signal level even

To begin, Small checks to make sure the signal level at the console output is correct. Many radio consoles put out about +8 VU at 0 VU on the meter—including at least 3 dB padding to isolate the console at the output from the next unit in the line.

You need the pad and the +8 VU or you've lost before you've even begun, says Small. But a lot of stations he notes are using consoles originally designed for recording studios. These consoles often put out +4 VU at a 0 VU meter reading; and they lack an isolating pad. To raise the signal level before it reaches the next unit in line, and to get the 3 dB pad, it means at least 8 dB of gain in an amplifier behind the console.

But don't raise the level much over +8 VU—most processors won't take it. Send +12 VU along the line and you'll run into (perhaps high) distortion from compressors, limiters, etc. Small recommends maintaining the +8 VU level at the output, and the input of every unit on the line. This runs each unit in the middle of its best operating range and provides a proper adjustment base for each unit.

Maintaining the +8 level also helps in an emergency: Suppose you have to patch out a compressor. You find the unit ahead of the compressor has been putting out +4 VU, while the compressor has put out +8. That means you've lost 4 dB of signal—replacing it will mean adjustments all along the line. If, however, you had maintained the level at +8 VU, patching out that compressor wouldn't have affected the level on the line or at the transmitter.

Setting up a stereo chain

It's best to check and completely adjust each unit in a stereo chain before going to the next, Small asserts. As for simply hanging the chain together, hoping to adjust each unit while monitoring at the end—Small maintains this won't work. Interaction among the units in the stereo chain, and off-setting balance errors, make effective control by monitoring from the end impossible.

Small explains: Let's say you start with a compressor. Get your input and output levels right. Adjust the settings for your program material (hard rock needs different adjustments than classical—*BM/E* will devote a future column to that; meanwhile, see our October, 1970 issue, page 18). Final settings Small says should be made by ear, listening to the compressor output through high-grade monitoring equipment; all you get from following the operating handbook's adjustment instructions are approximate settings.

Now move on to the next unit, adjust and check it out individually, and work your way right on through to the end at the modulator input.

Telco problems

At the transmitter, check not only for level, but for quality, Small suggests. A lot can happen on that telco line.

Like noise. On the telco line, noise is a fixed quantity. Drive the line at full +8 VU; don't match signal to transmitter by pulling the level down at the telco line input. Put a line amplifier at the transmitter with an adjustable attenuator ahead of it. Then, no matter what level you need at the transmitter, you can get it at the last minute.

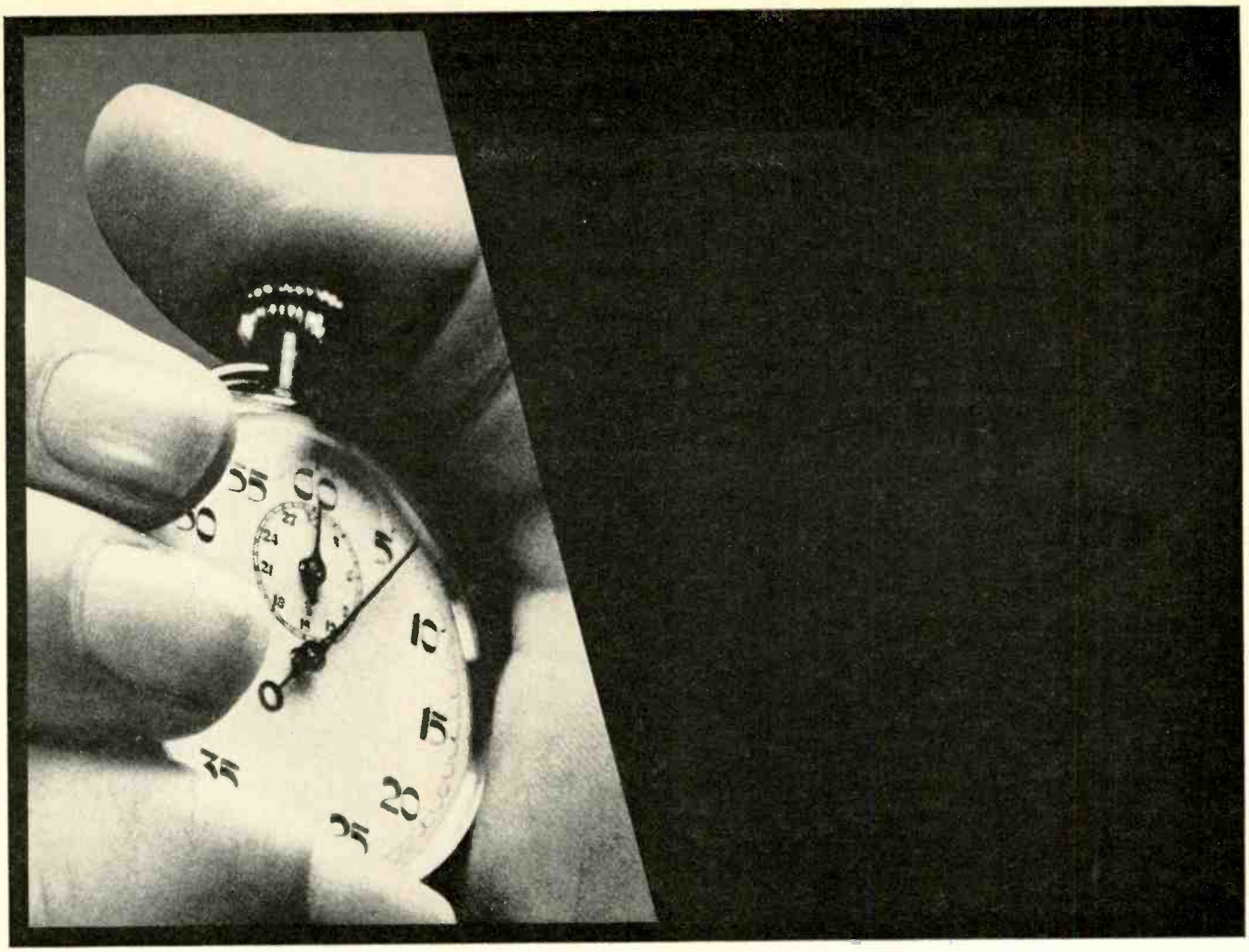
Set up this attenuator with calibrated detent positions—then, in emergencies, you can compensate exactly and immediately for any temporary change in signal level without having to make lots of

This new BM/E department belongs to audio engineers—only. Your ideas will make it, your interest will sustain it. Here's what we expect Audio File will contain:

- A forum for audio engineers to exchange problems and solutions.
- A growing compilation of the most effective audio practices in the industry.
- Tips for the man who wants the right equipment for the job; who won't accept the inadequate, won't be taken in by the superfluous.
- Forthright opinions—ours and yours—on controversial subjects in the industry. And your frank evaluations of equipment and practices affecting your work.

These are our goals—and we'll need your help. Write:

Audio File, BM/E Magazine
820 Second Avenue
New York, New York 10017



Solve 7 problems...in seconds.

Something totally new to add to your bag of tricks! We call them *Plug-in Problem Solvers.* They're designed to provide seven common modifications in microphone and sound system setups without soldering or rewiring—just plug them in! The Model A15A Microphone Attenuator that prevents input overload; Model A15PR balanced line Phase Reverser; and A15HP High Pass and A15LP Low Pass Filters to modify low and high frequency response; A15PR Presence Adapter to add brilliance; A15RS Response Shaper to filter sibilance and flatten response; and the A15LA Line Adapter that converts low impedance microphone inputs to line level inputs. Carry them on every job. It's a lot easier than carrying a studio console with you! Shure Brothers Inc., 222 Hartrey Ave., Evanston, Ill. 60204.

SHURE

Circle 104 on Reader Service Card

measurements.

Furthermore, adds Small, don't forget that a telco line usually includes at least one amplifier—often more. Check out the line with a signal about 10 dB higher than your operating signal for a *short time* (you run afoul of telco regulations if you use a lengthy blast). If a telco amplifier hits the top with a splatter, then watch out. It may not be able to handle your +8 VU. You might want to ask the telephone company to readjust or replace the culprit.

Isolate the amplifier driving the telco line with at least a 3 dB pad. This can save your audio signal from big bumps in frequency response because of the impedance of the line. Line faults may damage the amplifier, also, unless it's padded.

Final checks

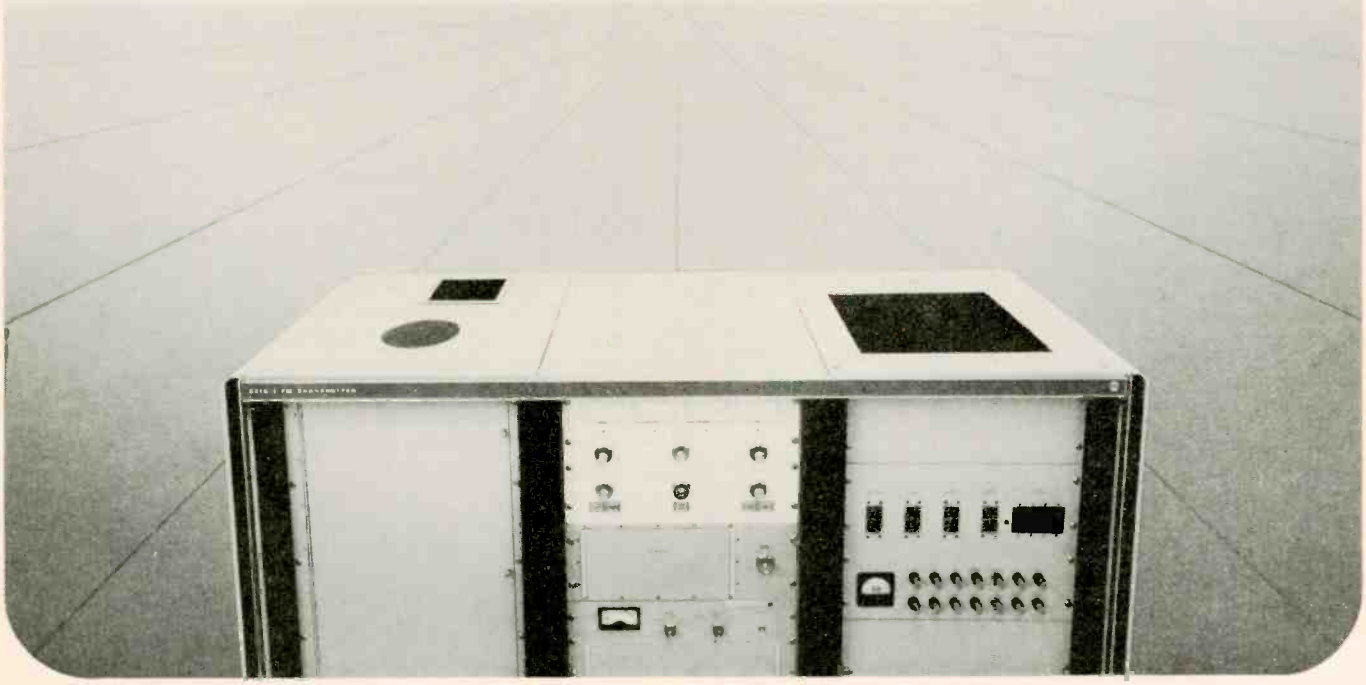
Small adds a list of final checks on the audio signal at this stage.

- Monitor downstream from compressor to limiter—minimal choices should be monitoring off-air and at limiter output. Monitoring at console output only, you can miss some horrible distortions introduced on the way to the transmitter.
- Measure signal-to-noise at 15 kHz bandwidth—noise above 15 kHz won't reach the transmitter, but will make your reading appear much worse than it should.
- Consider installing a relay (make-before-break to avoid audible clicks) activated by the on-the-air light circuit in the announce studio. The relay will cut a 3 dB pad into the line behind the compressor. When the announcer comes on, the relay will compensate for that higher peak-to-average ratio, which makes his voice sound about 3 dB louder than music—and which is what often irritates listeners. This relay may give you trouble in voice-over-music situations, however, so just plan to avoid them if you can't bypass the relay on such occasions.

Getting the most from your equipment—that's the gist of Eric Small's suggestions. And that's the meat of the audio engineer's daily fare. Whether you're running a flagship operation or a shoe-string daytimer, your problems will involve maximizing station performance. How are they solved? Our readers have the answers; finding them and reporting them—that's the job of this column. Drop us a line.

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).

COLLINS

COMMUNICATION / COMPUTATION / CONTROL

Circle 105 on Reader Service Card

INTERPRETING THE FCC RULES & REGULATIONS

Ascertainment of Community Needs —Part I

On February 23, 1971, the Commission issued a major Report[1] clarifying the confusion that arose from its December 19,1969, *Primer on Ascertainment of Community Needs.*[2] The Primer was designed to guide broadcasters preparing Part I ("Ascertainment of Community Needs") of Section IV of applications for new or changed facilities for license renewals or for assignments and transfers. The February 1971 Report will place in perspective the Primer and the matter of ascertaining community needs.

Part I of Section IV requires specific and explicit data regarding ascertainment of community needs and problems. For example, licensees are required to state the specific methods used to ascertain community needs, including (1) identification of representative groups, interests and organizations consulted, (2) identification of the communities or areas which the station will serve, (3) a listing of significant needs and interests to be served by the station, and (4) a listing of typical and illustrative programs which will be broadcast to meet these ascertained needs.

This seemingly innocuous, brief portion of various FCC application forms has engendered substantial problems for broadcasters and the Commission. One problem: Many broadcasters initially tried to respond to the questions in terms only of program needs. Unfortunately, many apparently still do. More troublesome however is this: The questions designed to require broadcaster inquiry into community needs have (perhaps because of their brevity) raised significant problems of interpretation. For example, how should a broadcaster actually go about ascertaining community needs; who should be interviewed; how many persons should be interviewed; what are "significant" needs; how many and what kind of programs should be broadcast?

1. The 1969 proposed Primer

To answer some of these perplexing questions, the Commission released its proposed Primer on Ascertainment of Community Needs in December 1969, "to clarify and provide guidelines as to the Commission's requirements and policies with respect to the ascertainment of community problems by broadcast applicants" and to solicit comments with respect to specific provisions of the Primer.

While most broadcasters are generally familiar with Commission requirements regarding ascertainment of community needs and the provisions of the 1969 Primer, there are some new developments to be found in careful study of the February 1971 *Report and Order in Docket No. 18774.*[3]

II. 1971 Report (i.e. Primer Revisions)

While most of the provisions of the 1969 Primer remain unchanged in the 1971 Report, some significant portions have been revised:

(1) **Exemptions:** Educational organizations filing applications for noncommercial educational broadcast stations are now exempt from the provisions of the Primer. However, religious organizations applying for broadcast stations "cannot turn their backs on secular problems" and must ascertain community problems and devote portions of their programming toward those problems.

(2) **Changes in facilities:** Part I of Section IV must be completed by applicants for "major changes" in facilities, if the proposed change would result in the increase of the area of coverage by more than 50%, or if there is a proposed substantial change in programming.

Under the terms of the 1969 Primer, it appeared that a proposed change resulting in 55% increase of area, and a diminution of 10% of existing coverage area, would not require the submission of Section IV data since there would be only a *net* increase of 45%. To clarify this construction, the Commission now specifically states that Part I of Section IV is applicable and must be submitted,

> [With a] construction permit for a change in authorized facilities when the station's proposed field intensity contour (Grade B for television, 1 mV/m for FM, or 0.5 mV/m for AM) encompasses a new area that is equal to or greater than 50% of the area within the authorized field intensity contours.

However, the Commission does note that if

1. FCC 71-176, _____FCC2d_____, released February 23, 1971.
2. 20 FCC2d 880 (1969).
3. Id. fn. 1.

"Scoopic 16 shoots the news faster than any other camera available."...*Says Henk de Wit, Director of Photography at KDFW-TV Dallas.*

*Staff at KDFW-TV Dallas ready to film the news when it happens, where it happens with their Canon Scoopic 16s.**

Canon's Scoopic 16. Made for fast-breaking news events. Because it shoots them faster than any hand camera around. That's a large claim for an under 7-pounder.

Uniquely designed hand-grip. Fully automatic exposure control with manual override. A built-in zoom lens. Motor drive and auto threading. All adding up to a perfect shot. Everytime.

Close-ups, medium and long shots, zooms, telephotos, wide angles. Even "follow" shots. Instantly focused. Indoors and out. Filming . . . not fumbling. Because your eye never leaves the view finder. You're always in focus for that great newsmaking moment.

But don't take our word for it. Try the Canon Scoopic 16 for yourself. **Give it a good workout for two weeks. Free of charge and without obligation.** That's how sure we are you'll find Scoopic 16 is all it claims. The best professional camera around. At only $1250.

To qualify for our offer, you need only be a bonafide TV station in the U.S.A. If this is you, why not send in our coupon today.

☐ I'd like more information on Canon Scoopic 16.

☐ I'm interested in your offer. Please send my application for *two weeks'* trial use of Canon Scoopic 16. Free of cost and without obligation on my part.

Name _____

Station _____

Position _____

Address _____

City _____ State _____ Zip _____

Canon U.S.A., Inc., Dept. BM/E-1
64-10 Queens Boulevard, Woodside, New York 11377

Canon/SCOOPIC 16

**All Canon Scoopic 16s pictured, sold and serviced by Professional Cine Products, Inc., Dallas, Texas.*

there is virtually no population in the gain area, a showing to that effect will relieve the applicant of the Primer's requirements.

(3) **Daytimers requesting fulltime facilities:** Under the provisions of the 1969 Primer, daytime AMs requesting fulltime authority had to submit Part I data (e.g., surveys, programs to meet needs) to Section IV-A. However, under the 1971 Primer, *this requirement has been deleted.* The Commission noted that at least two groups filing comments on the proposed Primer said it was obvious that the problems of the community do not change when the sun goes down.

(4) **Renewals:** *Different renewal standards are presently under consideration by the Commission.* The necessity of ascertaining community needs via the present complex process may be eliminated; however, until new rules are adopted, renewal applicants are required to comply with the present standards of the Primer.

(5) **Current information:** Some broadcasters expressed a desire to have the necessity of filing new Section IV "community needs" data eliminated—provided such data had been filed within the preceding 18 months. However, *the Commission has elected to retain its one-year standard,* noting that otherwise community-needs data would not be current enough "for us to make an informed judgment." The 1971 Primer rule is that new Section IV data need not be compiled and submitted, thereby unnecessarily duplicating recent efforts, *if such data were submitted within the previous twelve months.* Applicants should also note that they may begin preparation of an application up to six months before filing.

(6) **Purpose of section IV:** The Commission has described the purpose of Section IV as (1) to show what the broadcast applicant has done to ascertain the needs and interests of the community to be served, and (2) to list the programs or other broadcast matter proposed to meet these needs and interests.

The Commission, especially before releasing the 1969 Primer, found that a large segment of the broadcasting industry "steadfastly interpreted community 'needs' to mean program preferences." For example, the Commission received applications indicating that some communities' principal needs were for more country and western music, or for more sports programs, and the like.

Following the release of the 1969 Primer, a review of applications indicated that true community needs and problems (as opposed to program preferences) were finally being ascertained. Despite the Commission's assurances that the word "problems" (as used in the Primer) was to be considered generally synonymous with "community needs and interests," however, many broadcasters believed the 1969 Primer to be a major shift of Commission policy. *This is not true.* The Commission believes that the diverse interpretations given the Primer by broadcasters are unwarranted; however, the Commission has conceded that obvious confusion exists (as opposed to the clarification hoped for from the 1969 Primer) and declared that some revision via its 1971 Primer was in order.

Among the clarifications made in the recently released *Report and Order,* the Commission suc-

Continued on page 47

Expensive?

That's one thing Jamieson's new Compac 16/8 color film processor isn't.

Jamieson's new Compac 16/8 is priced at just $6,980. And that's complete, even to the crate it's shipped in.

Study the picture of our new Compac 16/8. What you see is a completely operable machine. And what you see is what you get for the low, $6,980 price.

Jamieson's Compac 16/8 conducts the standard ME-4 process at 20 feet per minute. With the advanced EH-101* you can run it at 30 feet per minute.

Our new Compac 16/8 runs 16mm and 8mm completely interchangably. It warms up and is ready to go in 10 minutes flat. It can force two stops without slowing down.

That's quite a bit for $6,980.
But there's more.

Jamieson's Compac 16/8 has a 2000 ft. magazine that's standard and a feed elevator. It has our patented tube tanks with features of high picture quality and economical cost, which are well known in Jamieson's larger models.

This new, low-cost color film processor has a new, quiet buffer squeegee. It has the automatic controls featured in larger machines and a complete set of flow meters.

We'd like to tell you more about our new Compac 16/8 and what it can do for your station. So write or call us.

How about 35mm Slides?
If you use many color slides, take a look at Jamieson's Compac 35/16. It processes 35mm slides as well as 16mm news film and commercials and at the same low price as the Compac 16/8.

*The EH-101 process uses standard ME-4 chemistry at slightly higher temperatures.

EQUIPMENT DIVISION

JAMIESON FILM COMPANY

9171 KING ARTHUR DRIVE, DALLAS, TEXAS 75247 (214) 638-2660

Circle 109 on Reader Service Card

Announcing the

CHROMA III™

Automatic broadcast color camera for field and studio

You can pull our new Chroma III off its studio tripod and take it to the sun-baked stadium or the wind-chilled ski slopes without making an adjustment. It's the most flexible—and the least temperamental—camera you've ever known.

Chroma III converts instantly to any operating mode. In the field it gives you full NTSC capability as a single unit, using standard coax. Change the cable and switch over to studio CCU, and it's back in multiple-camera operation.

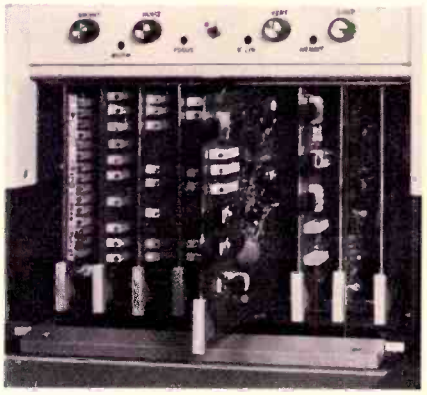
Chroma III also lets you forget about temperature extremes, line voltage variations, daily re-registration, and other usual set-up adjustments.

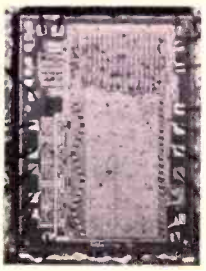
This, in brief, is Chroma III:

- **Excellent colorimetry**—through the most efficient, most color-faithful prism optics ever built for a color camera—the result of computer-aided design.
- **Pushbutton set-up**—one man does it in seconds.
- **Hands-off registration**—maintained automatically through precise, feedback-stabilized width / linearity / centering circuits.
- **Built-in full-screen video level monitoring**—reads directly in IEEE units.
- **Ultra-stable color encoder**—digital phase-shift circuitry and 50 dB carrier rejection under all environmental extremes.
- **Pushbutton white/black set**—instantaneously sets video level, pedestal level and color balance.
- **Automatic servo iris**—with provision for local and remote override.
- **Built-in digital sync generator**—for self-contained operation.
- **Pushbutton digital shading**—establishes exact shading corrections.

We've made the camera that our experience and field research have told us you want. These features just begin to tell the story—but we think you'll agree it's a great beginning.

Write today for our six-page Chroma III brochure.





TELEMATION

P.O. Box 15068, Salt Lake City, Utah 84115
Phone: 801-487-5399

Circle 110 on Reader Service Card

Operating Principles of a Slow-Motion Videodisc Recorder

By Joseph Roizen

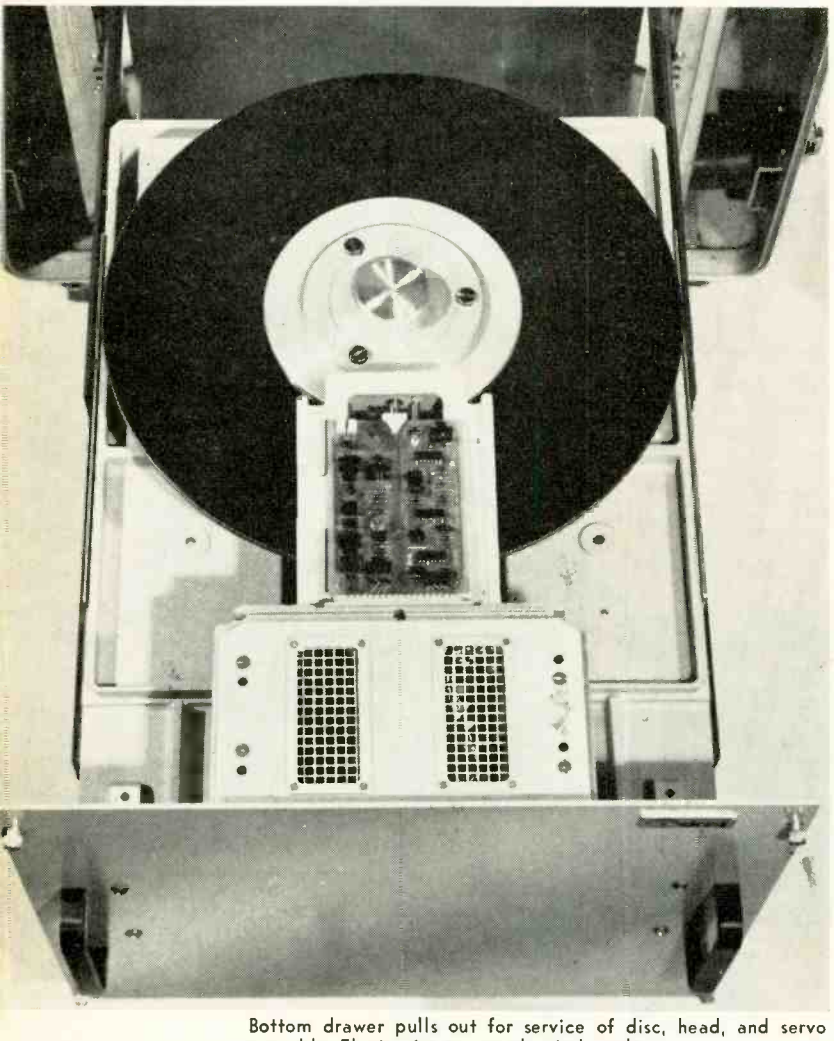
Instant replay and slow-motion production features have doubled viewer interest in ball games and other sports events. This article explains how the DMI 1000 Videodisc recorder operates with extended bandwidth and good time-base stability to reproduce frame-by-frame action of an NTSC color picture.

SLOW-MOTION RECORDING requires a rather unusual handling of the composite color television signal. In order to reproduce either a fixed repetitive image in the stop mode or a variable rate, slow-speed image, the ratio of time-base manipulation is, of course, tied to incremental steps of the field frequency.

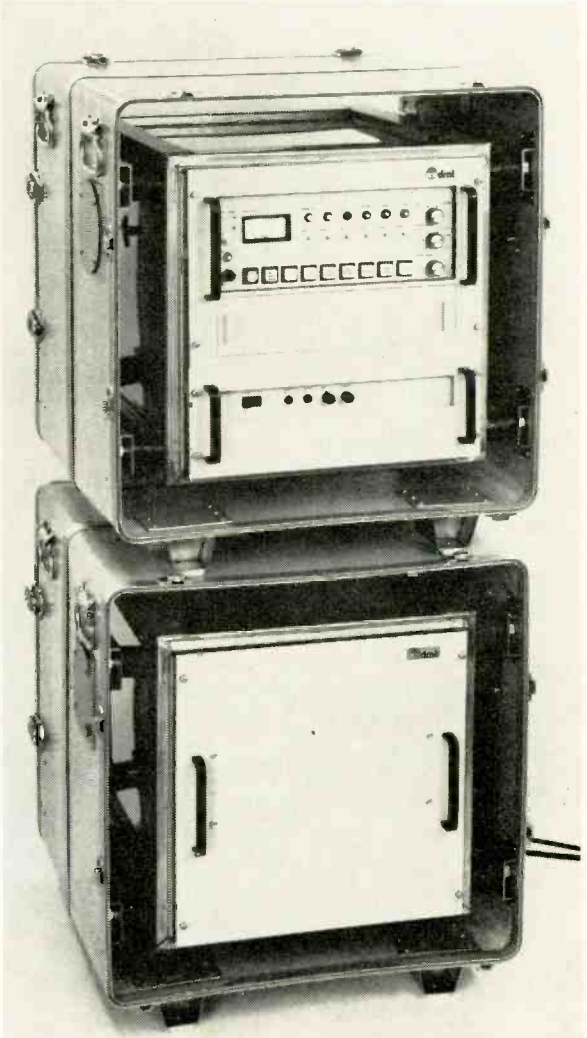
The major difficulty in handling the composite video signal stems from two sources. First, the necessity of using the field rate requires an artificial introduction of a half-line delay period so that interlace is maintained in the restructured frame. Second, the chroma phase must be corrected from field to field so that hue accuracy and the subcarrier suppression sequence is correctly handled.

It would seem simpler to design equipment to operate at frame rather than field increments.

Joseph Roizen is vice president, engineering, of Graduate Education Network, Palo Alto, California.



Bottom drawer pulls out for service of disc, head, and servo assembly. Electronics are on plug-in boards.



The videodisc recorder is often used in the field to cover sports events. For that purpose, it is mounted in a shock-resistant portable case. Control panel is at top, with bottom cabinet containing the disc assembly.

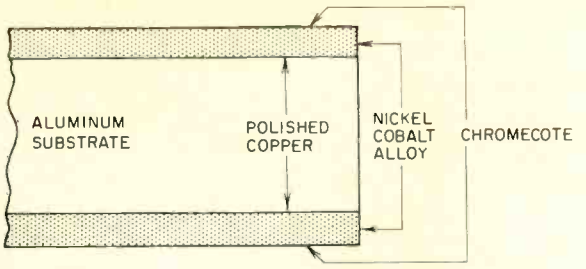


Fig. 1. The videodisc is made of a ¼-in. aluminum base coated with polished copper and an overlay of nickel cobal alloy which accepts the magnetic signals. Coating of Chromecote provides riding surface for heads.

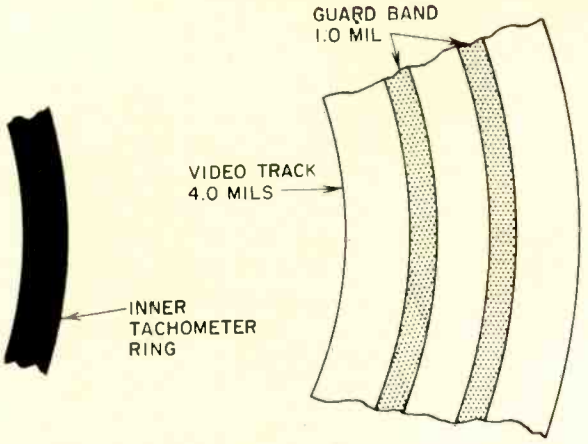


Fig. 2. Track configuration on the disc consists of 5-mil center-to-center track spacing. Inner tach ring contains 525-pulse timing track for servo operation.

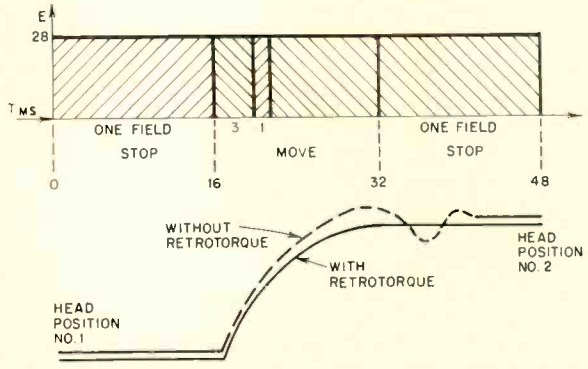


Fig. 3. The head records a single video field on each track. When the head moves to the next track, a retrotorque pulse damps overshoot or mechanical oscillation, smooths transition.

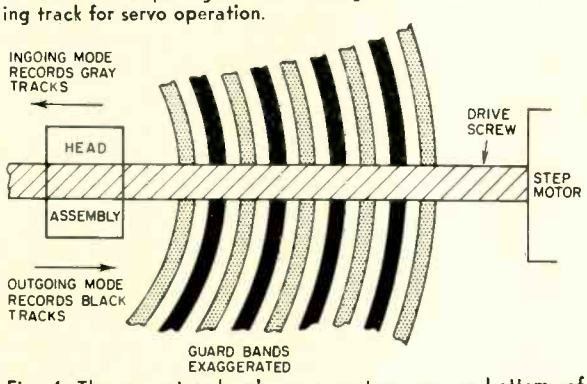


Fig. 4. There are two heads—one on top, one on bottom, of the disc. As the heads move inward, they alternately record odd-numbered tracks. On the reverse trip, the even-numbered tracks are laid down.

Ironically, this type of time-base image manipulation is generally used to slow down rapidly moving objects. Under these circumstances, inter-field displacement in normal frame would reduce image resolution.

Generally, the chroma phase reversal problem is handled by separating the luminance and chrominance components of the composite signal through low-pass and bandpass filters. The bandpass filter is generally centered around the chrominance subcarrier frequency. The chrominance signal is separately time-base stabilized to meet phase accuracy requirements. It must also be intermittently phase reversed to provide field-to-field color sequence. The corrected chrominance signal is then added to the luminance component which has been equally delayed to form the final composite NTSC color output.

By contrast, the DMI Videodisc 1000 handles the signal in a different manner, contributing to a great simplification of the time-base correcting circuitry and additional bandpass in the luminance channel.

Disc parameters

The disc consists of a ¼-in. thick aluminum substrate, 16 inches in diameter, coated on both sides to provide two recording surfaces (Fig. 1). The primary coating is copper which has been rose-polished to a surface flatness in the order of a few micro-inches. An additional layer of a nickel cobalt alloy of 10 micro-inches provides the magnetic recording surface. That layer is further coated by a proprietary material called Chromecote, a very hard nonconductive finish which provides the riding surface for the head assemblies.

Disc speed is 3600 rev/min. Its spindle is driven by a precision motor on extremely smooth ball-bearing mounts. The particular advantage of the DMI disc structure is that very fine control of the magnetic properties is maintained through the use of a thin coating. The alloy used has a squareness of better than 0.8 and very high resolution. In addition, the extremely thin Chromecote surface provides excellent output. Under operational conditions when the disc is rotating at high speed, a thin air film of 10 to 20 micro-inches forms between the head assembly and the disc surface. With only a 3-micro-inch Chromecote separation between the head and the magnetic signal, head-to-track distance is kept at the lowest possible figure. Typical rhodium coatings are in the order of 15 micro-inches and, therefore, increase signal losses when used as magnetic disc surface finishes.

Surface flatness of the disc is maintained at less than one micro-inch on an arithmetic average basis while the overall flatness is within 30 micro-inches. Vertical run out is under 4 mils. With this

degree of flatness, head and disc life are greatly enhanced. Thousands of cycling operations have been run to establish potential longevity figures for these two components. Track configuration on the disc is as follows (Fig. 2):

With a track width of 4 mils and a guard band of one mil, track-to-track center spacing is 5 mils. Writing speed at the perimeter of the disc is 2900 while the shortest track at the inner limit is written at 1400 in./s. Slightly beyond the innermost video track there is also a tachometer track with a 525-pulse sequence which produces a frequency of twice the horizontal rate for serving the disc assembly.

The heads are driven in staggered sequence by stepping motors connected to a spiral mechanism which provides the incremental physical displacement from track to track. These motors are controlled in a unique manner to maximize head positional stablization after each incremental jump. Voltage is applied to the motor with positional information indicating a two-step movement. Normally, system mechanics would cause a slight damped mechanical oscillation at the end of the movement. To eliminate this, the motor is given a reverse torque pulse prior to the completion of each move cycle (Fig. 3). This technique insures stable positioning before the record signal is gated on or playback is started. Tachometer discs on the stepping motors in combination with logic cir-

Principles of Chromalok

In the recovery of an NTSC video signal from any rotating mechanism, such as videotape or disc recorder, the basic problem is the same: The rotating machinery does not turn at a perfectly smooth rate. The time base is thus altered because of various inherent deficiencies in the mechanism. Rough bearings, axial motor displacements, dynamic imbalances, etc., all contribute to this problem. Even with the tightest servo control, a certain amount of time-base displacement is evident in the reproduced signal. Monochrome playbacks display this error in the form of horizontal jitter, which is usually masked by the receiver AFC circuit. Color signals produce a more noticeable effect: Reproduced hue is altered and degrades the picture.

The FCC-specified NTSC signal requires a time-base accuracy in the order of 4 nanoseconds for accurate hue reproduction of the color video. This accuracy must be maintained despite cumulative errors in the record and playback modes of the recorder, to meet both subjective acceptability and FCC requirements. The chrominance part of the signal must be time-base corrected before transmission.

Two very stringent demands are imposed on the system if it is to meet FCC specifications. The nathematical relationship of $\frac{455}{2}$ between the color subcarrier frequency and the derived horizontal line rate must be retained. In addition, the dot interlace produced by precise alternate line subcarrier phase subversal needs to be held to a fairly tight tolerance to avoid visible dot crawl. From a luminance viewpoint, it would be desirable to retain as much high-frequency luminance information as possible without generating unwanted moire effect.

Up to the present, color slow-motion disc recorders, capable of meeting some of these requirements, have used time-base correctors that depend upon electrically controlled variable delay lines to eliminate the displacements in the playback signal. A device known as Amtec with a correction range of up to one microsecond can reduce gross time displacements. A subsequent unit, Colortec, further refines the time base accuracy by restoring proper chrominance phase. These devices are both rather expensive and complex. Signal handling also includes the separation of chrominance and luminance components by low-pass and bandpass filters which limit the luminance response to well below the subcarrier frequency.

The Chromalok circuit has a new approach to this problem; it uses a comb filter to extract chrominance information and a heterodyne circuit for time-base correction of the unstable chrominance.

The Videodisc 1000 uses a precise servo mechanism to achieve a high level of time-base stability of disc rotation. Nominal time base displacement is approximately ± 25 ns, providing a cumulative peak-to-peak error of 50 ns.

For the purpose of this analysis, an additional 50% error is allowed and it is assumed that a maximum peak-to-peak error of 75 ns might occur. This error does not occur on an instantaneous basis but builds up over a period of time based upon the mass and inertia of the disc itself. The maximum rate at which the error could possibly occur is in the order of 400 cycles and, consequently, the maximum time base displacement over a given television line is never in excess of 12 ns. Obviously this is more than the NTSC signal can accommodate without a severe hue shift in the reproduced image and for this reason the Chromalok circuit comes into play.

A simplified block diagram of the Chromalok system (Fig. 8) shows its function. The composite video signal is applied to an input bandpass filter which covers the 2.8 to 4.2 MHz range. The filter is adequate to pass all chrominance components that exist around the subcarrier and its sidebands in the 3.58 MHz region. In addition, luminance components in that region are passed.

The signal is separated into two paths, one of which contains a 63.5-μs delay line with an additional incremental delay of half the color subcarrier period (140 ns). The second path is direct, with no delay. The delayed and undelayed signals are applied to a chrominance adder circuit in which high-frequency luminance components are cancelled by subtraction while the chrominance components are summed. Circuit efficiency depends upon very accurate tailoring of the one-line

cuitry provide the necessary sequential positioning information. The heads operate over a limited portion of the disc so that the inner-to-outer peripheral writing speed is adequate to handle the necessary bandwidth.

Signal logic

Recordings on the surface of the disc are made by gating video signals to the video heads in the following sequence:

Head #1 and head #2 are positioned on the starting tracks prior to recording. For the purposes of illustration, it might be considered that head #1 records all the even fields and head #2 records the odd ones. When the record mode is initiated, head #1 lays down field #1 on the top surface of the disc, on track #1. At the completion of field #1, field #2 is gated to head #2 on the bottom surface which records the first track on that side of the disc.

While field #2 is recording, head #1 is repositioned to track #2 on the upper surface and fully stablized in the new position. At the completion of the recording of field #2, the signal is gated to head #1 again and field #3 is recorded on track #2 of the upper side. The sequence continues until the inner limit of the disc is reached, where head directions are reversed and a series of inter-

Continued on page 30

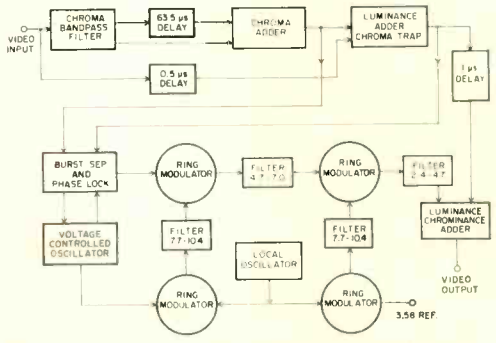


Fig. 8. Chromalok circuit improves time-base stability and minimizes burst phase shift of the 3.58-MHz signal, bringing it within NTSC-FCC specifications.

delay to the center frequency of the subcarrier being used, and very precise line time. Approximately 20 dB of luminance attenuation is obtained with this circuit, with subsequent improvement expected to be in the order of 34 dB or better. This should be accomplished by the use of components designed for this purpose.

The full-bandwidth input video signal is applied through a separate channel containing a 0.5-μs delay line for time equalization, and simultaneously fed to a luminance adder and chroma trap which receives the filtered chroma signal from the chroma adder. The output of this luminance adder consists of a relatively pure luminance signal from which chrominance components have been eliminated through additional notch filtering at the color-subcarrier frequency. This luminance signal is further delayed by one micro-second to provide coincidence timing with the time-base-stabilized chroma information from the heterodyne corrector.

Both the unstable chroma information and the separated luminance are applied to a burst separator and phase-lock circuit. The burst signal is extracted and used to control a voltage-controlled oscillator (VCO) running at the color subcarrier frequency. Oscillator phase remains locked with burst phase recovered from the disc. These variations are due to disc time-base instabilities. The VCO has a 2- to 3-line time constant, which is sufficient for this purpose.

The 3.58 subcarrier output of the VCO is phase-modulated by video disc perturbations. This variable subcarrier is applied to a ring modulator which also receives the output of a local, relatively stable oscillator running at 5.75 MHz. Thus, ring-modulator output contains both the sum and difference of the two applied frequencies. In this case, the desired frequency is the sum (9.33 MHz). A bandpass filter between 7.7 and 10.4 MHz eliminates not only the difference frequency but also the second harmonic of the color subcarrier frequency (7.16 MHz). The 9.3-MHz output is then applied to a second ring modulator whose alternate input receives unstable chroma recovered from the luminance adder. Hence the output signal from this ring modulator contains sum and difference signals as well, but there is a significant change. Since the two signal sources were both unstable in the same direction and with the same magnitude, the intermodulation between the two produces a stable output, i.e., the instabilities are self cancelling.

The wanted signal is the difference frequency of 5.75 MHz. At the ring-modulator output, a 4.7-7 MHz bandpass filter is inserted. The chroma information available at the filter output is stabilized, but at the wrong frequency. An additional heterodyne modulation process is therefore needed to restore it to the NTSC color subcarrier of 3.579545 MHz. This is accomplished by a second path from the local oscillator which is applied to a third ring modulator. The second input to this modulator receives stable studio reference subcarrier. This combination produces at the output of the modulator a stable sum signal of 9.33 MHz. A second 7.7 to 10.4 MHz bandpass filter eliminates the undesired modulation products and the stable 9.33 MHz is applied to the fourth modulator, which also receives the stablized chroma information. The difference frequency is now 3.58 MHz. The output of the fourth modulator is filtered through a 2.4 to 4.7 MHz filter. The correct color subcarrier and chrominance information is then passed on to the luminance-chrominance adder from which a composite NTSC video signal is obtained. Finally the output signal is applied through a processing amplifier for independent re-insertion and control of each of the separate video signal entities.

Phase Error In Stereo Tape Cartridge ELIMINATED

CBS Radio and Marathon Broadcast Equipment teamed up to lick a problem. Clear stereo commercials now possible.

GETTING A GOOD CLEAN SIGNAL on both stereo and mono FM receivers from a tape cartridge has been a hit-or-miss affair—mostly miss. Chances are the stereo will be out of phase—Marathon says the average cartridge exhibits a phase shift of 180 degrees at 5000 Hz.

The stereo-only listener may not be aware of the shift—to him the performance is all right. But phase shift in the order of 50 to 180 degrees (Fig. 1) seriously degrades reproduction when received on a monophonic set. In fact, a 170-degree phase shift produces practically no output between 5 and 8 kHz on mono, Fig. 3. This occurs because of the matrixing of the stereo signal in the transmitter exciter. (Summing L + R in the main carrier when one is out of phase, or when there is an azimuth error, causes a drastic loss of high frequency.)

What had been considered an unavoidable limitation bothered Fred Telewski, project engineer for CBS Radio. Telewski was in charge of designing new technical facilities for CBS FM—initially in New York and then in San Francisco. The stations wanted to use cartridges for both music and commercials. If the situation were not remedied, no stereo commercials would be possible—all existing cartridges on the market suffered from the same maladay—phase shift errors between the L and R channel caused by skewing of the tape.

Telewski studied the problem and determined that the skewing was caused by poor guidance of the tape within the cartridge. This resulted in inconsistancy in aligning the tape with the record and playback heads. Work in the engineering lab proved to Telewski that he could reduce the problem by adding more tape guidance.

"The additional guide inserted in the cartridge eliminated the skewing of the tape as it flowed across the recording and playback heads," Telewski reports. "This allowed the tape flow to be set for correct azimuth and in that way eliminated phase error."

CBS found the engineering personnel at Marathon Broadcast Equipment Sales Corp. eager to tackle the job of putting an extra tape guide into a mass-produced cartridge. A final design was settled on in the autumn of 1970. The result of the effort is the new Marathon 300-S cartridge seen by many of you at the NAB Convention.

Fig. 1. Lissajous figures showing phase error.

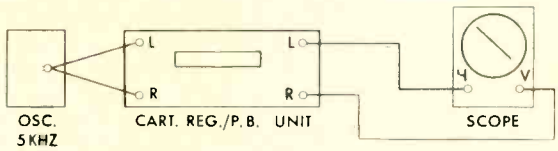


Fig. 2. Test set-up to produce a Lissajous pattern.

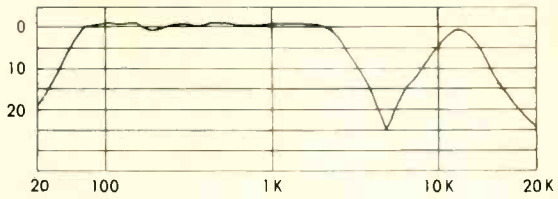


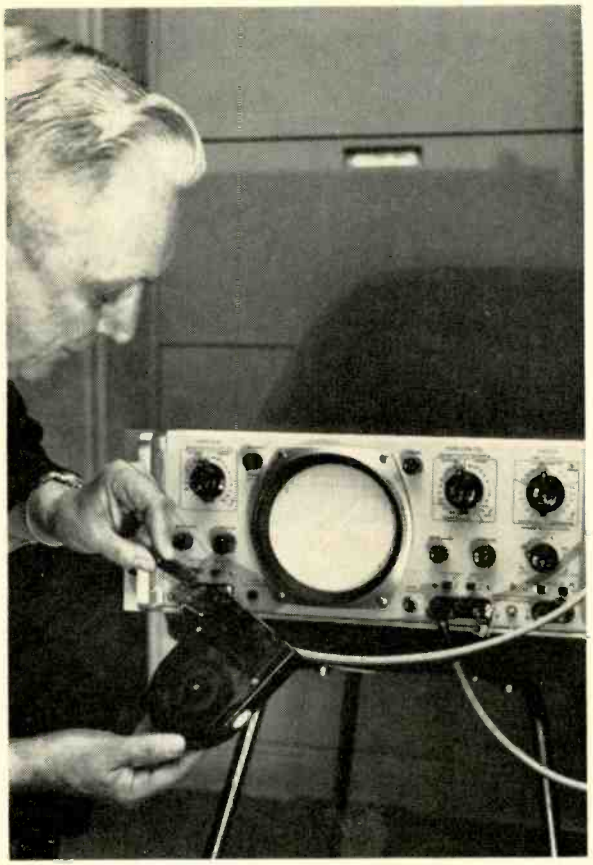
Fig. 3. Response when L and R are summed (mono) for 170 degree phase error.

This new cartridge will give consistently good compatible performance not only in stereo, but also in mono from stereo source material.

Marathon cartridges are now being used by three live-formated CBS-owned FM stations, WCBS/FM, New York, WBBM/FM, Chicago and KCBS/FM, San Francisco. WJIB, Boston is another station that has converted to the 300-S.

The illustration (right) shows an extra adjustable guide has been located in one corner of the cartridge. It comes factory adjusted. The price is somewhat higher—a 40-second model starts at $4.15. To help you set up your cartridge machine, Marathon also sells (for $35) a Stereo Test and Phase Alignment Cartridge. This individually-produced cartridge is made on an optically aligned stereo cartridge and contains 500 Hz and 5 kHz signals.

The alignment procedure entails hooking up an oscilloscope to the left and right outputs of the playback amplifier, Fig. 2. You connect L to the



Telewski demonstrates how an additional adjustable guide can eliminate tape skewing.

Adjustable guide on the Marathon cartridge is located for easy access during operation.

vertical input and R to the horizontal input to get a Lissajous pattern as shown. Marathon also recommends connecting an AC VTVM to one of the channels. Maximum output on the VTVM should coincide with the correct pattern to be established on the oscilloscope.

The first step is to adjust the playback head azimuth while playing the 500 Hz portion of the alignment tape until the pattern in Fig. 1 A is produced. The straight diagonal line indicates identical phase and amplitude on left and right channels. Next, the 5 Khz portion of the alignment tape is played and the playback head azimuth adjustment screw is re-touched to produce as nearly as possible a similar line to that produced by the 500 Hz signal. There will be some variation in the pattern at 5 kHz but this variation should not exceed +10 degrees as shown in Fig. 1B. Such variations are normal, Marathon says, and are probably due to machine tolerances. They will have little or no effect on a monophonic program derived from stereo reproduction. This adjustment aligns the head for proper azimuth and phase which holds for as high at 12 kHz.

Marathon also provides instructions for aligning the recording head. This requires using a variable frequency audio oscillator. **BM/E**

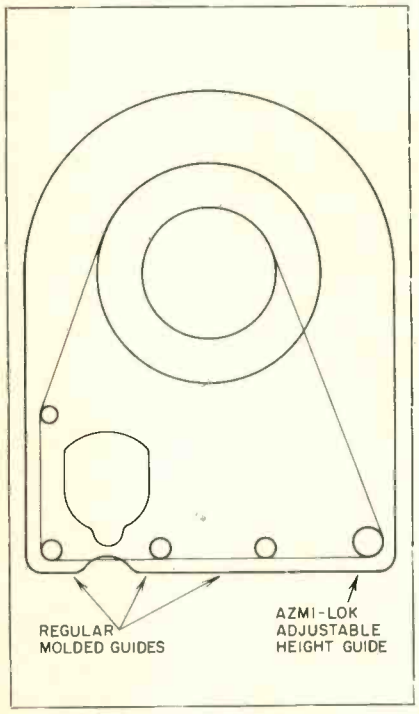


Diagram of the Model 300 S cartridge by Marathon shows the addition of an adjustable guide.

For more information on the 300-S cartridge and the stereo phase alignment procedure circle **300** on the Reader Service Card.

Automation That's Not

By R. L. Hoover

At the small radio station, automation is expensive and removes the human element from programs. But traffic automation can save money while offering positive control for management. Here's how one small station uses a nonelectronic system.

RETURN FOR THE SPONSOR'S DOLLAR is closely linked to the way a station trafficks the program log. The sponsor's well-being reflects in repeat business for the station. Station management commands the programming sequence and meets FCC requirements as a licensee through controls on the program log. The control functions of the program log can be set down on paper for humans to execute, or programmed for a computer to run as an automation system.

Automation or live operation?

Various automated systems are on the market. Most include absolute control of the station by management, while saving labor costs. But if programs are automated, what has been accomplished?

The very essence of radio is the human element—that almost intangible yet vital link between the radio station and each listener. A fundamental philosophical discussion of radio might be based upon the singularity of the listener who, when combined with others, makes an audience. When the listener becomes a plurality for the radio station, the station has lost its audience.

A listener is a person who responds, whereas a corporation of listeners is without individual life. The station that grosses more to this day than any other—WOR in New York—is ever mindful of each listener, from the cabbie to the banker. This station knows that each listener is listening to another human at that moment.

Small station boardman

In the small station, the boardman must be an entertainer, a newscaster, a pitchman and a staff announcer. A network can be brought in to relieve the boardman of being a firstrate newsman. A good pitchman can do the spots on cartridge, and staff announcements can be put on cart for station IDs and introductions, etc. But the very essence of radio itself cannot be put in a can, because the essence is the live/human element talking to each listener. Unfortunately, complete automation removes the essence of radio from broadcasting.

Labor costs

Automation does not relieve any station of the FCC requirements for maintaining a First Class (or Third Class) licensed operator on duty at the control point. Most small stations put their boardmen on duty. When the station buys an automation system, the owner may possibly be surprised to see the payroll remaining about the same as before, because the boardmen become meter watchers. A juke-box/record-changer station can save by putting the secretary on duty as operator while the boardman goes out to sell. But it's doubtful if the new salesman will have many repeat sales.

Do it right

The small market station manager should want the best radio for his service area that he can produce within his budget. Licensees of today might recall Mr. Gifford's classic remark, when asked for guidelines to put WEAF on the air for the American Telephone and Telegraph Company back in 1921. He said, "If we can't do it right, we won't do it." WEAF was affectionately known as Water, Earth, Air and Fire, and today is WNBC New York. The American Telephone and Telegraph Company invested money putting the human element in the airlanes over New York. This investment in the basic essence of radio, the human element, did not fail WEAF, and is still the very essence of radio for this modern age, almost 50 years later.

Program logs

The primary reason for buying an automatic broadcasting system may possibly be that the station owner wants to have complete command and control over his station. The licensee can get the desired command and control by preparing complete and accurate program logs. If he automates program-log preparation rather than the whole radio station, he can still save considerable manhours in the traffic department and keep his boardmen running the board. The word "automation" may possibly be incorrectly applied to a ra-

Robert Lloyd Hoover is owner of KPUL and KPUL-FM, Pullman, Wash.—Moscow, Idaho.

dio station's operations after the program log has been automatically prepared. Automation designed to control the whole radio station obviously precludes the human element, but desired control and economies may be affected by limiting automation to the preparation of the program log, which keeps the essential ingredient in radio.

An inexpensive automatic computer system

Complex operations for computers to perform are broken down into simple steps. Some of the basic steps are the permutations, deletions and additions of variables or data. These same basic functions are performed when the daily program log is made up by identifying sponsors as variables that are inserted, deleted or moved around in time (space on the log sheet), which is called a permutation with other sponsors. The input data set the process in motion from the order or contract books.

Program logs are now handled by computers programmed to do these basic functions in some large stations, but many smaller stations are still typing each day's log and are spending from five to eight hours daily in this task. Advertising agencies are learning to cut their buying-time process for national and regional buys through computer schemes adapted to their needs.

A simple computer-oriented method has been developed for use at KPUL and KPUL-FM, which allows positive management control over the program logs. It provides for complete and accurate program-log preparation in a short time, and is inexpensive.

Traffic cards

The basic functions of deletions, additions and permutations of sponsors are done by hand instead of by a computer. A Xerox machine becomes the automatic printer. Cards with program names and cards with sponsor names are typed. The name is typed on the top of a Hollerith card (IBM punched card), one name per card. Slots, similar to a time-card rack, are prepared for the cards to be inserted, one below the other, in order of time of occurrence. When complete, a page shows up only the top line of each card. Program cards are inserted on the left side and sponsor cards are on the right. Then the cards are turned upside down onto a Xerox machine for printing. Out comes a perfectly printed page, equivalent to a typed page from a program log.

Style

The elegance of the system is that the next day's log can be prepared in a short time. Skill can be built into programming non-competitive sponsors next to each other. Sponsors can easily be moved around in time for study and to get good coverage for a sponsor. All this is easy to do by "permuting the sponsor cards with other sponsor cards." Even- or odd-day frequency traffic is easy to handle.

A complete operation analysis of the broadcast day is easy to perform. The whole day's program can be seen when all the masters are laid down side by side on a large table. Spots can be juggled to get the best effect. Spot pile-ups are avoided, yet traffic build-up can be effected for commuter hours. Rapid comparisons with the station's contracts and orders determine which sponsor cards are to be deleted and which cards should be inserted for the next day's programming.

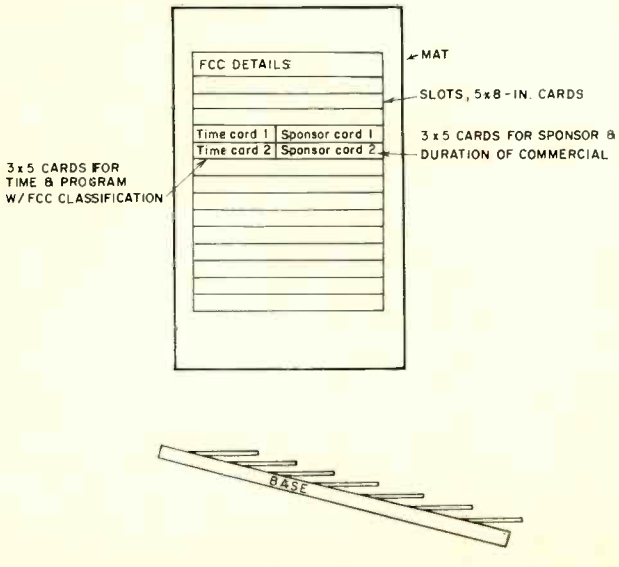
Reduced traffic time

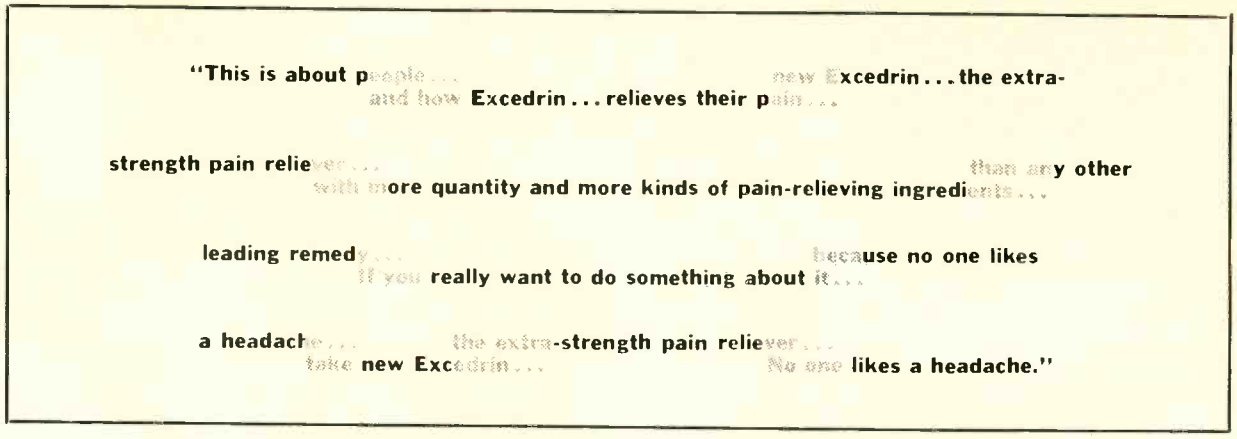
Because of the short time taken to prepare the logs with this simple method, the station manager may possibly decide to prepare the program logs himself. This will provide the positive control over the station's operations that management looks for in an expensive automated system. But the ease and ability to move spots around for visual comparison in each day's operations analysis may possibly be better than by using a computer for programming, because the computer cannot think for itself.

Details

Sketches below show how mats are used to back 5 × 8-inch filing cards, folded to make slots. The 5 × 8-inch cards are taped to the mat. Smaller, 3 × 5-inch filing cards are used here, inserted into the slots. The program title, time of occurrence and FCC logging classification entries are typed on cards placed in the left side of the slots. Sponsor cards and the duration of the commercial announcement or commercial continuity are placed in the right part of the slots. A few years ago, Jack Poppele (of Tele-Measurements, Clifton, N.J.) suggested that the cards be color coded to help in traffic operations.

We tried this scheme, but it didn't work out too weli, because then the sponsor cards cannot be used for other days and frequency runs. We found, on the other hand, that the best system is to use separate sets of mats for Saturdays, Sundays, the early part of the week, and the high-volume Thursdays and Fridays. **BM/E**





Speed Hearing: Variable Velocity Comprehension

Herewith a McLuhanesque approach to the rhythmic spoken word of a broadcast commercial . . . as contrasted with the linear printed word you are now reading. How to cram 26 seconds of copy into 17 and still retain the natural flow of meaning.

SPEED READING has become popular with busy executives who must digest a lot of printed words every day. People have had similar ideas about accelerating spoken words. After all, you can think at jet plane speed; why should you be satisfied with horse-and-buggy speech?

It's possible to speed up taped speech and still comprehend it, but the pitch increases and the resultant Donald-Duck effect destroys the mood. One solution to that problem is the Eltro Mark II Information Rate Changer, a West German tape recorder whose heads rotate in the direction of tape travel. It lets you speed up a tape without increasing sound pitch.

The Harmonic Speech Compressor, developed by Bell Labs and used by the American Foundation for the Blind in their Talking Book Program, is another solution. Recorded speech is played back at twice normal speed through octave-band filters which lengthen the waveforms and restore normal pitch.

Both electronic methods produce the same effects: Speech rate is doubled, the pitch remains the same, and the message gets through. But speed hearing, like speed reading, takes some getting used to, and requires concentration for complete comprehension. Also, double-speed speech sounds choppy.

Variable velocity speech

Perhaps there's a better way of packing more speech into a given time period while retaining comprehension and naturalness. A New York audio technician and commercial producer named Tony Schwartz recently demonstrated his nonelectronic method of shoehorning commercial copy into roughly half the time it normally takes. Dubbed *mnemonic joining,* the technique involves only a tape-splicing block and a good ear for speech rhythms.

Mnemonic joining means de-emphasizing most of the redundancy in speech, relegating to the background the unimportant connectives, throwaway syllables, and space-fillers which permeate normal talk.

The brain uses the ear as a scanning device, explains Schwartz. The brain registers fleeting momentary vibrations, recalls previous vibrations, and expects future vibrations. From all this, the brain synthesizes meaning. It can do so at a higher speed than you might guess.

Schwartz has an announcer read copy, taping it until the spot sounds okay in terms of pronunciation, intonation, and emphasis. Then he gets out his splice block and starts cutting the tape apart.

A headache-remedy commercial begins: "This is about people, and how Excedrin relieves their pain." In raw form, the complete copy takes 26 seconds to read. Schwartz cuts the tape at the comma and loads that cut on one tape deck. Then he cuts another piece, putting it on another machine. He plays the first cut, but starts the second before the first has ended, overlapping the announcer's voice on itself. He goes through the rest of the spot this way, and when he's finished the 26

seconds of copy have been compacted into 17 seconds. The diagram shows you where he makes the overlaps.

The key point is that an experienced announcer automatically stresses the important syllables and words, and throws away the space-filling connectives. Schwartz lets the important syllables and words go solo, but overlaps the throwaways. The result is variable-velocity hearing, with good comprehension.

For instance, read through the first splice in the diagrammed spot. At the end of the first phrase, you hear the word "people" in the foreground, and the phrase "and how" in the background. "People" completes the sense of the first phrase, while "and how" seems to go into some sort of delay line in your brain. During the ensuing copy, your brain picks up the rest of the second phrase which logically completes the sense of "and how." Those words are then read out and the entire phrase has meaning.

You can gain a second or two from a splice like that. Yet the important pauses—like after the word "Excedrin" in the second phrase—remain and give emphasis. Speech flow is natural, unlike the choppy phrases of electronically speeded-up speech.

Print vs speech

An admitted McLuhan disciple, Schwartz has noted for some time the difference between print and speech. He points out that until recently radio and TV handled speech as an extension of print copy. A commercial was often read by the rules of grammar, which doesn't always get the message across. Phrasing and emphasis do.

He also noted that old radio was aurally redundant. You still find this in radio spots. Consider the following:

(First man): "Wonder if anyone's home?"
(Second man): "I'll knock and see."
(Sound of knock on door.)

The audience is told that the sound they're going to hear next is a man knocking on a door. That, says Schwartz, is a waste of time.

In most movies and television programs, you seldom hear more than one person speaking at the same time. The theory has always been an extension of the linear left-to-right orientation of print media: One thing at a time. Aural redundancy.

36 seconds into 14

The most impressive bit of tape surgery done by Schwartz is a spot he transformed for the Warner Bros. movie, "Woodstock." The client gave him 36 seconds of copy, and wanted a 30-second spot with an 8-second open end for a local tag. Schwartz got all the copy into 14 seconds, and used 8 seconds up front for a sample of music from the film. How did he cut the time more than in half?

The movie is a distillation of the action that took place at the 1969 Woodstock Music Festival in White Lake, N.Y., which drew an audience estimated at around half a million young people. Much of the film consists of performances by rock bands, and the copy lists a number of them. Schwartz realized that reading ten or 20 names in linear fashion wasted a lot of time. So he overlapped phrases, and at times you hear the names of three groups almost simultaneously.

One rationale for the "Woodstock" spot is that listeners aren't expected to hear all the names of all the groups, but only to learn if their favorites are included. It's like scanning a menu in a hurry to find out if your favorite dish is there.

Also, there's enough redundancy in names to allow much overlapping. For instance, in the group name "The Jefferson Airplane," the first and last words are unimportant qualifiers, while "Jefferson" is the key. Hence only "Jefferson" comes through solo, while the first and last words are overlapped with other names. Rock fans recognize the group instantly when they hear "Jefferson." And the overall effect of overlapping names creates an exhilirating, exciting mood that conveys the turned-on vibrations of the festival—and the film.

One advantage Schwartz's mnemonic joining has over electronic speech acceleration is easier comprehension. With linear acceleration, everything is speeded up—important words, unimportant words, pauses. But Schwartz accelerates selectively, only where it won't disturb the basic rhythm and flow of the speech. Emphasis is retained, and sometimes even pauses are left in important phrases. Your brain is working as a variable-velocity scanner.

For more information about this new technique, write Tony Schwartz/New Sounds, 455 West 56 St., New York, N.Y. 10019. **BM/E**

Surrounded by tape and film editing and monitoring equipment, Tony Schwartz works at a console he designed. BM/E photo

CLASSROOM TV: It's not hard to make it better

By John H. Lindquist and Bob Martin

A college professor and a television professional confronted a problem all too common in campus TV: Televised classes were boring the students. And the production equipment available for improved programming was limited. Here's what they did about it—

OUR FIRST STEP was toward the administration building. To use TV effectively in teaching, we needed help breaking away from the past. That is what we told the administration at the University of Akron, Ohio, and their response was immediate. We got the time, the technical personnel and equipment for a summer of experimentation, pre-production planning and production for the fall quarter.

Our next step was to rethink the sociology course we were teaching. We wanted to create a personal tie between instructor and learner. The pseudo-office setting used in earlier videotape lectures seemed to impose a barrier between teacher and student. The teacher was not relaxed—in fact he exuded a stuffy pedantry that turned what exciting material he had into boredom. So we simply moved the teacher out from the desk to an easy chair. In the informal setting he became more relaxed, more of a conversationalist, a visitor making a point.

Don't trust the old ways

We learned from this small change that nothing in the teaching approach was sacred. Even the organization of the material to be taught needed re-evaluation. We used to present the body of information in 50-minute bites. If that 50-minute period were not enough, the lecture would take up next period where it left off. The course had been prepared as if it were one continuous happening.

But the television medium gave us a chance to make each period an integrated unit. Each "show" would cover a particular lesson, and the course themes would run as threads through the material, tying each lesson together with the rest in a package—instead of just marching the lessons along in a never ending series. Topics requiring more than one class were broken into fully integrated segments, each to be covered in its own 50-minute period.

As a general teaching technique we wanted the student to recognize that each class had its own message. That message we boiled down to a one-sentence statement of the objective of each class.

From commercial TV we had learned that the well thought-out message gets through without constant repetition—and our insistence on one-message-per-period programming brought the same results. We did not have to repeat things and could thus spend the time teaching new material or going into more analytical depth.

Dr. John Lindquist is a professor of sociology at Trinity College, San Antonio, Texas.
Bob Martin is a producer-director with the Instructional Television Center, University of Akron, Ohio. They collaborated on videotape instruction at Akron when this article was written.

How to get away from the BTF

A few ideas from the authors to those who find their students yawning at the tube:

- Don't let the class-period format get you down. Try an occasional film-in of relevant shorts and feature films for discussion; don't insist that everything be incorporated into the old class-period restrictions.
- Don't use up too much time creating spectaculars. It's better to replan your course, improving the whole in small ways, producing material which can be plugged into individual lessons. Even your giant productions won't compare with Rowan and Martin, so don't use your energies on them while consigning the majority of the course to bland treatment.
- Investigate your available resources—library magazines, visual material from other departments, etc. A can of spray paint, crepe paper, masking tape and four large boxes became our set for an examination of political campaigns: ballot boxes and campaign bunting, with a politician's platform for the lecturer.
- Know your equipment and its limitations. We wasted hours of production time by thinking off-the-air half-inch tapes could be used in the final edited lesson. They simply didn't work.
- Listen to student criticism. Ask for it. Pay close attention, especially when you try some new technique.
- Be ready to give and take criticism within your team. Make evaluation of the final product part of your routine. Never take anything for granted.
- Above all, believe in yourself and the medium. Try again and again—in spite of failures and in the face of criticism from your anti-TV colleagues. There is an educational revolution taking place. Television can be part of it.

Make your format flexible

While our easy-chair approach developed intimacy, it did not bring the viewer into any particularly unusual learning situation. Sometimes this would stifle the teaching process, so we began letting each lesson dictate the production techniques it would receive. We tried many experiments, but always stuck to one rule: Nothing was to be done for effect alone. If a particular technique did not contribute to the teaching of the material, we would not use it. As lecture scripts were developed, they began to reflect this free attitude by being conversational instead of pedantic.

We dropped the "this is what we're going to cover this quarter" approach. It, too, would have done nothing but place unnecessary restrictions on our lesson development.

When it was appropriate, we took advantage of the fact that TV is a good vehicle for showing human drama. Our coverage of the writing of the U.S. Constitution is a good example.

Our objective was to show that the writers of the Constitution were real people, people motivated by their own intellects and by contemporary forces. We wanted to humanize the Constitution, not enshrine it.

The *You Are There* approach worked well for this. We needed two class periods, during which the students saw and heard members of the Constitutional Convention make points, argue cases, make compromises and reach agreements. An announcer provided vignettes of each speaker.

We laid the sound on videotape and added the pictures—the Convention, the speakers, the speakers' homes, their backgrounds, what they sought to preserve. The instructor merely set the stage at the opening and wrapped up loose ends at the close.

In another situation, dealing with many different analyses of democracy, we produced a short sound and picture montage. The sound was recorded voices of American political leaders discussing democracy. Video was pictures related to the comments—some complementary, some contrasting.

A class dealing with social structure and control featured a (bearded and appropriately dressed) folksinger doing contemporary anti-establishment songs.

Another class featured Bill Mauldin cartoons. We showed the cartoons on screen, and had the captions read by an off-camera voice. While the folksinger had worked well, however, these cartoons were outdated. No one under 40 even smiled.

But, despite these occasional troubles, we found our revised TV teaching was very successful. In the old days, students said the course suffered from being televised. Now they say TV makes the course better. This is enough in itself, but we had one other vote of confidence. After seeing our results, the administration agreed to give us another summer of preparation. **BM/E**

Professionals and Professors: How they can work together

The old shibboleth that educational TV should not be tainted with commercialism has, perhaps, died with the airing of Sesame Street. But it did leave its damage in thousands of classrooms across the country, where the traditional Big Talking Face became first the major element and eventually the major complaint in classroom television.

"Making television teaching noncommercial has also made it nonprofessional," claim authors Martin and Lindquist. They see the best TV teaching as that resulting from cooperation between the teacher and a person they call the producer-director, who has professional broadcasting experience. But, they add, "just putting a teacher and a producer-director together is not enough."

Here are a few tips from the authors to others who want to bring broadcast professionals into TV teaching.

- It's up to the producer-director to take advantage of the TV medium to motivate an audience. Teaching is not merely entertainment; it attempts to affect student attitudes, behavior.
- Don't be arty. A person with commercial TV experience should be especially careful because he may suddenly find himself given much more freedom in his use of techniques, etc., than was allowed in the commercial environment.
- But don't be afraid to take chances. It's okay to risk failure to produce some successes; also, you have to be inventive with the equipment on hand. We got our Ampex VR-1100 VTR to do things the factory said couldn't be done—like editing pictures onto a tape that already had a sound track, and getting a fine match of audio and video. The important thing is to try to get what you need, even if "it can't be done."
- Watch your own programming. And watch student reaction. It can help make your work better.
- Take an active role in the entire production process. Communicate your enthusiasm—an interested cameraman will look for the good shots, while a merely skillful technician will wait for orders.
- Help the talent become media-oriented. Pass on relevant books, magazines and so on.
- Keep up with commercial films and TV—use what the commercial people have developed, for your own productions.
- Don't assume traditional teaching gambits (like rhetorical questions) will work on TV. The teacher must rethink the educational process when his course goes on TV; the producer-director is his co-partner in the venture. Course content is the teacher's specialty; however, when it comes to technical and staging matters, it's the producer-director who should call the shots. The teacher will just have to put himself at the mercy of the director, the studio crew, engineering staff and, even, the equipment itself.

Slow-Motion Videodisc Recorder

Continued from page 21

leaved tracks is recorded with the heads moving outward (Fig. 4). A logic circuit controls proper gating of the video signal, incremental sequential positioning of the heads and the unique end-stop half-space positioning to permit reverse direction interleaving of the video tracks.

Signal path

In playback, the signal path (Fig. 5) must provide for individual control of the separate head assemblies until their sequential signals are made common by the switcher and demodulated. Each head assembly is connected to a separate preamp located on the board adjacent to the head drive mechanism. The two separately amplified head outputs go into individual resonance-compensation circuits in which frequency and Q effects are balanced out by appropriate tuned circuits. The resonance-corrected signals then go to a pair of RF equalizers that are used to achieve identical signal levels from both heads across the desired RF pass band. It is particularly important that the heads are well equalized, since alternate switching from head to head at low, slow-motion rates shows noticeable flicker if differential levels get into the demodulator. The dual equalizer outputs are connected to a switcher which puts them in continuous sequence. Then, the common switcher output is applied to a carefully balanced FM limiter and fed to a pulse-counting demodulator.

The video output of this demodulator must now be subjected to logic switching and chroma correction (Fig. 6). The logic circuit determines whether a particular field requires half-line delay to achieve the proper interlace of a reconstructed frame (such as in stop motion) or if the signal should be applied directly. Two paths are available at the output of the logic switching, the first through 0.5 H period delay line (31.75 micro-seconds). The second path is direct. Either signal appears at the input of a chroma-extracting circuit which applies the chrominance information to a heterodyne color corrector before it is re-added to the separately filtered luminance signal. The adder output is normally processed and is provided with reinserted sync, blanking and burst from a local color sync generator. Since the color-correcting circuit is of particular interest here, the principles of the Chromalok system are described in greater detail in the accompanying box.

Servo system

The Videodisc 1000 uses a closed-loop speed and phase control system to maintain uniform angular velocity of the rotating disc (Fig. 7). The basic disc tachometer is an inner-circle recording of 525 cycles which is reproduced by the same head that creates the original recording. This particular method eliminates any eccentricty problems since record and playback mechanical dimensioning are identical. Very careful attention is paid in the circuit to guarantee a perfect tachometer track on the disc. A sampling technique is used to determine that a proper recording has been made, after which that track may be used for control purpose as long as the disc remains on the machine.

Studio sync provides the basic time reference for servo system. Horizontal sync information is frequency doubled and fed through a tuned amplifier. That signal serves as reference against which the tachometer signal is compared to control disc

Continued on page 45

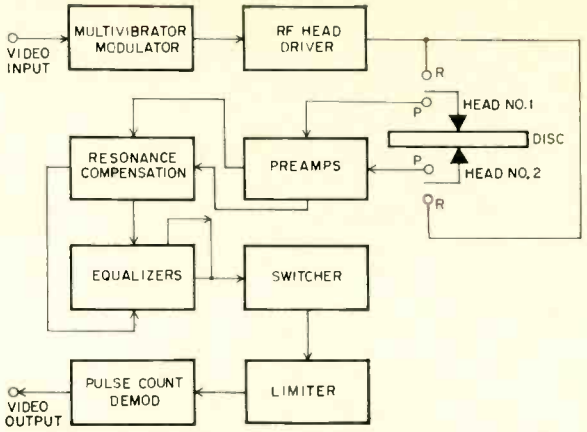


Fig. 5. The two heads record and play back sequential lines alternately. Thus in playback the preamplified and RF-equalized head outputs must be switched between limited, and demodulated.

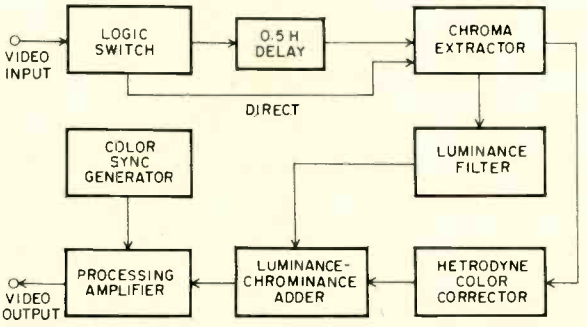


Fig. 6. In the stop-motion playback mode, the complete video frame is reconstructed from both fields, one of which is used direct, while the other is delayed half a line to achieve interlace. Color correction follows.

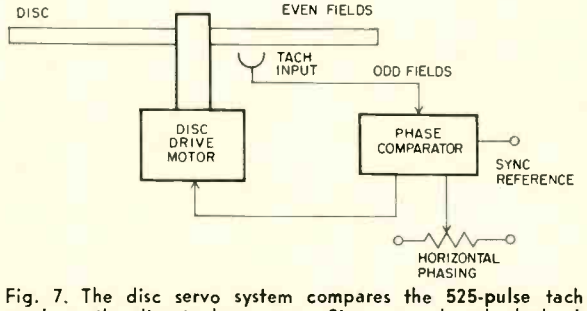


Fig. 7. The disc servo system compares the 525-pulse tach track on the disc to house sync. Since record and playback mechanical dimensioning are substantially identical, close speed control is attained.

Look what our customers say about "easy-to-operate" Gates audio consoles . . .

"With a flip of a switch, we mute loudspeakers in microseconds. And our Gatesway II never gives us feedbacks."

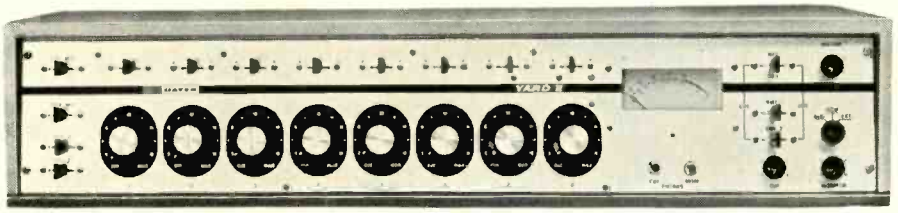
Earl Greer, Radio Station KXRX
The San Jose Broadcasting Co.
San Jose, California

"Our Gates Dualux II saves us time and steps. We control FM and stereo from one convenient location with ease."

George W. Watson, Chief Engineer
Radio Station WDRC & WDRC-FM,
Buckley Broadcasting Corp. of Connecticut
Hartford, Connecticut

"Our Gates Yard II gives us unbelievably high performance with minimum work."

Gene Showalter, Manager
Radio Station WDQN
DuQuoin Broadcasting Co.
DuQuoin, Illinois



For the finest in 100% transistorized audio consoles . . . look and listen to Gates. Or ask our customers! For more information about "easy-to-operate" audio consoles, write today. Gates, 123 Hampshire Street, Quincy, Illinois 62301.

HARRIS INTERTYPE CORPORATION
GATES
A DIVISION OF HARRIS-INTERTYPE

Circle 114 on Reader Service Card

From the Innovators

Norelco...The First Family of color cameras

...one for every budget and purpose

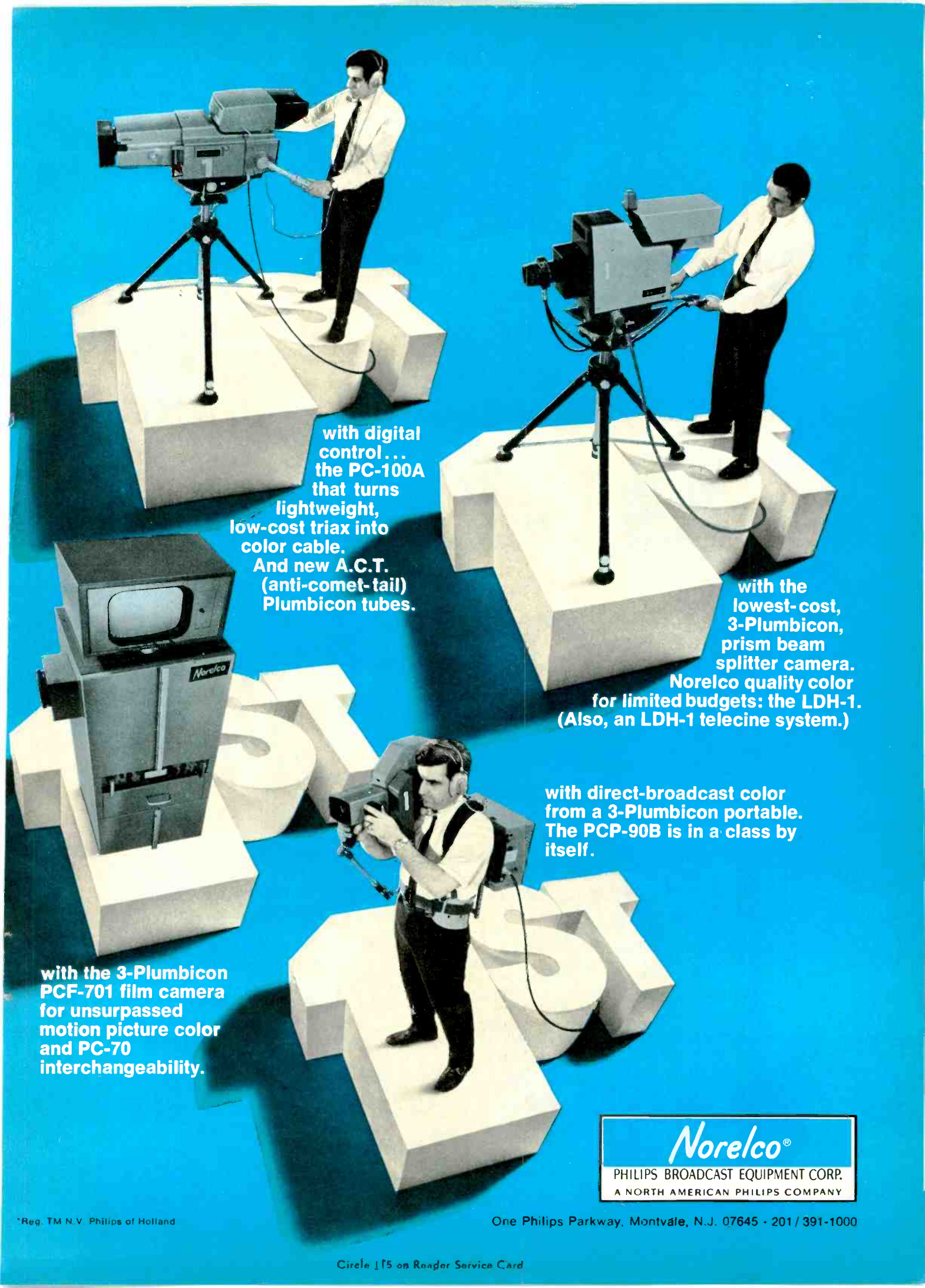
One name stands pre-eminent among color television cameras: Norelco.

With good reason. From the PC-100A—the ultimate in colorimetry and reliability—to the LDH-1 Compact for modest budgets, Norelco has come to mean the very best.

"The very best" translates into such proven design innovations as the three-tube concept which has ceased to be a controversy when the subject is broadcast quality... The sealed prism beam-splitter... Solid, sleek, *cast* outsides that protect the insides and look new years after sheet metal boxes have developed frightful wrinkles ... Modular, all-solid-state circuitry, with spare components interchangeability that means money in your bank... Reliability that affords peace of mind. Above all, the "Norelco look" on the TV screen. Faithful. Crisp. Today's worldwide standard for color television pictures.

Norelco cameras are built *for* the Plumbicon* tube, not adapted to it. This accounts importantly for the quality that is consistent from one end to the other of the First Family of cameras. Happily, the best costs no more, and in many ways costs less. To meet the family, telephone or write Philips Broadcast Equipment Corp., One Philips Parkway, Montvale, New Jersey 07645 • 201/391-1000.

with the 3-Plumbicon tube, sealed prism beam splitter camera. Today's industry standard... the PC-70S-2.



hands off!

NOW THE CBS LABORATORIES COLOR CORRECTOR IS TOTALLY AUTOMATIC

CBS Laboratories has taken another giant step forward in color television broadcasting. The widely-acclaimed Color Corrector is now fully automatic. Adjust the controls once and forget it. The Color Corrector automatically guarantees uniform color balance of remote feeds from any part of the country. Automatically corrects variations from one camera to another, from one scene to another, or from film to tape. And automatically gives you the big edge for viewer ratings and advertising dollars. When it comes to color broadcasting, nothing can touch the new CBS Laboratories Automatic Color Corrector 6000.

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

Circle 116 on Reader Service Card

BROADCAST EQUIPMENT

CATV equipment

Audio-video modulator, called the Uni-Mod, is designed for MATV and CATV applications. Device accepts audio and video inputs, then modulates them on RF carriers which are combined and filtered to provide RF output conforming to standard TV format. Models are available with outputs on TV channels 2-13; output level of any unit is 40 dBm, sufficient to drive medium-sized distribution system. Operation can be color or monochrome. Features include adjacent channel operation and sharp-skirt filtering. $500. JERROLD. **279**

Two-port tap for low-density applications has bandwidth of 50-300 MHz, with typical tap-to-tap isolation of 20 dB and input-output isolation of 30 dB. Nominal insertion loss is 0.6 dB; return loss is 20 dB, $9.95 each in quantities of 1000. C-COR ELECTRONICS. **280**

Video message programmer—or video flip chart—for CATV and CCTV use. Card-carousel display system shows up to 45 changeable messages and/or pictures by flipping each message card into viewing area on a preset time cycle. Message change is instantaneous—card does not move on the screen. Two operating modes: consecutive display of all messages or stationary display of one message. For CATV use, programmer comes as complete system, including a channel modulator and FM tuner. NEWELL INDUSTRIES. **282**

Heterodyne FM processor, Model FMR-2000, is a frequency-modulated repeater that delivers equal-level stereo signals to cable system. Up to 20 channels are provided in 10.5 in. of rack space. FM processor is crystal controlled, has FET input, ceramic IF filters, ALC and AGC, and each channel module delivers 36

Continued on next page

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

New and significant

UHF/VHF monitor, Model 701, FCC approved for monitoring at

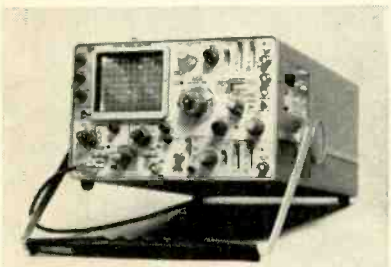
transmitter aural and visual frequency and precent of aural modulation. Inbuilt capability for monitoring transmitters up to 30 mi. away, anticipating FCC approval of remote-station operation. Covers all VHF channels, provides digital readout of frequency errors and has digitally settable flashers that display plus/minus peaks simultaneously. Optional accessories include superstable oscillator, WWVB receiver and off-frequency/over-modulation alarm. TIME & FREQUENCY TECHNOLOGY. **275**

TV camera, Model 800, weighs 15 lbs., modular design accepts optional button-on 7-in. viewfinder. Camera is switch-selectable for random interlace or external drive, with a third drive-mode position available for crystal-driven horiz. sync, 2:1 interlace, or EIA RS-170. Camera converts to 525/60, 625/50, 873/60 and 945/60 line-scan rates. Video amp. has bandwidth greater than 13 MHz, 850-line resolution and S/N ratio of 40 dB. Rear-mounted controls in-

clude beam, target, focus and blanking level. DAGE/VISUAL EDUCOM. **276**

Plug-in sweeper, Model 61083, provides electronic sweep from 10 to 1220 MHz in one band, sweeping this spectrum in 0.01 sec. or less. Coverage includes TV channels, and built-in attenuator permits use as signal generator. Sweeper output is +13 dBm with optional impedances of 50 or 75 ohms. AM and FM modulation are included. Harmonic and spurious signals are 30 dB down; signal flatness is ±0.3 dB over the whole band. Slope adjust control provided. $1885. WILTRON. **278**

Dual-trace, portable oscilloscope, 453A Mod 127C, has built-in TV sync separator for display of TV waveforms with up to 1201-line, 60-Hz field rates. Scope weighs 33 lbs. and comes with front panel cover and carrying handle. Deflecting factors and bandwidth for both channels: DC to 60 MHz from 20 mV/div to 10 V/div,



DC to 50 MHz at 10 mV/div, and DC to 40 MHz at 5 mV/div. Amplifiers can be cascaded to obtain 1-mV/div sensitivity at 25 MHz, single-trace. Operating modes: single-channel, alternate (switched)-channel, plus algebraic sum and difference. Calibrated sweep coverage: 5 s/div to 0.1 μs/div; 10X magnifier extends sweep to 10 ns/div. $2135. TEKTRONIX. **277**

Stereo headset includes polarizer with overload relay and reset button which preclude overdriving reproducers. Mark III Isophase electrostatic headphones weigh 15 oz, have freq resp 20 Hz-20 kHz. Headphone/polorizer basic system, $159.95. Additional headphones, $75 each, couplers $9.95. Up to four headsets usable with each polarizer. STANTON MAGNETICS **281**

dBm/V to system. LEDs are used as pilot lamps, which blink when output level drops below minimum. Input/output impedance: 75 ohms, with 18-dB return loss. Sensitivity is 2 μV for 30 dB quieting. Image rejection is 90 dB. CATEL. **283**

Audio gear

Inter-com system, Model BCS-5000, for use by radio and TV broadcasters. System is assembled by user from standard modules, which include mike pre-amps, a switching matrix, coupling and monitor amps, power supplies, control panels, and aux. mikes and speakers. PC boards plug into pre-wired frames for system flexibility. RCA. **284**

Commercial sound amplifier, Model LT-3500, has continuous rating of 350 watts (rms), with paging and program service rating of 425 watts (33% duty cycle). Freq response $\pm$1.5 dB from 30 Hz to 15 kHz, THD less than 2% from 50 Hz to 7.5 kHz for continuous output. Gain is 85 dB; hum and noise, at least 80 dB below RPO. High- and low-pass filtering, total fuse protection. $870. MCMARTIN. **285**

Quick-ground audio connectors provided with on/off switch allowing performer to control professional quality mikes during performance. Types TF and TFL have built-in slide switch and are available with 3-, 4- and 5-pin female straight cord plugs. SWITCHCRAFT. **286**

Solid-state mixer/amplifier, Model 1589B, is transformer isolated, providing balanced 150-ohm or 600-ohm-line output. Power output is +18 dBm at less than 0.5% THD over frequency range of 20-20,000 Hz, and +20 dBm at less than 1% THD over same spectrum. The mixer/amplifier has self-contained 120/240 VAC, 50/60 Hz power supply and operates off of external 24/28 VDC battery. ALTEC. **287**

Stereo echo mixer, Model EM-7S, incorporates slide controls for program gain, and panning on mixing channels rather than fixed channel assignment. The EM-7S handles up to eight inputs (4 line, 4 mike) switched from front panel. Active mixing circuits use ICs; power output is rated at +28 dBm, while mike input

Circle 118 on Reader Service Card →

Continuous checks during the manufacture of Comm/Scope coaxial cables keep physicals and electricals up to critical standards. Constant monitoring keeps diameters precise. And every reel is 100% sweep-tested before shipping. With Comm/Scope Coaxial Cables the quality is built in, then backed by the industry's only five-year written guarantee.

For cables that deliver long-term signal stability, no discontinuities to 300 MH_Z and beyond and a clear TV picture, specify Comm/Scope Coaxials...Alumagard® or Coppergard® for aerial or direct burial installations.

For information and prices, write or call.

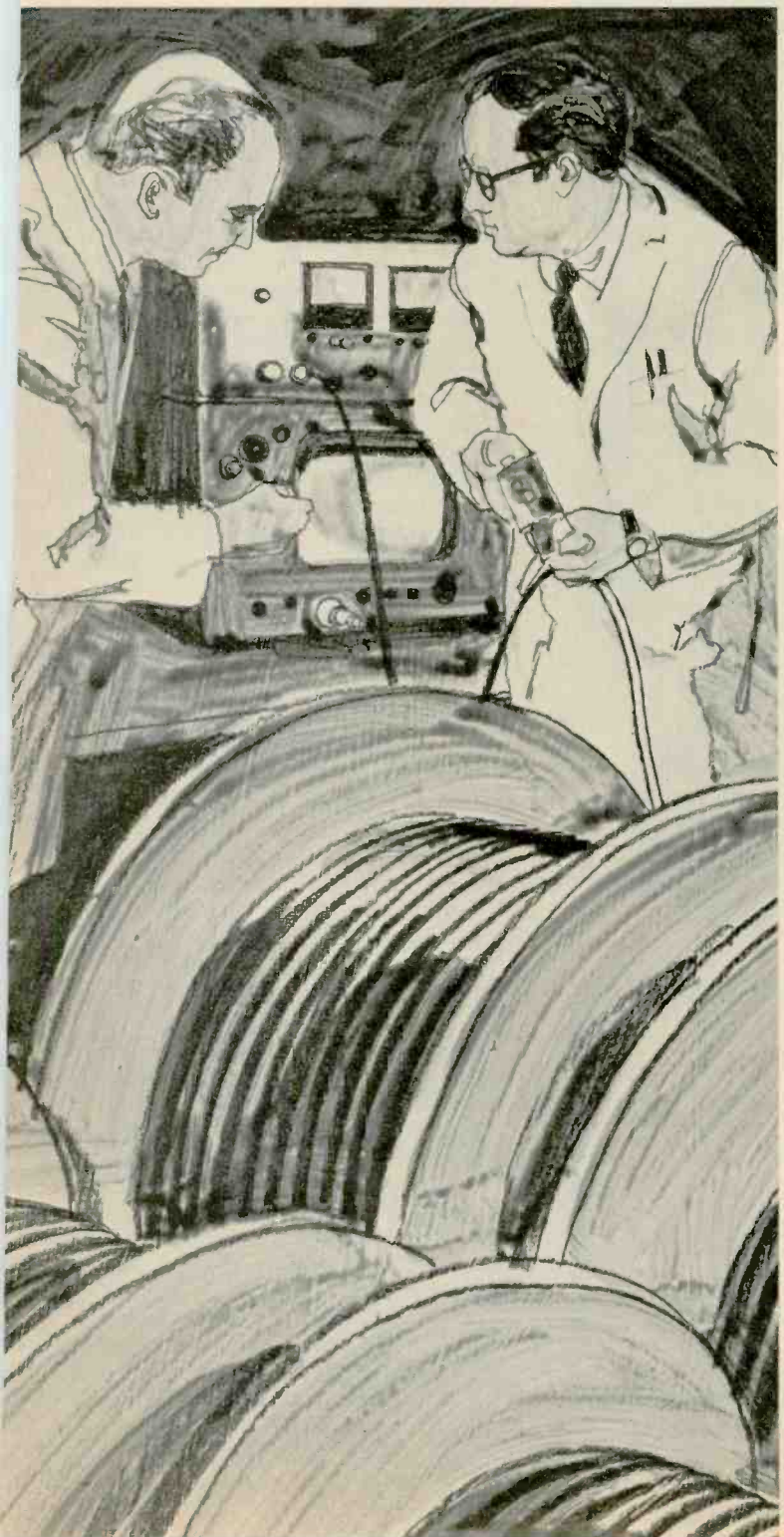
COMM/SCOPE CORPORATION

P. O. Box 2406
Hickory, North Carolina 28601
Phone 704/328-5371

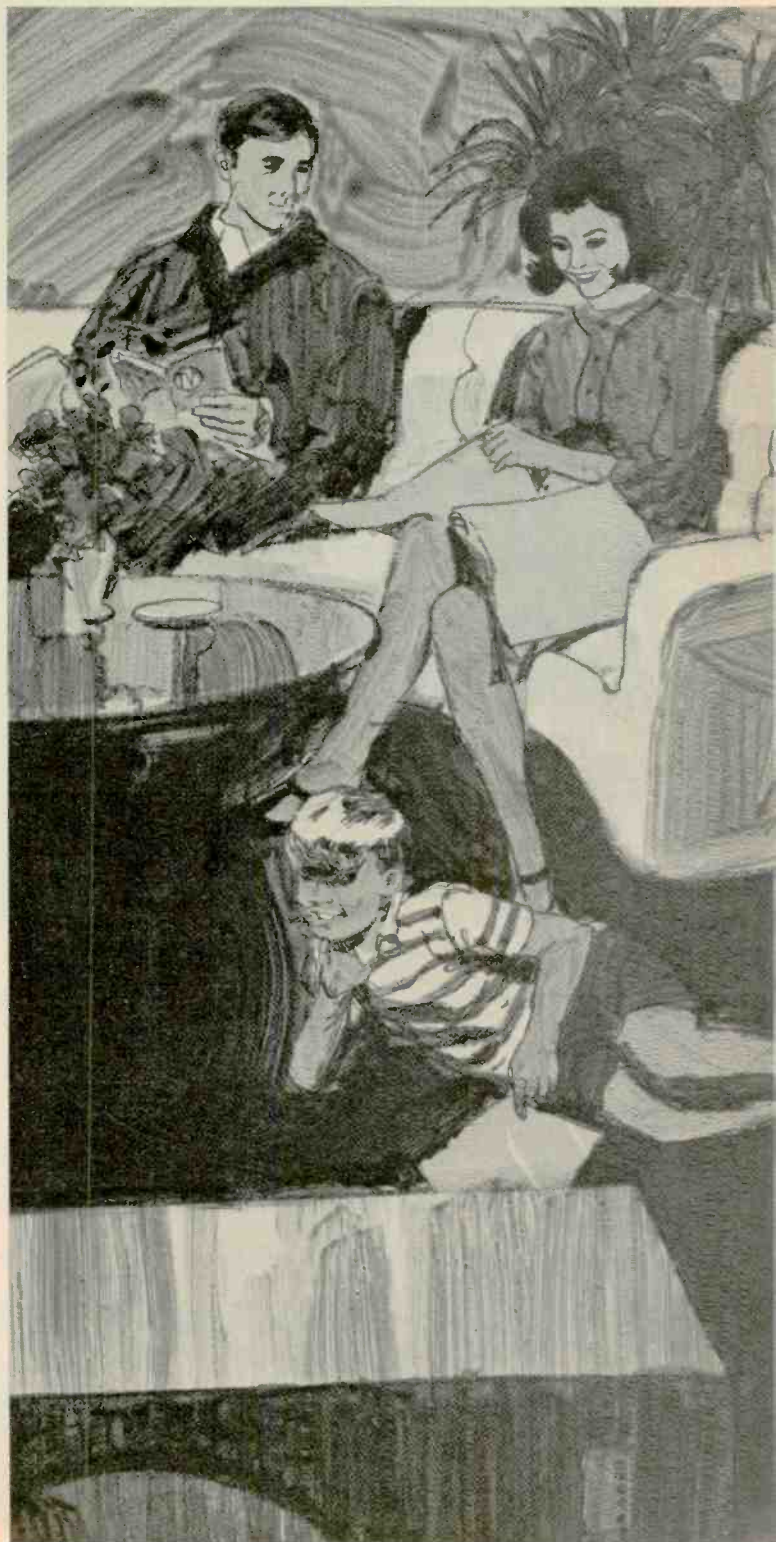
A SUPERIOR CONTINENTAL COMPANY

Warehouse locations: San Rafael, California; Dallas, Texas; Tampa, Florida; Seattle, Washington; Sherrills Ford, North Carolina; Las Vegas, Nevada.

Electrical and physical quality controls here...



mean bright, distortion-free pictures here!



noise is down −127 dBm, referred to the input. GATELY. **288**

Video equipment

Multiplex TV film chain, Model OM-300, projects either 16-mm movies, 35-mm filmstrip or 2 × 2 slides for television from its input stations. Optical transfer time is maximum 175 ms., audio transfer accomplished simultaneously with the picture. Output 1 V pk-pk composite video into 75 ohms; 550 horizontal lines resolution at center from line output. Optional remote control of the multiplexer and inputs (magnetic sound track, and TV camera with either random interlace, external sync output or 2:1 interlace). KALART VICTOR. **289**

Vidicon TV camera, Model 600, 2/3-in. type for use in MATV and CATV systems; Compact, weighs 4 lb., comes complete with f/1.6 16-mm lens. Resolution better than 400 TV lines. Built-in automatic light compensator provides constant output even with illumination changes as great as 4000 to 1. Video and RF outputs are available simultaneously, the RF output being tuneable to channels 3 to 6. Model 600 features modular PC-board construction, automatic target control, plus simplified operating controls. $236. JFD. **290**

Remote camera control, Model CR-1, produces a composite video signal that conforms to EIA specification RS-170 when driven by firm's Model STA-1 sync generator. The CR-1 operates with firm's Series ST and STV CCTV cameras, offering remote control of beam, target and electrical focus, and providing video processing circuits for polarity reversal, gamma correction, phaseless adjustable aperture correction, peak white clipper and blanking reinsertion. DIAMOND POWER. **291**

High-fidelity video-image printer, for such uses as portable video copying with all-electronic scanning and frame recording from a monitor for CCTV or TV-phones. Printer consists of newly developed 2.5-in. photorecording tube, high-resolution TV camera having 1.5-in. vidicon pick-up tube, two picture monitors, and a signal/power controller and recorder. Operation is not via conventional TV picture tube and lens camera system. Instead, photographic pa-

10 inch Giant

This is the new, unique Setchell Carlson 10-inch monochrome video monitor...the *only* professional-quality 10-inch monitor. It gives you **13% more viewing area than standard 9-inch monitors, 26% more** when used in a dual rackmount configuration.

It is small and handy, but able to do giant duty. Use it for broadcast studios, industrial monitoring, surveillance, remote installations, medical, VTR display, educational, and many other applications.

You'll find the picture quality always superb (horizontal resolution 640 lines or better), the reliability factor amazing, the weight practically nothing (15 pounds), and the cost modest.

One hundred percent solid-state circuitry assures you maximum performance and stability, low power drain, and a minimal heat factor. Setchell Carlson UNIT-IZED® plug-in circuit modules make maintenance a breeze.

At $189, it is the lowest-priced American-made monitor of comparable size, and is available in single or dual rackmounts.

Take a giant step forward... ask your Setchell Carlson dealer for more information, or write to us. 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 122 on Reader Service Card

per comes in contact with fiber-optics face plate of photo-recording tube and is exposed to light from screen phospher during scanning period of a single frame which is triggered by a driving impulse. Paper is developed and stabilized automatically, the recorder supplying either single copies or multi-prints of pictures. To obtain high-fidelity pictures, multi-interlacing scanning method provides 1323 lines per frame. PANASONIC. **292**

Multi-screen audio/visual programmer includes 27-channel Media Mix LC programmer, plus three dynamic dissolve controls compatible with either Selectroslide or Carousel projectors, a power relay box for operating up to three motion picture projectors and all necessary accessories and patchcords. Programmer has nine auxiliary channels for control of other presentation devices. Four dissolve speeds for slides are possible, as well as control of motion pictures on each of three screens —six additional control channels still being available. $3450 for whole system. Separately, Media Mix programmer is $1495; dissolve controls, $594 each; program punch/splicer $120. SPINDLER & SAUPPE. **293**

Low-cost recording camera, Model C-5, photographs oscilloscope displays. Waveform photography is simplified by fixed-focus and fixed-aperture design. The C-5 mounts on firm's 5100-Series and 7000-Series scopes, 601 and 602 display units, Model 528 waveform monitor and the Model 4501 scan converter. Hinged door at top of camera permits viewing of CRT without removal. Shutter speeds: 1/10, 1/25 and 1/50 sec: lens is 60-mm f/16. $185. TEKTRONIX. **294**

Monochrome video monitors, Models 6M912 (16 in.), 9M912 (19 in.) and 3M912 (23 in.), offer front-panel operating controls, regulated power supply, and a fast AFC circuit to ensure good display for helical-scan VTRs. Video input is 1-1.5 V pk-pk, negative, sync. Video amplifier bandwidth is 8 MHz; horizontal resolution, 640 lines or better. External sync provisions are available. Model 6M912, $239.95; Model 9M912, $254.95; Model 3M912, $293.95. SC ELECTRONICS. **295**

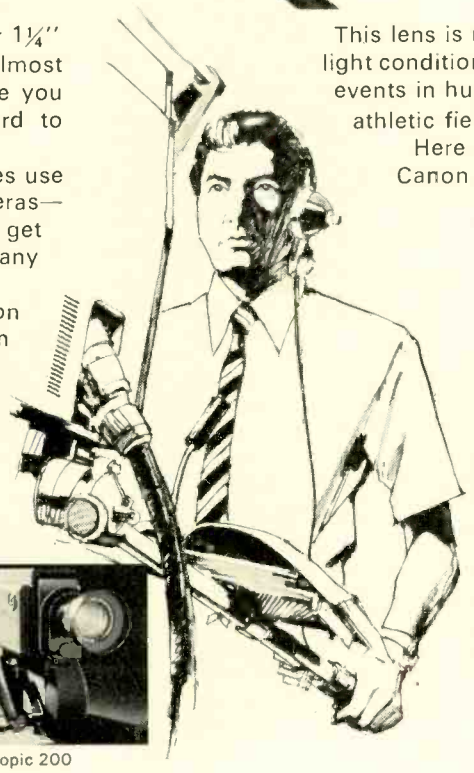
P17X30B2

We've got your lens!

Broadcast or CCTV, manual or motor, 1" or 1¼" plumbicon or 1", ⅔" 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.

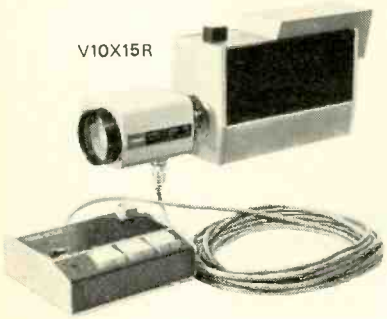
Here are a few examples of the whole Canon line.

	Manual	Servorized/Motorized
1¼" plumbicon	**P17X30B2** **P10X20**	**P10X20B4**
1" plumbicon	**PV10X16** **PV10X15B**	
1" vidicon	**V10X15** **V6X16** **V5X20** **V4X25**	**V10X15R(DC)** **V6X16R(AC/DC)** **V4X25R (AC/DC, EE)**
⅔" 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).

V10X15R



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

Canon

Circle 120 on Reader Service Card

THE FIRST NEW BROADCAST ENGINEERING BOOK IN YEARS!

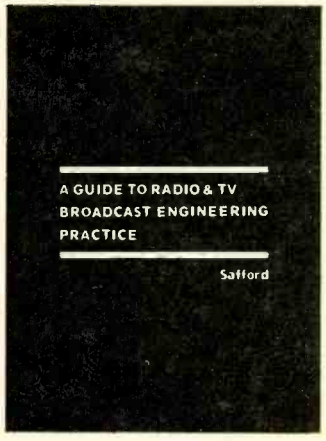
SAVE $3.00 on this Special Prepub Offer!

A Guide to Radio & TV Broadcast Engineering Practice

By E. L. Safford, Jr.

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

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



- 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)

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 facility.

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 solutions to 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!

CONTENTS

Other Helpful Books On Broadcasting For Every Station!

HOW TO SELL RADIO ADVERTISING
By Si Willing. Millions of words have been written about salesmanship, yet thousands of salesmen are still groping for the right formula. And therein lies the secret as Si Willing illustrates it by theory and, even more important, by practice. You'll hear all sorts of objections and how they've been successfully countered. You'll learn the approaches and the clinchers, how to use available sales tools to the best advantage, how to overcome fear and timidity, and how to deal with the competition. You'll learn ways to sidestep objections, how to recognize the "opportune moment," how to convert a "No" to a "Yes," and how to satisfy the prospective sponsor who has everything. If you want to improve your selling techniques and increase your sales, this book has what you need. 320 pps.
Order No. 511 ..... Hardbound $12.95

CATV SYSTEM ENGINEERING: THIRD EDITION
By Bill Rheinfelder. Here is the new 3rd edition of what has become the accepted technical standard of the CATV industry . . . an expanded and revised version of the first and only authoritative book on planning, designing, and operating a CATV plant. Containing only tested and proven information, this classic text is a must for every individual with an interest in day-to-day cable TV operation as well as a handy reference volume of straight-forward answers to the problems encountered almost daily in any system. While specifically written to serve the needs of cable TV, much of the data will be useful to technicians involved in other video amplifier system applications. 256 pps., 140 illus. 14 Chapters. Hardbound.
Order No. 298 ..... 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

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).
Also send me ☐ No. 511 ☐ No. 298
☐ I enclose $_____. ☐ Please invoice on 10-day FREE trial
Name _____
Company _____
Address _____
City _____ State _____ Zip _____
SAVE POSTAGE by remitting with order. B-41

Circle 123 on Reader Service Card

CROSS-TALK

Dear BM/E:

There seems to be a controversy concerning just how much of the chain from studio to listener's ear the engineer should concern himself with. Some favor a strict "hands-off" approach, running everything under their control with the flattest frequency response, while others prefer to predistort their signals to suit the lowest common denominator of receiving equipment. (At least one major record manufacturer has adopted this latter idea, with mixed reviews.)

I personally favor the first approach, because it tends to reward the listener who obtains the best equipment (and the rest don't really care). If someone buys an AM-FM/stereo receiver to listen to my AM station, I would prefer that my signal not sound bass-heavy, splattery, and distorted on it. The same is true for car radios, which are usually fairly clean sounding—if you set your audio to (supposedly) sound good on poor receivers, then those who have better equipment (and this is an increasingly large segment of the audience) will be dissatisfied.

It might also be pointed out that the usual form of "audio enhancement" is a variable boosting of bass and treble, say at 100 Hz and 5 kHz. These are precisely the frequencies at which the harmonic distortion of most AM transmitters starts to rise, so boosting at these extremes of the AM frequency response spectrum will increase the apparent transmitted distortion. . . .

It is my feeling that a low-distortion, flat-frequency response signal has the best chance of being consistently listenable on a broad cross-section of receivers. Tampering with the quality of our signals to accommodate poor radios is futile, but even if it were successful, it would lead to stagnation in the gradual improvement of receivers. And isn't the improvement of the state of the art supposed to be one of our goals?

Vincent Mangiameli,
Chief Engineer
WOLF
Syracuse, New York

Dear BM/E:

Your October, 1970, editorial entitled "Stereo For Everyone" has come to our attention. It is very refreshing to find an increased interest in

stereo television among people in the industry. Our production "Midsummer Rock" was built around the importance of sound and the need to develop better reproduction for the viewer. In order to achieve better sound, the entire concert was recorded on 8 tracks and then mixed down to 2 track stereo. This audio was then placed back on the video tape. We had to alter some of the standard procedures in recording audio. The notch filter was cut on the Ampex 2000 so that we could utilize both the audio channel and the cue channel for stereo reproduction.

The finished product did prove our point. Television sound could and should be improved. A new dimension is added with stereo and the wide band response which accompanies most FM stereo set-ups. The TV viewer is ready for more than the 5-6 kHz top end he gets now 90% of the time from network and film shows. The TV viewer is ready for more than the standard four-inch speaker can deliver.

In your editorial, you mention that "Midsummer Rock" was produced by Metromedia. To set the record straight, Avco Broadcasting produced the special in Cincinnati and then offered the program for syndication. Metromedia, subsequently, purchased the show for many of its markets.

Bob Heath
Jack Cunkleman
AVCO Broadcasting Corporation
Cincinnati, Ohio

Time Tone needed

Dear BM/E:

We are in the market for a Time Tone. Can you tell me if there is one for sale on the open market? If not, maybe one of your readers could help. Any help would be greatly appreciated.

Jon Roberts, P.D.
WMMB/WYRL-FM
Ft. Lauderdale, Fla.

Ed note: *We assume Mr. Roberts refers to a device which produces a "bong" on the hour or half hour, like that used by CBS on its radio and TV nets. As far as we know there is no such device commercially available. CBS built its own, as did NBC. They use an electronic tone generator, one-shot version, driven by a pulse from the Master Clock system. That system is available from Bulova,, but it's expensive. Why a master clock? Because if you set an electric clock exactly on time referred to either WWV or CHU, it will be off as much as five seconds in an hour or so. That's how much the frequency of the 60-Hz power line varies. Can any of our readers help?*

Slow-Motion Videodisc Recorder

Continued from page 30

phase. A range of horizontal phase adjustment is provided to permit locking output signal with studio sync. This is necessary to accommodate the delay inherent in signal processing. In addition to the tachometer, disc-position information is available from a once-around pulse developed by a magnetic head scanning a timing ring on the drive-motor shaft. Separate servo loops control the disc during the different stages of operation. A loose loop is used in up-date modes while a tight loop functions during normal operations. During all operational functions the disc is maintained at proper speed and positional accuracy by the servo system. All changes in image rates are performed by logic control of the duration of read/write function of the individual heads on the disc.

Operational controls

Two sets of operational controls are available to perform time-base manipulation of the video images. The local controls are built into the main unit and provide an easy method of checking out the system at the site of the equipment installation. In normal operational use, a small remote panel which duplicates all local functions can be placed up to 1000 feet from the equipment itself. This provides operators with the convenience of disc control adjacent to the studio switcher.

A ring of small, white-light indicators sequentially indicates the passage of the 20-second storage time of the disc. An inner ring of red light indicators permits localizing reminder cues that signify specific points of interest on the disc. In the center of the two light rings a vertical translucent panel contains illuminated numercial indicators that show the rate of image reproduction in varying increments. The operational buttons have been laid out for convenience of manipulation with logical placement in relation to the functions performed. Record functions (time lapse or real time) are initiated by a button at the top of the cluster. A reset and EE indicator are also in that group. The play functions are in a central row and include direction of play, as well as stop-action selection. Search functions are in the bottom row. The cue button is located slightly to the left of the control cluster. Further to the left and at the center of the panel is a movable arm that provides the variable features of the time base manipulation. This arm controls the rate of the reproduced image between normal play and full stop. For convenience an "on-air" tally light is located in the top center of the control panel. **BM/E**

SALE OF THE MONTH

"Speculative Spots" sell skeptics on TV

Scott Marriner
Local Sales Manager
KCAU-TV
Sioux City, Iowa

The Challenge: Today's soft economy was our problem: It cost us plenty of national and local spot business; and, of course, loss of cigarette ad revenue was no help. We needed some way to attract new local and regional advertisers —hesitant merchants who had never tried television advertising, small businessmen with small budgets and no agency to advise them. Our job? Demonstrate clearly what TV can offer these businesses.

The Solution: Our sales and production departments worked together in producing "speculative spots." These were short TV spots and campaigns tailored to a potential customer—fully produced on videotape without any prior commitment from the business. "Your Home Town Bank" was one of these—a one-minute commercial designed for local banks in our coverage area. One of our salesmen would take the "speculative spot" to the businessman's office and present it on a one-inch VTR. We found many people who had avoided TV advertising for years suddenly taking interest when they actually saw what the TV broadcast medium could do for them. Our bank spot has been accepted as a one-minute commercial by 25 banks in our area, run as we prepared it. An insurance company not only bought our commercial, but also adopted the logo we had designed for use with the campaign. A local farm supplies and appliance store which hadn't used TV in years saw our spot featuring KCAU's children's show host touring the store. They bought the spot and now have a regular schedule on our Saturday afternoon bowling tournament. Since the beginning of this year we have produced more than a dozen such speculative spots, many of which are actually being used on the air. And our local sales are already up 5% from last year.

Two tips from BM/E

A documented success story on film or videotape might be just what television ad salesmen need—and TvB has announced it will help (with $500 toward production) underwrite the cost of member-station produced success stories. If you can compress your station's story to fifteen minutes, try TvB. And if you can get your best sales idea down in writing, try us. We'll print it—and pay you ten dollars for your help.

FCC Rules

Continued from page 14

cinctly states that the purpose of Part I of Section IV is to ascertain community "problems, needs, and interests." The key is the phrase "problems, needs, and interests."

In answer to the Primer question, "What is the general purpose of Part I, Section IV-A or IV-B?" the Commission has said:

> To show what the applicant has done to ascertain the *problems, needs and interests* of the residents of his community of license and other areas he undertakes to serve . . . and what broadcast matter he proposes to meet those *problems, needs and interests,* as evaluated. The word "problems" will be used as a short form of the phrase *"problems, needs and interests."* The phrase "to meet community problems" will be used to include the obligation to meet, aid in meeting, be responsive to, or stimulate the solution for community problems. (Emphasis supplied.)

Obviously, among the major questions that continue to perplex broadcasters are: How should ascertainment of community problems be made? Who should be interviewed? Where should the interviews be made? What are the significant data to be obtained from the interviews? What programs to meet needs should be proposed?

Next month *BM/E* will attempt to answer those questions and analyze the remainder of the Commission's latest pronouncements concerning ascertainment of community needs. **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.

NEW LIT

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

High-power waveguide junction circulators, 63 of them, for UHF and other frequencies, detailed in Raytheon's Special Microwave Devices Operation shortform catalog. **200**

Motion picture equipment, new items in the Birns & Sawyer line, including a silent generator (55 dB noise emission level at six feet) and complete mobile studio "ready at a moment's notice." **201**

RF instruments in Bird 48-page catalog of coax load resistors and attenuators, absorption wattmeters, Thruline directional peak and average watt-meters, RF filters and power sensors. Range 25 milliwatts to 250 kW, 0.45 to 2300 MHz. **202**

Long-distance telephone circuit measurements, new techniques for making echo return loss and singing point measurements, in Wiltron Technical Review issue, obtainable free by writing Wiltron Company, 930 East Meadow Drive, Palo Alto, California, 94303. "Of interest to anyone who makes long distance calls."

Hydrogen thyratrons, including general principles of operation described, definition of technical terms used, and complete list of glass and ceramic thyratrons now available from English Electric Valve. Free to qualified engineers writing company in Chelmsford, Essex, England.

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

HELP WANTED

TV engineering personnel willing to work with future in mind. Latest equipment and production studio. Minimum travel, good salary, fringe benefits. Send resume and salary requirements to Dallas D. Clark, Television Production Center, Inc., 445 Melwood St., Pittsburgh, Pa. 15213.

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

GENERAL MANAGER—seeking first full command after accumulating extensive value in management consulting and top group broadcasting. If you need a total manager, who will protect your license, increase ratings and provide profits—I could be your most important 1971 management decision—let's discuss. Box 471-1 BM/E, Blue Ridge Summit, Pa. 17214.

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.

POSITION WANTED: CATV manager/technician experienced in all facets of CATV—from construction to origination. Will relocate anywhere. Available immediately. Box 471-2, BM/E, Blue Ridge Summit, Pa. 17214.

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.

1ST Phone, Bill Wade grad, up-tempo MOR/top 40, tight board, draft exempt, dependable, will relocate: Howard Goff, Box 214, Cardiff, Cal. 92007.

MOR, Black, rock dj/announcer/news/sales, Institute of Broadcast Arts Graduate, third endorsed, 10 years show business experience, college, veteran, married, will relocate, write D. C. Calvert, 18936 Littlefield, Detroit, Michigan 48235. 864-1581.

EQUIPMENT FOR SALE

FOR SALE

Following used equipment in good condition:

3	RCA TK31 camera chains,	ea.	4000.00
1	.1 watt microwave link complete	ea.	2650.00
1	TA9 stab amplifier	ea.	200.00
1	TS5A switcher	ea.	390.00
5	TM5A Master Monitors	ea.	300.00
2	TK20C Icon Cameras	ea.	200.00
12	580D power supplies plus other RCA equipment	ea.	50.00
1	General Electric master monitor	ea.	200.00
1	Sync generator	ea.	300.00
1	TV19B Video mixing amplifier	ea.	50.00
1	TV 51B sync mixing amplifier	ea.	50.00
2	TV 17B video DA and power supply	ea.	150.00
1	Zoomar lens, 10:1, 50mm-175mm	ea.	895.00
1	Eastman 275 movie projector	ea.	3000.00
1	Ampex VR1000B tape recorder with 3 Mark III heads	ea.	4500.00

Contact: Chief Engineer
WXXI/Channel 21
410 Alexander Street
Rochester, New York 14607

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.

EQUIPMENT FOR SALE (cont'd)

$100,000
INVENTORY REDUCTION SALE
20-30-40%

Savings off current list prices on Ampex, Bell & Howell helical video tape recorders and accessories. New Equipment in original factory sealed cartons. Can be used as origination equipment for ITFS or CATV.

Contact—Ed Wille, Video Sales Manager
Ken-Com
3540 N. 126th St.
Milwaukee, Wis. 53005 (414) 781-3084

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.

RCA COLOR TELEMURAL PROJECTOR. Projects color TV picture for auditorium or classroom. 800 people can easily view 6' x 8' picture. TLS-50 takes standard NTSC video input w/separate or composite sync. and is complete w/portable cabinet, speakers and instruction manual. Good condition. Make offer over $1000. Alan Gordon Enterprises, 5362 Cahuenga, North Hollywood, Calif. 91601. (213) 985-5500.

CCTV MONITORS—Large selection CCTV video monitors, B/W & Color, new & used, 8" to 27". Conrac Miratel & Packard Bell. CYB-21" color monitor in cabinet $950.00 CYN-17" color in cabinet $850.00. MCU19M 19" color in cabinet $495.00. 27VM5 27" B/W in cabinet $235.00. CVA-17" B/W chassis for cabinet or rack mount $195.00. Other models available, some high resolution, some chassis style for rack or cabinet. Write or phone for complete listing. Nelson-Hershfield Electronics, 1848 W. Campbell Ave., Phoenix, Arizona 85015 (602) 264-1348.

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.

Sony 777, Revox A77. Almost new. 3¾-7½. Cash, or trade on Ampex 350 series Stereo. KTAO, Los Gatos, Cal. 95030.

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.

Our latest used equipment bulletin is out! If you have not received your copy, write us. The Maze Corporation, P.O. Box 6636, Birmingham, Alabama 35210.

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

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

EQUIPMENT FOR SALE: AMPEX VR-1002, allenized with Amtec; 2 GPL 16mm film chain projectors, much other used television equipment. Call or write: Marquette University, Radio and Television, 625 North 15 Street, Milwaukee, Wisconsin 53233. 224-7467.

EQUIPMENT FOR SALE (cont'd)

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.

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.

Any type tower erection finance. Bill Angle—Tel. 919-752-3040. Box 55, Greenville, N.C. 27834.

NEW TV TRANSMITTER—GATES 500 WATT hi channel (7 thru 13), never used, complete visual/aural tubes, diplexer. WALSER, GPO Box AL, San Juan, PR 00936.

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.

Heliax-styroflex. 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.

CAPSTAN IDLERS for AMPEX 300, 350, 440 Series, self aligning with replaceable ball bearings, $22.50 net. VIF INTERNATIONAL, Box 1555, Mtn. View, Ca. 94040.

4" Meters: (1) FM Freq., (2) Modulation, on 19" Panel, $45. Solid State Johnson SCA Receiver, Model IC8, $85. Box 7328, TS, Ruston, Louisiana 71270.

CONSULTANTS

JANSKY & BAILEY
TeleCommunications Consulting Department
CATV & CCTV
Phone 202/296-6400
1812 K Street N.W.
Washington, D.C. 20006
Atlantic Research
The Susquehanna Corporation

PROGRAM SERVICES

TAPES FOR AUTOMATION

THE **CnB** STUDIOS

Specializing in Custom Services

3415 BERESFORD AVENUE
BELMONT, CALIFORNIA 94002
415 / 592-6149

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.

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.

DEEJAYS! 11,000 classified gag lines, $10.00. Unconditionally guaranteed! Comedy catalog free. Edmund Orrin, Boyer Road, Mariposa, Calif. 95338.

TECHNICAL SERVICES

CUSTOM CARTRIDGE RELOADING and refurbishing. Fidelipac replacement parts and cartridges. Write us today for prices. PROFESSIONAL AUDIO SERVICES, BOX 1953, FT. WORTH, TEX. 76101.

TECHNICAL SERVICES

VIDEO TAPE RECORDER AUDIO HEAD ASSEMBLY SERVICE

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

INSTRUCTIONS

FCC FIRST CLASS RADIOTELEPHONE LICENSE IN SIX WEEKS. Classes in El Paso, Dallas, Atlanta, Chicago, Cincinnati, Denver, Ft. 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.

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

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

"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.

Advance beyond the FCC License level. Be a real engineer. Earn your degree (mostly by correspondence), accredited by the Accrediting Commission of the National Home Study Council. Be a real engineer with higher income, prestige, and security. Free catalog. Grantham School of Engineering, 1503 N. Western, Hollywood, California 90027.

ADVERTISERS' INDEX

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

Less Regs For The Public Interest

Several events in the last two months portend a refreshing new look in federal regulation policy as it affects communications.

Item. Clay T. Whitehead, Director of the Office of Telecommunications Policy has emerged as a clear voice championing reform. He has urged minimal regulation of CATV (see *CM/E*, p. 1, March) and in March before the EIA called for changes in the nation's current regulatory process which he termed obsolete. The framework from which the FCC (and other commissions) operates is wrong according to Whitehead. Policies, rooted in 1934 concepts, assume that communications services are natural monopolies. This is not realistic. Technology has opened up other alternatives.

Item. The FCC, itself, seems to have embraced a non-monopolistic notion in its recent decision on data communication services. Private microwave and wire services have been authorized and the existing common carriers, primarly telephone and telegraph, have been forbidden from operating from a protected monopolistic vantage point. The FCC's new ruling says that if common carriers want to operate in the data communication realm, they will have to set up separate subsidiary companies and they are barred from buying services from these subsidiaries. The subsidiary must take on a new name not identified with the common carrier. Thus, the common carrier has no preferred base from which to calculate tariffs. They must compete in a free market place.

In coming up with more realistic regulation processes, Whitehead says the issue is not technology nor is it economics. Rather it is that the government has got to decide how to make decisions faster.

In Whitehead's view this will come about if the government sets guideline policies rather than detailed regulations. "Government strongly, but in the least meddlesome way, lays out what is expected of industry, establishes the limitations beyond which the industry may not go, and leaves it to the industry and the public to find their own equilibrium."

This policy implies that the government, instead of foreseeing abuses, steps in only to correct situations that are contrary to public interest. As Whitehead puts it "An *ounce of prevention* is worth a pound of cure, in regulation as elsewhere, but a *pound of prevention* can be fatal."

The new approach to regulation by policy rather than details is now occurring in the case of domestic satellites, in which wide open competition has been called for. As a consequence, potential suppliers have considered customers' requirements seriously in planning and pricing their services. Example: Western Union's proposed attractive rates for TV network interconnections.

This did not happen before, said Whitehead, because both customer and supplier felt their requirements and capabilities had little role in regulation rituals.

The new policy calls for regulation agencies to create incentives and set rules which let the great resources of this country to get on with the business of creating new services. Among other things, this means it will not always be necessary for a proposed new service to prove that it will not harm some other regulated service offering.

The recent FCC decision on establishing data processing communications services that are largely unregulated is salutary. But it was eight years in coming. Let's hope that some more decisions that are expansionary rather than restrictive will be forthcoming in the future and that they will come with due speed.

James A. Lippke, Editor

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.)

It's no song and dance.

If you're processing video signals, you've got enough to do without worrying about the equipment. So at 3M we've reached into our repertoire and come up with a handful of reliable video products that work like magic.

The first trick out of the bag is the **helical VTR dropout compensator.** A combination dropout compensator, ultra-stable processing amplifier, AGC and automatic chroma level control, it corrects, cleans up and stabilizes helical VTR signals.

Next on the bill is the only **dropout compensator** made that provides proper color and luminance replacement for quadruplex VTR's. The 3M system eliminates white and color flashes, color mismatches and grey-out values, while maintaining full video stability and color interlace even through multi-generation dubs. An interface kit for your VTR and a test tape are free with your order.

The perfect partner for either of the above units is the 3M **dropout profile recorder.** Operating on-line, it records an hour of playback on a 5" chart for evaluation at a glance. Tapes too degraded to use for new program material can be stored along with a permanent record of their performance. The recorder includes a built-in calibrator and remote control.

Our **color video encoder** works its magic by supplying a standard NTSC color signal from any 3- or 4-channel camera, low-priced or high-priced. Its unique all-digital color bar generator is exceptionally accurate yet never needs adjustment, while its just-as-unique video input clamping eliminates low frequency hum and noise. Other circuits provide sharper, crisper pictures, improved color fidelity and automatic green channel luminance in monochrome.

And as our last act (for now), there's our **10-channel bridging video switcher** with audio-follow. Frequency response is ± 0.25 dB to 10 MHz, low frequency tilt is under 1% and isolation is 52 dB at 3.58 MHz. Both the center conductor and video ground are switched, so connections are easily made and one switching has no effect on other switchers looped to the same input. Routing switchers up to 10 x 20 are readily assembled.

That's the 3M Video Magic Show. We've had to be brief, so why not contact us for the details? In the meantime, you might like to know that in spite of the high performance, we're more than competitively priced.

And if that's not magic, what is?

Mincom Division, 3M Company, 300 South Lewis Road, Camarillo, California 93010. Telephone (805) 482-1911.

VIDEO PRODUCTS

Mincom Division 3M COMPANY

Circle 140 on Reader Service Card

DITCH WITCH '71...

THE NEW VP12 VIBRATORY PLOW

Installs service lines, tubing without trenching

THE DITCH WITCH VP12, a completely new vibratory plow. It is a self-propelled, four-wheel-drive power-steerable unit that buries service or drop wire and copper, plastic, or steel tubing to diameters of ⅜" without trenching! Turf damage is held to absolute minimum. The plow shaker is powered mechanically by a 25-HP air-cooled engine independently of the dual-range hydraulic four-wheel-drive. Stability on hillsides and rough terrain provides unmatched operator safety. Controls are easy-to-reach for operator convenience. Compactness provides maximum maneuverability in tight places and one man easily can load the VP12 in a small van, the back of a pickup or on a Ditch Witch trailer. It will move through a standard yard gate with room to spare. Available with either feed or pull blade for installation speeds up to 150 FPM.

DITCH WITCH

The Professionals

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

Circle 141 on Reader Service Card