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# BROADCAST ENGINEERING

the technical journal of the broadcast-communications industry

Indiana University

AUG 24 1972

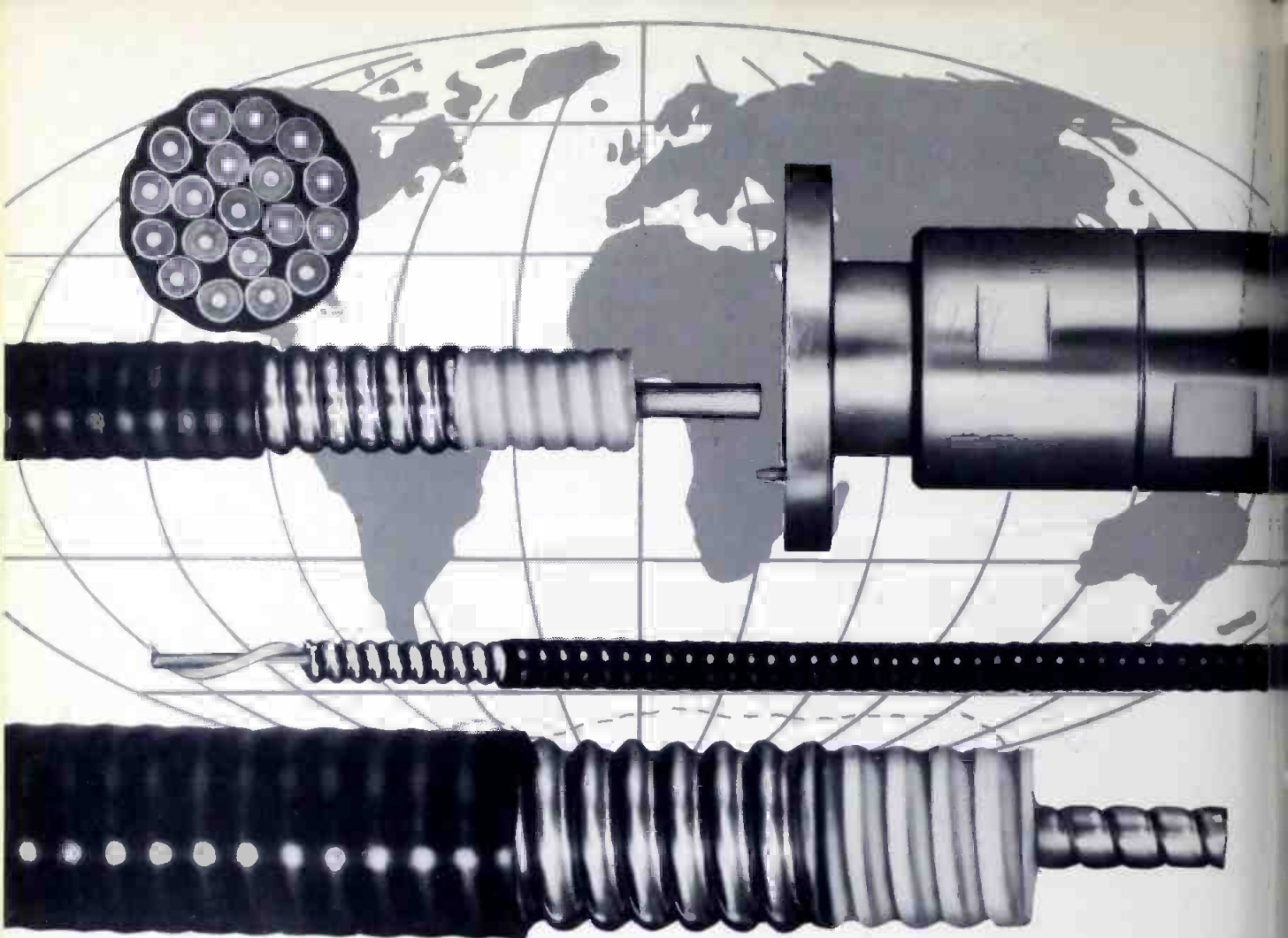
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## ELECTIONS '72

Covering the Olympics  
New Operator Rules  
Flood Survival Report

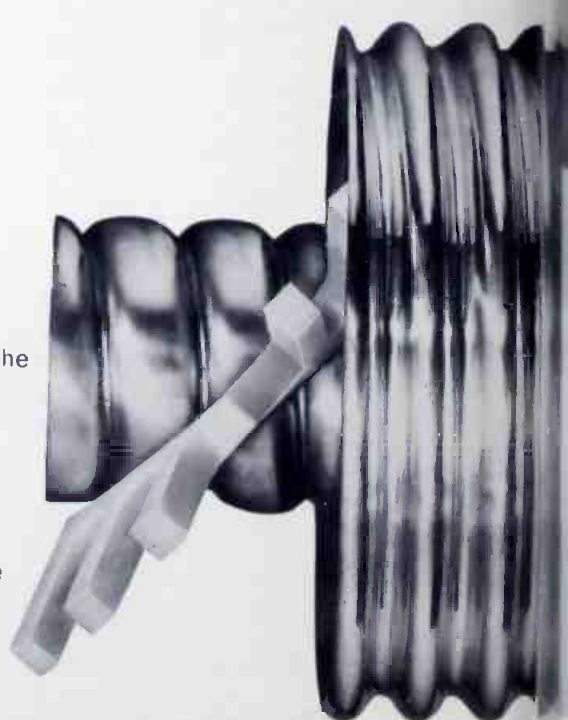


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# dp-1

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# BROADCAST engineering

The technical journal of the broadcast-communications industry

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Since this is an election year, we have covered in this issue several facets of election reporting. From operation to station image, you'll find interesting ideas from page 14 through 30.

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### EDITORIAL

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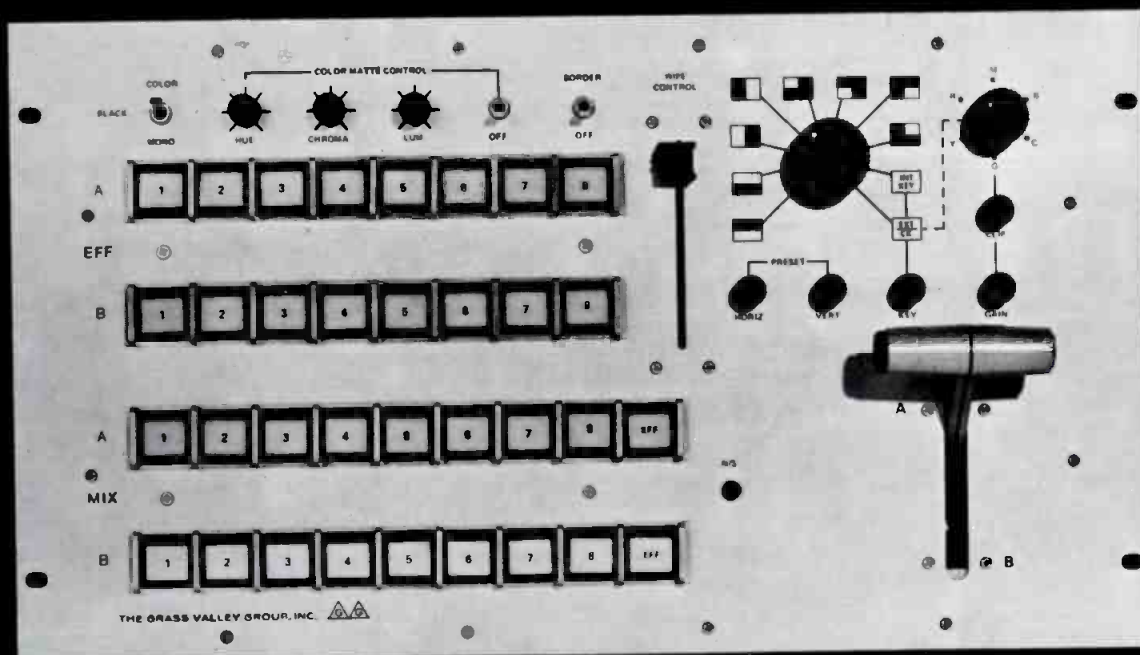
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# DIRECT CURRENT FROM D. C.

AUGUST, 1972

by Howard T. Head

## New Rules Permit Reduced-Grade Operators at Radio Stations

### AN EDITORIAL

As reported in a special article beginning on page 32 of this issue, the Commission has adopted new rules permitting the increased use of reduced-grade operators for routine transmitter operation at many AM and FM radio stations. This action, which was taken in response to a petition from the National Association of Broadcasters (NAB), recognizes the fact that the first-class operator requirement for routine operation frequently wastes the time and abilities of trained technicians who could be doing more useful things. We applaud the Commission's action in recognizing these facts, and in attempting to conserve the talents of skilled personnel.

In taking this step, the Commission has endeavored to assure that trained technicians will be more readily available to cope with serious maintenance problems, and that their talents will be applied to this purpose. A chief operator (first-class) must be designated at stations receiving this new permission, to supervise operating personnel and to have the time and authority to provide adequate station maintenance.

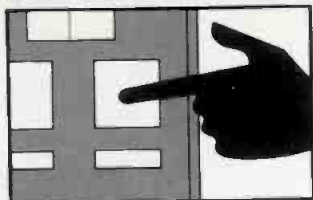
The Commission's order adopting the new operator requirements lays stress on these matters, and emphasize the obligations of each licensee to assure that all personnel are adequately trained, and to provide an environment which will encourage the improvement of both operating and maintenance practices. This is all as it should be. We are all familiar with many instances where neither the time, talent, or resources have been available to provide even satisfactory operation let alone adequate maintenance. To the extent that the Commission's new requirements encourage these improvements, they are all to the good.

The avenue of improvement, however, is a two-way street. Licensed operators, and to a lesser extent, station licensees, are under the direct watch of the Commission's field inspectors. Whether a course of action is "right or "wrong" is often a matter of determination by an individual inspector. The Commission has no less obligation than the station licensee to make sure that its inspectors have competent skills and are adequately instructed. Because of the Commission's authority, the Commission's burden in this regard is far heavier than that of the licensee, and we encourage the Commission to accept these responsibilities.

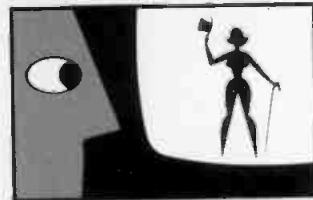
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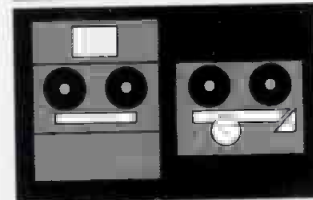
- 1 ENTER EDIT POINTS  
preset the "start" and "stop"  
frames for both master and  
playback tapes.



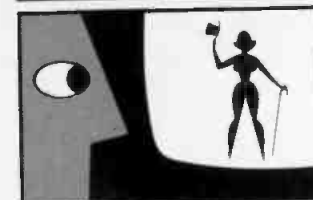
- 2 PRESS FOR CUE  
automatic location of initial edit  
points and parking of tapes with  
correct preroll allowances.



- 3 PRESS FOR PREVIEW  
automatic preview of selected  
scene. (Correct the edit points  
if desired).



- 4 PRESS FOR RECUE  
simultaneous "single glide"  
re-parking of tapes.



- 5 PRESS FOR EDIT  
automatic tape synchronization  
of tapes and recording of scene  
exactly as previewed.



- 1 ENTER EDIT POINTS  
for next scene.



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We urge the Commission to undertake two specific actions in this regard. First of all, the Commission should take appropriate measures to set up formal organized training of its field inspectors. The broadcasting industry stands ready to cooperate in this endeavor in every way. Second--and this is a needed step which can be undertaken now--the Commission should make available for public inspection the instructions issued to its field inspection staff. Station licensees and individual operators can hardly be expected to understand what is required of them by the Commission's inspectors if the inspectors are privy to instructions which they are not permitted to see. An instruction which the Commission does not wish licensees or operators to see should have not been issued in the first place.

It has been our experience over the years that with few exceptions, licensees, licensed operators, and Commission personnel want the satisfaction of a meaningful job competently done. What we are proposing is a partnership between the Commission and the Commission's licensees and licensed operators. Improved technical quality from radio and television stations has been a personal crusade on our part for many years. We believe that steps such as those described above will help bring this improvement to pass.

#### Progress Toward Lifting of AM Freeze

The Commission's staff has completed a first draft of a 200 page Report and Order looking toward a lifting of the "freeze" on AM applications which has been in effect since 1968. The original draft will undergo considerable refinement and revision before it is presented to the Commission, which will probably occur within four to six months.

In its present form, the proposal would continue in effect many of the present freeze requirements, particularly the requirement that an application for new or changed facilities provide service to areas not now receiving primary service. However, several exceptions to this general requirement are incorporated in the draft.

As previously reported, exceptions are contemplated in the case of applications proposing service directed primarily to ethnic or other minorities. Particular emphasis would be placed on minority ownership of such stations. One problem which is not satisfactorily solved is that of assuring that a station qualifying under this exception would not be later transferred to other, non-qualifying ownership.

The draft under consideration also relaxes the requirement for proposals for new or changed nighttime facilities. One possible qualification would be a requirement that such a proposal provide increased nighttime service, without regard to rendering new primary service, so long as no interference is caused to other stations. More liberal rules are also contemplated governing the assignment of new Class IV station to the six local channels (1230 kHz, 1240 kHz, 1340 kHz, 1400kHz, and 1450 kHz and 1490 kHz).

# Now showing...the Reliables

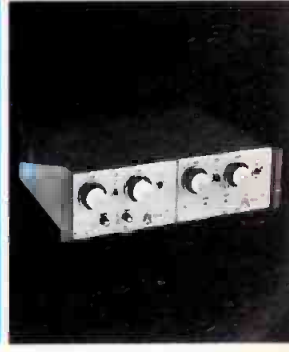
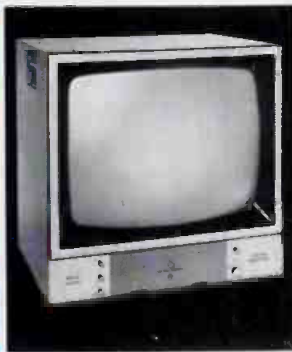
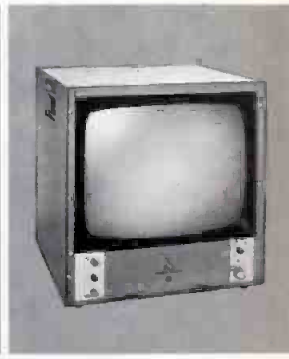
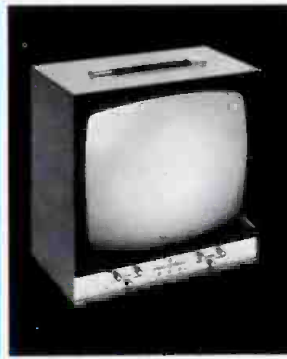
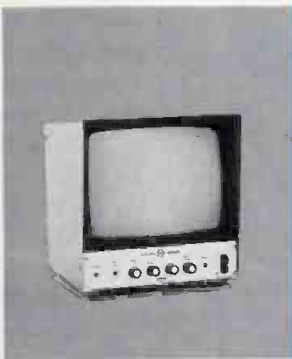
Each monochrome monitor features three plug-in circuit modules in rackmount format. Small size saves less rack space than similar units and permits monitoring of 3 separate video signals. High quality, all-purpose monitors with Setchell Carlson's exclusive UNIT-IZED® plug-in circuit modules.

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

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

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

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



23" monochrome monitor offers excellent picture quality and attractive styling at a low cost. Circuitry is 100% solid-state and the horizontal resolution is 640 lines or better. Monitor has a wide range of applications and is available in professional-quality models.

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

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

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

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

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## LETTERS TO THE EDITOR

### Police Cooperation Can Be Important

Dear Editor

In reference to your article in *Broadcast Engineering* in May of 1972 on the theft of station equipment, I would like to pass along some thoughts on the subject.

In cooperation with the Phoenix Police Department, I have posted in the most conspicuous places around the station a red sticker that states that all items of value on the premises have been marked for positive identification. I then purchased an inexpensive electric engraving tool and engraved on all equipment: PROPERTY OF KTUF/KNIX.

On most equipment, this engraving is on the face of the unit. In addition to this, all serial numbers have been recorded and filed in a safe place.

We also had problems with the theft of copper wire used in our radial system on our AM tower. The local power company offers, for a nominal fee, lighting from dusk to dawn around our studio and transmitter buildings. The lighting comes on automatically with photo cells, and the whole system is maintained by the power company. We use mercury vapor lamps on 30-foot poles, and they throw out a minimum of one foot candle up to 200 feet from the buildings.

**E. Doren**  
Chief Engineer  
KTUF/KNIX  
Phoenix, Arizona

### Collins Transmitter Information Needed

Dear Editor:

Several days ago, while performing routine maintenance on the modulator cabinet associated with this station's 25+ year old Collins Model 20-T kW transmitter I no-

ticed a small amount of oil dis-  
pant had leaked from the modu-  
tion transformer, T-406. While t  
operating parameters of the mod-  
lator have not been serious to da-  
I'm sure you'll agree the tran-  
former warrants immediate re-  
placement. The rub is that after  
quick phone call to the Colli-  
parts representative in Dalla-  
Tex. I have discovered this mod-  
transmitter parts are no longer ca-  
ried on their inventory.

What I wish to know is whe-  
and who would I contact about  
obtain a replacement transforme-  
The gentleman I talked with at Co-  
lins mentioned the possibility  
contacting the Military MAF  
association as they were suppos-  
to have operated several of the  
transmitters on their network.  
Any information anyone could  
provide would be greatly apprecia-  
ed.

The second part of this letter  
concerns itself with a quick trou-  
bleshooting technique I have used  
successfully.

The example I have chosen  
with reference to a TapeCast  
Model-600RP cartridge machine  
which I recently encountered  
problem with the cueing circuit.  
The problem was that the cueing  
tone was not being picked up and  
amplified, causing the cueing so-



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did not to drop out (at the drop out) at the designated position on the cartridge.

By applying a signal from a pen-  
le harmonic signal injector I was  
ble to enable the cueing solenoid.  
ulating the magnetic cueing head  
the probable source of trouble.  
he resistance of the head had in-  
eased to an intolerable value and  
as replaced.

How well this technique would  
ork on other model cartridge  
achines (such as Collins, Gates,  
otmaster, etc.) I am not sure.  
ut I thought I would pass the idea  
ong.

Joe Waters, CE  
Station KVRB  
Rock Springs, Wyo.  
82901

## Speed Adjustments

Dear Editor:

I am writing in reference to the  
em in the May, 1972 Engineer's  
xchange column concerning tape  
nd turntable speed adjustments. I  
resume that the author is interest-  
d in having his turntables run at  
xactly the correct speed. If that is  
ie case, he would no doubt speci-  
/ synchronous motors.

On the assumption that his turn-  
bles use some kind of synchro-  
ous motor, it should be obvious  
at the use of a strobe disc will tell  
hether or not the drive ratios in  
ie turntable involved are correct,  
egardless of the power line fre-  
quency (within reason). If the  
urntable and light source for the  
trobe disc are running from the  
ame source of AC, any error of  
he frequency will affect both  
qually. Hence the relative accura-  
y will be unaffected.

If the author intends to have his  
urntables run at a constant speed  
egardless of power line frequency  
ariations, he cannot rely on some  
ind of readjustment procedure,  
ince the frequency of the commer-  
ial AC tends to change more or  
ess slowly from hour to hour  
usually the 24-hour average is held  
o 60 Hz). An adjustment that is  
orrect at 6:00 AM would not be  
ight at 6:00 PM. Similarly, he  
an't use four-pole motors and  
xpect speed to hold constant, un-

less his line voltage is well-regulat-  
ed. And he must rely on the power  
company again, since the use of a  
Sola-type voltage regulator will  
damage the motor (due to the high  
harmonic content of most of them).

If the author has experienced a  
2.0 rpm error (out of, presumably,  
45 rpm) I would hate to try to use  
an electric clock in his neck of the  
woods. Fortunately, here in Syra-  
cuse the line frequency is excep-  
tionally accurate. Clocks synchro-  
nized with the line stay accurate  
indefinitely. We check ours against

WWV periodically and never have  
to reset them.

Vincent Mangiameli  
Chief Engineer  
Syracuse, N.Y.

Letters Continued  
on page 53  
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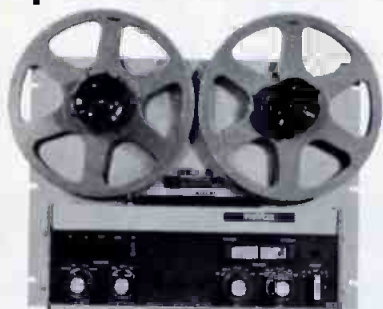
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Guaranteed for life. Every basic part of the A77 Mark III-B is protected by a lifetime guarantee except the heads, capstan and pressure roller, which are guaranteed for a full year. This should tell you something about the reliability engineered into the Mark III-B.

18 new features. The original A77 model, so widely praised since its introduction, has been improved in 18 ways. For example, a new oscillator circuit for greater efficiency, lower distortion. A modified and strengthened braking system. A new hardening process to reduce capstan wear. Improved tape handling and spooling.

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## NAB President Tells Broadcasters To Stand Firm

Vincent Wasilewski, the NAB's forceful president and a strong advocate of broadcast freedoms, called upon the industry to stand firm against the kind of government intimidation that could result in regulating freedom of speech.

In his address before the Missouri Association of Broadcasters, he made it clear that he feels the First Amendment guarantee of free speech applies as fully to radio and television as to newspapers and magazines.

"The purpose of the First Amendment," he said, "obviously is to assure that the right to speak is unhampered. Certainly the Founding Fathers did not intend the right to be restricted because speech was transmitted by one method rather than another.

"Those who wrote the First Amendment intended that it should extend into the future and apply to all methods of communication, even those not yet invented. Thomas Jefferson himself said it should apply to 'all avenues of truth.'"

Wasilewski counted off recent efforts to intimidate broadcasters in their news coverage—from GOP Chairman Robert Dole's charge that some reports try to sabotage national policy to a White House speech-writer's report of anti-trust action—and he cited some sound advice given by newsman Elmer Davis in the Joe McCarthy era: "The first and great commandment

is: Don't let them scare you."

The NAB President said broadcasters find it difficult to keep such inspiring words in mind "when the government is crackling you three-year broadcast license loudly in your ears." But, he said it must be done.

"Broadcasting's critics," he said, "point to the fact that stations are licensed by the government and therefore must answer to the government for their operations. Obviously, some regulation is necessary, but that must not be allowed to serve as an excuse for regulating freedom of speech."

## Gates Picks Up GE TV Lines

Harris-Intertype Corporation, the parent company of Gates Radio Company here, and General Electric Company have completed a definitive agreement under which Harris will purchase GE's lines television broadcasting equipment for \$5,520,000 in cash.

The companies announced on March 10 that they were discussing the purchase, which is expected to be effective in July.

L. J. Cervon, Vice President and General Manager of Gates, said the acquired lines consist of TV cameras, transmitters, antenna and studio equipment produced by GE's Visual Communications Products Operation in Syracuse, New York. Annual sales volume of the television broadcast equipment products was not disclosed.

Gates will gradually transfer manufacture of the GE lines to its plants in Quincy. A majority of GE's employees in sales, service, engineering, and management positions at the Visual Communications Products Operation will be offered employment with Gates.

Harris-Intertype's existing lines include equipment and systems for space communications, data acquisition and information processing.

## New Company Start

Richard D. Bogner and Leonard H. King, who sold Bogner Antenna Systems Corporation to Ampex Corporation in 1969, have formed Bogner Broadcast Equipment Corporation in Valley Stream, New York, to supply VHF, UHF and ITFS TV transmitting antennas. Electronics, Missiles and Communications, Inc. of White Haven, Pennsylvania has been appointed marketing agent.

marine, land-mobile and fixed  
-way radio equipment; com-  
munications and short-wave radio  
broadcasting equipment; micro-  
wave instruments and electronic  
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tems.

## IEEE Activates Cable Committee

The Technical Activities Board of the IEEE has activated a Coordinating Committee for Cable Communications Systems (CCCCS). The purpose of the committee will be to provide a common focus within the IEEE for the specific professional interest of scientific and technical personnel engaged in all aspects of the emerging cable industry.

The scope of the Committee includes coordination within the IEEE and liaison with other organizations with regard to standards and other appropriate technical activities in the following areas: Methods; Services; Terminals; and Interconnections.

The technical functions of the Committee are being carried out through several sub-committees. The Committee also intends to sponsor technical meetings.

Inquiries regarding information requests to the Committee should be addressed to: Mr. Archer Taylor, Chairman, CCCCCS, Malarkey, Taylor and Associates, 1225 Connecticut Ave., N.W., Washington, D.C. 20036.

## Gray Research Sold, Renamed

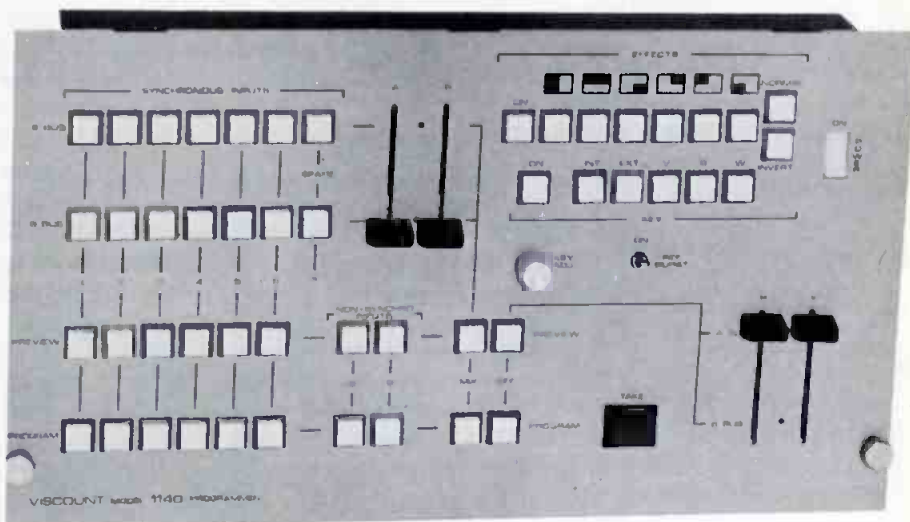
William Stacey and Mahlon Stacey have purchased Gray Research and renamed the company Micro-Trak Corporation.

Long known for their microwave, carrier, multiplex, audio products and antenna heater control system, the company will continue with most of the Gray lines. In addition, Micro-Trak will meet Gray Research obligations.

Micro-Trak also plans to market a master clock system and a custom speaker line. The company address is 630 Race Street, Holliston, Mass. 01040.

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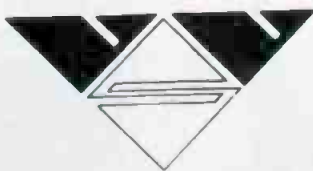
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## No Practical Jokes

The Commission has received a number of complaints concerning broadcasts of harassing and embarrassing telephone conversations without giving notice to the party called. This is required by Section 73.1206 of the Commission's Rules.

These calls are made by the licensee to provide entertainment programming for broadcast, and involve asking the party questions of an harassing, embarrassing, or perplexing nature designed to elicit reactions usually expected from "practical jokes."

### Case In Point

Instances of this practice may be found in the following cases. A station representative called a beauty salon owner, stating that the caller's wife had her hair dyed at the beauty salon about a week prior to the call and that her hair was falling out. The announcer then asked the beauty salon owner what he was going to do about it. The party called hung up in disgust.

Later he learned that a radio station had called him and was concerned that the broadcast would have adverse consequences to his business. He said that damage to the woman's hair is now believed to be a fact by many persons. At no time while on the air was he informed that his conversation was being simulta-

neously broadcast. The licensee said that it was in practice to so notify the party called sometime before the end of the broadcast, but that the practice was not followed in this instance.

### Bankrupt Integrity

In another case a disc jockey, identifying himself as representing a fictitious company, called a housewife telling her that he understood that she had purchased a new piece of plumbing equipment and that he wanted to talk to her about it. She said she was not interested. He persisted, and she hung up.

The next day the man called again, he persisted in making embarrassing suggestions in poor taste including the suggestion that he come to the house to photograph the new equipment. The housewife angrily hung up.

A third call was made the next day during which the man told the housewife that the whole thing was a joke, that he was a disc jockey, and that the previous conversation had been recorded.

The lady complained that she was upset because her husband was away on business, she was home with three small children, and she had found out with the Better Business Bureau that the company, which the DJ claimed to represent, was nonexistent. The licensee's practice was not to give any notice of recording during the telephone conversation, but to give notice of recording and intention to broadcast at some time

## Patch Cable Eliminator

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before the actual broadcast was made. Such notice was not given to the lady in this instance. Another variation is found in the practice of a broadcaster making a recording of a telephone conversation for broadcast purpose with the intention of releasing, at the end of the recording, the permission of the party called to later broadcast the recording. In the particular case, the party called hung up before his permission to broadcast was obtained, and the recording was later broadcast without permission.

#### A Matter Of Record

A Public Notice dated February 4, 1966, No. 83, FCC 66-98, the Commission took cognizance of broadcasts of contests and promotions adversely affecting the public interest, resulting, among other things, in alarm to the public about imaginary dangers, infringement of public or private rights or the right of privacy, and annoyance or embarrassment to innocent parties. That Public Notice is applicable to situations described above.

Licensees should know that Section 73.1206 of the Rules requires that before a telephone conversation is recorded for later broadcast or is begun for simultaneous broadcast, the licensee must inform the other party that the conversation will be recorded for broadcast purposes or will be broadcast live.

The recording of such conversation with the intention of informing the other party later—whether during the conversation or after it is completed but before it is broadcast—does not comply with the Rule if the conversation is recorded for possible broadcast. Likewise, the initiation of a live broadcast of a conversation with the intention of seeking the other party's permission for its broadcast sometime during the conversation, does not constitute compliance.

Licensees are reminded that compliance with Section 73.1206 of the Rules does not excuse them from compliance with local or interstate tariff requirements that a tone-warning device be used in conjunction with the recording of two-way conversations. The interstate and intrastate tariffs also contain provisions prohibiting the use of telephone service "... in a manner reasonably to be expected to frighten, abuse, torment, or harass another." The American Telephone and Telegraph Company and major independent telephone companies are requested to review the foregoing tariff relations with licensees within the areas of their operating companies.

Section 223 of the Communications Act and similar provisions in the laws of each state make certain types of harassing or annoying telephone calls a criminal offense. For example, Section 223(1)(B) of the Act provides criminal penalties for making an interstate call without disclosing the identity of the caller and with intent "to annoy, abuse, threaten or harass any person at the called number."

With the broadcast industry on the firing line these days, it makes no sense for stations to invent new problems. This magazine suggests that such violations be reported by the industry. If we don't police ourselves, we know what to expect from our audience, advertisers, our legislature, and our FCC.



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Fig. 2 This is a portion of the election vote processing facility in WTIC's Studio A. It may require extra personnel, but it will pay off in your professional image.

# WTIC

## accepts the challenge of TV election reporting

By Harold A. Dorschug\*

WTIC-TV has covered two elections with its computerized character generator display system and is planning for this year's election with several improvements based on this experience. These are expected to result in faster reporting with more information being displayed.

The basic system remains as it was in 1970 (See "Television Election Reporting System", May, 1971 BE). It consists of a Foto-Mem Centaur minicomputer, 64-track magnetic disc memory, Foto-Vision cathode-ray terminal and Videograph character generator. A standard teletypewriter equipped with tape punch and reader is also connected to the computer which is standard practice for computer use. Election results produced by this arrangement are inserted over a suitable background in the picture as Figure 1 demonstrates.

Because of its location in the state capital and the fact that the entire state of Connecticut lies within its coverage area, WTIC-TV does a more comprehensive

job of covering elections than might otherwise be the case. Reporters are stationed at every one of the more than 600 voting places throughout the state. As soon as voting closes, results are telephoned to the studio. Here an organization of over 80 people processes the returns. Figure 2 shows a portion of this group.

While the Centaur computer is capable of compiling the total vote, the Honeywell 115 in the station's business department is used for this purpose. This has been the practice for a number of years and the Honeywell is programmed to provide such things as a voter profile, comparison of current vote with prior years and other information not presented by visual means. This information is delivered in hard-copy form by means of a high-speed printer. Radio and television anchormen each receive a copy of this material for air use and another goes to Centaur control.

### WTIC System Change

Because of the rate at which votes are reported during the hectic period immediately following close

of voting and the speed at which processing occurs, transferring the information into the Centaur is critical operation. This is one area in which a significant improvement is expected.

In 1970, punched paper tape was used as the transfer medium. Three secretaries working from the printer copy punched teletypewriter tape which in turn was passed into the tape reader. Since the minicomputer sorts the votes by candidates, determines the leader and calculates his plurality, only a minimum of data must be entered. Entries may be in any order and readout from the character generator do not have to follow the input sequence.

Fig. 1 Display of the manner in which the computer controlled character generator election returns will be used at WTIC-TV.





Last year it was decided to use CRT terminals in place of paper tape. These terminals, resembling a TV monitor with a keyboard, are widely used with computer systems as a means of rapid entry and retrieval of data. Two were interconnected with the Centaur and a program written whereby the CRT's would input the data and a teletypewriter would command video-graph output. Much to our surprise and disappointment this arrangement proved substantially slower than the paper tape transfer.

The principal reason was the manner in which a CRT terminal operates. On command, a specific race format appears on the screen.

The operator then moves the cursor (a square mark indicating the location where a character will be entered) by line and space to each position where an updated vote belongs. Our terminals lacked tab keys which would have permitted pre-set adjustments to particular points and consequently time was lost.

Direct exchange of data between the Honeywell and the Centaur would be ideal. However, the cost of an interface of this kind is very high since it requires software or program modifications. Also, the Honeywell is not used for primary voting and some off-year elections so that the Centaur must still stand

alone. Paper tape again looks impressive although in a more sophisticated form than used previously.

Arrangements have been made to operate a high-speed tape punch from the Honeywell. This will perform independently of the page printer whenever votes have been updated. The tape will be passed into the Centaur reader which will be located near the punch.

#### *Entering Data*

Since the punch operates at a speed of over 100 characters per second or nearly ten times the speed of a teletypewriter tape reader, it will be necessary to transfer only basic election information.

This is one of the biggest advantages of a computerized system over manually operated character generators. By construction of format, the computer requires only the vote, sorting out the name of the candidate from the position of his vote in the sequence, after which it enters it into the correct place in the display and calculates and enters his plurality. Because of this advantage, the discrepancy in tape punch and reading speeds is not believed to be a problem.

Entering the votes through the teletypewriter in this manner will offer another advantage. Practice has shown that the program director must know which races have been updated because he often follows a particular race if it shows excitement. The teletypewriter will print all the information going into

the Centaur and will be understood by the director. An assistant director usually performs the chore of keeping these printouts in order for this purpose. Since CRT terminals destroy their display after entry into the computer, this feature was lacking last year and found to be a definite disadvantage.

The Foto-Vision CRT terminal will be used to control output displays from the Videograph. They are ideal for this use since they provide a preview device. Races can be called up in any sequence regardless of the order in which they entered the Centaur.

#### The Presidential

This year, the race of primary interest is the Presidential. This will be reported in 28 separate formats: one for the entire state and

another for each of 27 key cities. Each format will contain the name of area or community reporting percentage of complete vote included in report, name of each candidate with his vote and the name and plurality of the leading candidate. Here we will be competing with CBS network reports and speed will be very important.

#### State Elections

Connecticut will also elect representatives from each of the six Congressional districts within the state. Six individual formats will be used for these races following much the same makeup as the Presidential displays. Here final votes can be shown and when a winner is determined his name will blink on the screen for emphasis.

Three additional formats will be included in the Congressional races. These will be devoted to returns from the three major cities in the First District: Hartford, East Hartford and West Hartford. These will follow the pattern of other formats but will indicate number of districts included rather than percentage of vote.

The only state offices in contention this year are seats in the House and Senate of the General Assembly. Two formats will be used for these races. Both will contain only the final vote with one showing the number of seats won by each political party for the House and the other similar report for the Senate. No names will be given because of space involved.

To keep track of these 39 displays will keep the computer busy but its major benefit will be demonstrated later in the evening. At that time final returns from all 169 towns within the state will be carried. Such a presentation has never before been done because of limitation of facilities.

These town reports will be in the form of a full screen roll from bottom to top with each of the towns appearing in alphabetical order. The report will consist of the name of the winner of the most important

Fig. 3 Portion of town roll showing format which will report victors in top races for all 169 Connecticut towns.

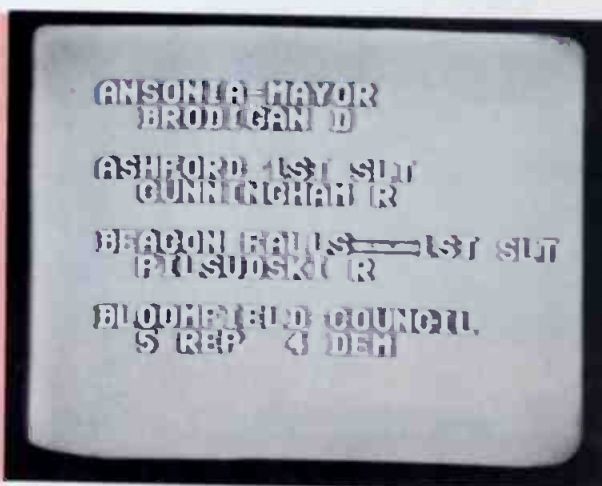


Fig. 4 Sample of display in which computer sorts and selects winners. Space separates winners and losers.



Fig. 5 The big picture of WTIC's election coverage is complemented by the display unit board. It will be used for pan shots during late evening election wrapups.



ice in each town. This can be accomplished because of the enormous memory capacity of the computer together with its ability to sort entries and arrange them in alphabetical order regardless of the sequence in which they are entered. Throughout the evening, as final results become known, they will be entered into the computer but on-air use will be limited to periods later in the evening. This is because the time necessary to roll through a complete directory will require ten minutes or more. A sample of how this town roll will appear is shown in Figure 3.

#### Display Feature

Another unusual feature of a computerized display system is its ability to arrange a list of candidates in order of their vote standing. City council races, for example, are won by those candidates having the highest number of votes

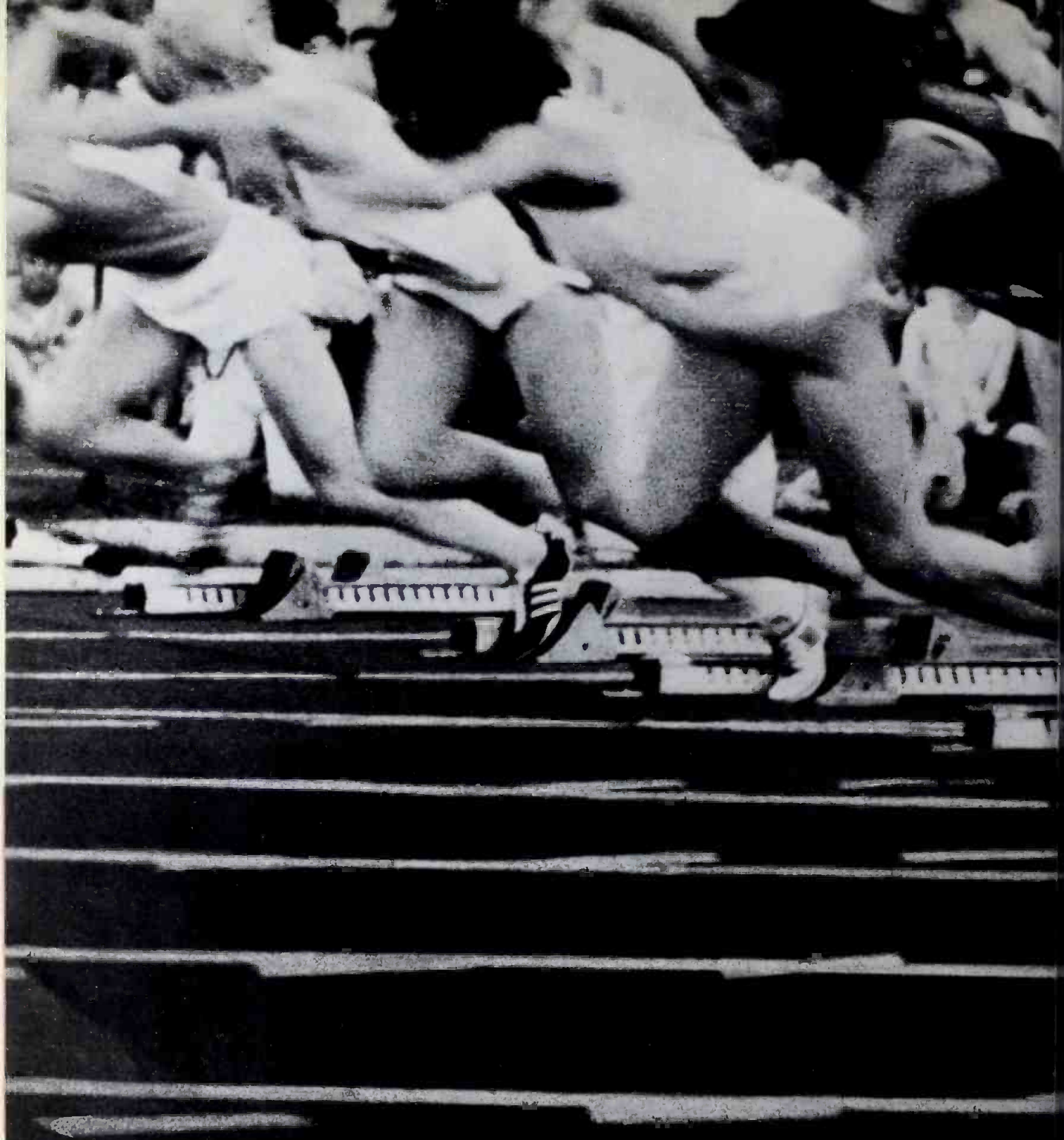
out of the total group of candidates. Often the mayor is the top vote getter. Figure 4 is a sample of seven winners selected in this manner. A space separates the winners from the losers and because of space limitations, usually only the name of the top loser is included for reference. At the moment it does not appear as though this feature will be used this year.

The Videograph system will be backed up with a studio set containing several hundred digital display or "split-flap" units arranged to show returns from major cities within the state. Although they will be updated continuously throughout the evening to provide a backup for the Videograph, their main function will be to preserve the final vote. Once set, they remain without change and offer an excellent source of material for a quick camera pan during later short wrap-ups. Figure 5 illustrates how

they are integrated with the studio set.

#### The Final Tally

The 1972 election will be covered in many ways. The networks and large stations are known to be developing spectacular systems that will make even the 1970 efforts look primitive. However, WTIC-TV feels its experience has enabled it to iron out earlier kinks, streamline its procedures and create display formats which will provide its audience with rapid, exciting and accurate results. Editor's Note: For all their computer approach, the need and desire to cover the entire election scene for their state puts WTIC in a maximum interest situation. Your viewers are most interested in their city, their county and their state. The presidential voting is important, obviously. But your emphasis must be on your state.



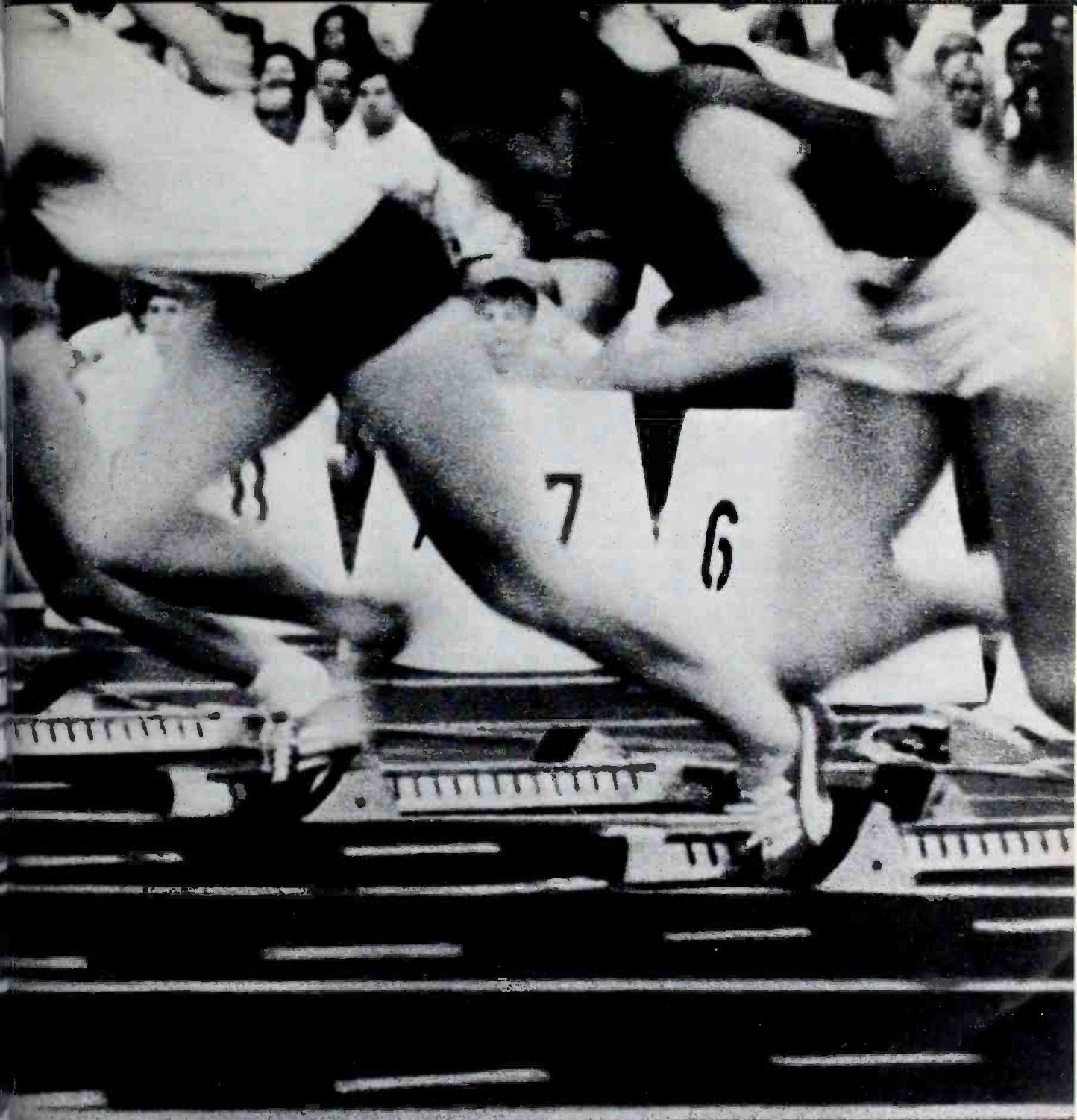
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# Planning Ahead for Radio Election Coverage

By Pat Finnegan/BE Maintenance Editor

Another national election will soon be here. Most broadcast stations will rise to the occasion and provide the public with extensive coverage. Discussing election coverage and its effects upon engineering personnel with a number of station engineers, produced an assortment of programs, methods, and techniques, used at their stations in the past, along with various feelings that ranged from very good to Ugh!

The makeup of a station often determines its approach to the type coverage it will provide. The radio only, radio plus TV, or the TV only, all seem to tackle the event somewhat differently. In this article, we will attempt to concentrate on the radio only station. The type of programs, methods, gimmicks, and techniques varies greatly. Unfortunately, many gimmicks have been attempted without ever being

tested out, or without consultation with engineering. The result can be poor end product or failure. This article will attempt to point out some of the techniques that have worked well for a number of stations, along with some reminders on preventative maintenance.

## Elections Equal News

An election is news, so the News Department is most often the controlling factor in how the election is covered. All the other departments are involved, but the News Department is in the drivers' seat.

There will be a large amount of out of the ordinary activity on election day. Since all departments are involved, inter-department cooperation and planning are necessary for a successful day. As Gordon Trout, C.E. WIRE, Indianapolis, Ind. puts it, "Cooperation and

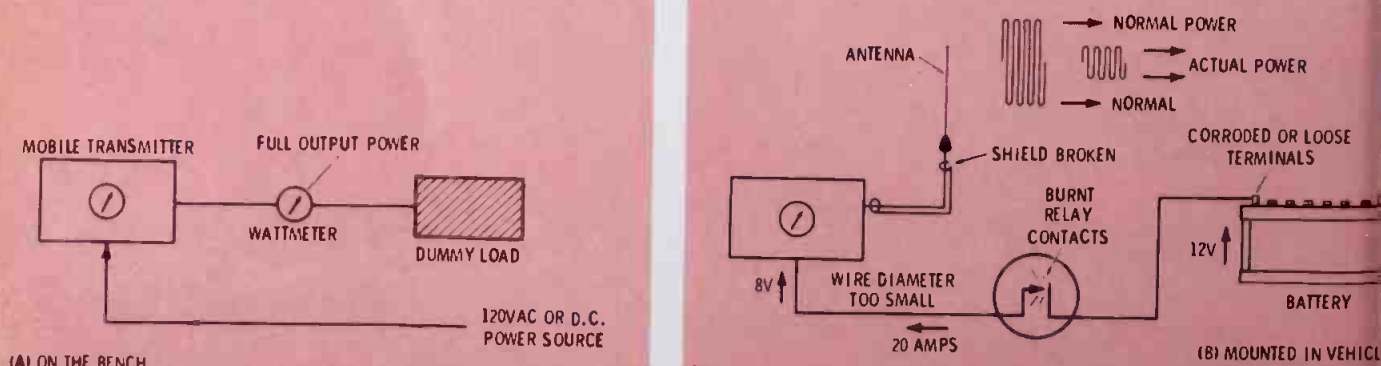
planning are essential. The departments here at WIRE get together at least three to four weeks ahead of time. Ideas are proposed and techniques and details worked out. Cooperation is very good and everyone works well together."

## Two-Part Approach

Radio coverage of the election can be divided into two phases: daytime coverage while the polls are still open and voting is going on, and then the "Election Party" in the evening after the polls close and the tabulations begin.

During the day, most of the programming is "taking the pulse" of the election. For the most part, this will include remote pickups from mobile units, tape recordings and telephone call-ins. A majority of these will originate through the remote pickup transmitters in the

Fig. 1 The mobile transmitter can check out ok on the bench with a good load and proper voltage input. In the car, it may be another story. The power output may be well below its capability.





Mobile units like this one from WIRE are a very real asset to election coverage, but make certain ahead of time that they are in top operating condition.

### Mobile Units

mobile units, and will occur from almost anywhere in the county.

Stations with mobile units will give these transmitters a real workout throughout the day. Not only will there be additional usage, but the units will range all over the county and into places where they seldom go. Even though the mobile transmitters get normal day to day usage, one or more can be operating marginally. During normal use, the mobile transmitter may not be too far away from the base receiver, so it performs in a passable manner. That same transmitter out to the county may give poor results or complete failure.

As a preventative maintenance measure, all the mobile transmitters should get a good tuneup and checkout before election day. What's more, a physical inspection

should be made of its installation in the vehicle. Check the connections, especially the battery connections, antenna mounting and lead in. These can work loose or become defective due to weather exposure and vibrations of the vehicle. Make sure each unit is delivering full power output in the vehicle. When a unit is tested out on the bench, its environment is ideal, so the supply voltage may be normal or even high. But the voltage supply system in the car may be faulty, causing problems when you can least afford them.

Set all the transmitters and receivers right on frequency; that is, "net" the whole system. This will provide a more uniform product from all units. Don't overlook the base transmitter and especially the base receiver. All the air programming will go through the base receiver, so it must be peaked.

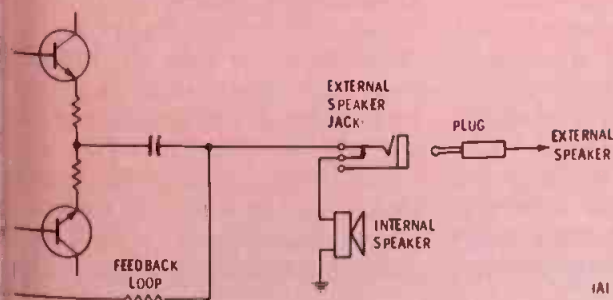
After the system has been serviced, it needs a good operational checkout. Run the mobile units out into the county to positions where expected reports will be made. During this test, select the best transmitting positions.

### Two Channel Mobile

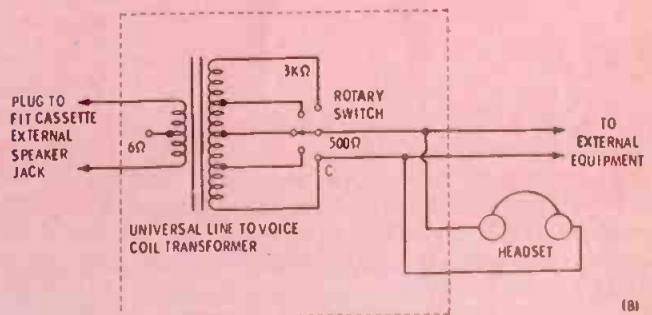
Station WIRE makes use of a successful technique in operating their fleet of mobile units. The mobile transmitters are licensed for two frequencies 60 kHz apart, with a base transmitter and receiver on each channel. Each mobile unit is equipped with a Marti transmitter/receiver that can be switched to either channel.

WIRE has successfully operated this way because each channel uses a different antenna polarization. One channel is used for cues, the other for directions. Its antennas are vertically polarized. This

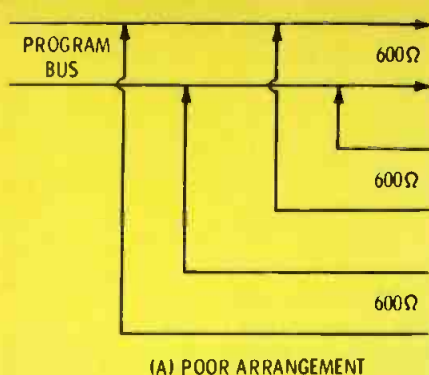
Fig. 2 A good match between cassette and external equipment will give better quality and isolation. In (A) you see a typical output circuit of a Norelco cassette; while (B) shows a small matching device that can be built, with a universal line to voice coil transformer, switch, etc. Plug will disconnect internal speaker.



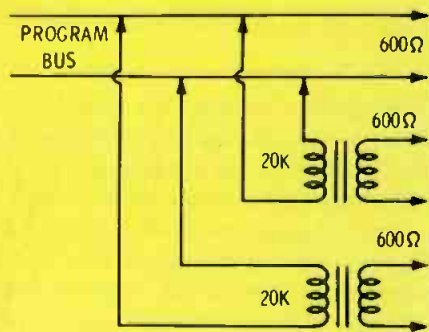
(A)



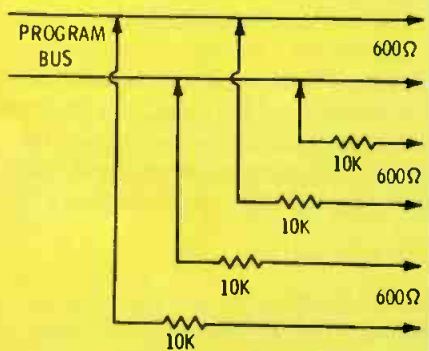
(B)



(A) POOR ARRANGEMENT



(B) BEST ARRANGEMENT USING BRIDGING TRANSFORMER



(C) GOOD ARRANGEMENT USING RESISTORS FOR THE BRIDGE

Fig. 3 (A) Shows paralleling several 600 Ohm circuits across a 600 Ohm program Bus will play havoc with program levels and create a severe mismatch. (B) Shows the best arrangement, using bridging transformers. (C) If transformers are not available, resistors can be the bridging element.

leaves one clear for the actual on air reports. This channel uses horizontal polarization on its antennas.

Directions and cues are called out to the mobile unit on the cue channel, so the mobile units normally stay switched to this channel. As soon as they are ready to make the air broadcast, the mobile operator switches his transmitter over to the news channel.

#### Tape Recorders

The small portable recorders will also get a healthy workout. Although they're now in daily use, you should clean them up and check them out. Especially, get the heads, pinch rollers and guides clean. Clean out the oxide and other bits of tape that seem to accumulate in the head area. It will usually mean opening the unit up more than for normal cleaning.

The batteries are another soft spot. Rechargeable batteries, when they are aging, don't always take a full charge. Since the unit may not normally get extensive use at one time, it may be passable. During the election day coverage, the recorder may get much extended use and be out a long time before it is returned for recharge. A marginal battery can go dead right in the middle of an important recording.

Check your plugs, cables, and mikes that are associated with the recorder. Newsmen are hard on equipment and often forget to mention that a mike or cord is bad. . . until they're ready to use it again.

Cassette recorders are getting much use in the news area, probably due to their small size and weight. Selecting a cassette for daily use or for a new twist during the election coverage, should call for experimentation first. Some of the less expensive models have speed and quality problems, and some have a low output level. There are cassettes that work reasonably well for radio news. Problems usually arise when feeding the output of the cassette to another big recorder of other equipment, and that includes levels and impedance matching. When a mismatch and low output level occur, the next unit must have enough reserve gain. But increasing the gain can also introduce an undesirable

amount of background noise. Before actually committing the proposed procedure to use, experiment first for the best results, and then follow the successful method. Stations have been successful in feeding a cassette output into the mike input of a Marti, the bridging input of another recorder, and even connection direct to the telephone line after removing the telephone transmitter.

#### Quality Remotes

Perhaps a word should be said here about quality on remote news broadcasts. The report from the remote location should first of all be intelligible. There should be no disturbing elements present such as a loud buzz or hum. On the other hand, the quality need not be good as that which originates in the studios. Small amounts of background noise, hollowness, or slight frequency response roll-off actually contributes color or atmosphere to the broadcast because it sounds like it's coming from an off-beat location.

#### Special Hook-ups

All through the day and the evening, there will be many special operating techniques, broadcast that call for special patch-up hookups, and switching. Circuit jacks and switches that may see little normal use will be called into action. Circuits that are inactive for a long time can also be inoperative without your knowledge. Check out each special patch, procedure that is planned by a usually running signals through the circuits to make sure they work.

Where special hookups are concerned, be on the lookout for circuit loading problems and mismatching. For example, simply patching several additional 600 Ohm circuits onto a normal 600 Ohm bus will be disastrous to program levels. Try to use a bridging arrangement whenever possible either with a transformer or with bridging resistors. A bridging transformer will drop the signal level about 20 dB on its load side but will not effect the bus level. Does the equipment behind the bridge have enough gain reserve to make this up? Better check it out.

For a lesser loss (and lesser is

ion) you can use series resistors. In a balanced circuit, use equal values in each leg. Usual bridging combinations are 20K, 10K or 5K ohm load across the 600 Ohm circuit. The 5K load will affect the results slightly, but lesser values will start loading down the 600 Ohm circuit.

When an unbalanced circuit gets involved, other problems can occur. Paralleling an unbalanced circuit across a balanced circuit can cause hum, noise and RF pickup. If there is a high powered FM or AM transmitter nearby, disturbing circuits can unloose problems you didn't know were waiting in the wings.

Polarization is important when it comes to unbalanced circuits. Make sure of the correct polarization before plugging it in. If the polarization is incorrect, your new circuit will short out the old circuit. They will not only kill the program, but can also damage some output transistors in some amplifiers! This is why an early checkout of proposed hookups is desirable long before the program is actually ready to go on. Mark the circuits, make marks or plugs in some way so there will be no problem comes the press activity on election day.

### The Election Party

At most stations the Party comes after the polls close. This isn't a Win Party... it is a Work Party!

### Airing The Vote

What happens during the evening and how the voting tabulation is done and presented over the air varies from station to station. Some stations do everything themselves—collect the figures from the polls, tabulate, and air the results. Some stations set up remote equipment at the Board of Election and get the tally as these people do the official tabulating and then report the results over the air.

Some have it relatively easy. Take Bill Hecht, C.E. at WHBU in Anderson, Ind. A number of local organizations get together, rent a large auditorium, send out people to all the polls at closing time and get each precinct totals as they come off the machines. The information is tabulated in the auditorium, posted on large boards and

so on until the winners are determined. Hecht simply sets up his remote equipment at the auditorium (which is also open to the public) and does a remote from there all evening, reporting the results as they are tabulated. For national and state results, the Station gets reports from CBS Radio Network and the Wire Services, which are put on back at the studios.

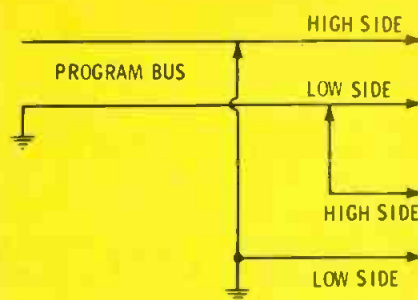
However you obtain the local voting figures, both tact in dealing with local election officials and getting their cooperation is essential. This part doesn't ordinarily involve the engineer, unless he has contact with these officials in some way. Such would be the case in setting up remote equipment at the Election Board in the City or County Building. Remember, these people must conduct the election according to laws, and they must perform their functions according to laws. So, don't ask them to violate the law for your benefit.

At an in-station party, much activity will be going on. Unless everything is planned ahead of time and each individual assigned specific duties, there can be real havoc. In many stations, an engineer is on duty whose sole job is troubleshooting and correcting problems that may develop. This is a good practice, and most stations can free an engineer, or at least hold his other duties to a minimum during that period.

### State and National

Many stations are affiliated with a national radio network where they will receive up to date reports throughout the evening on the state and national scene. The independent stations have the wire services to provide the bulk of their non-local information. There is still another source of national information that can add to a station's program. This is through the "News Line" telephone system set up by various organizations. The Party's National Headquarters have these installed as do the headquarters of some of the major candidates. You could get a voice announcement of the candidate making his acceptance, or the loser ceding the election.

Here is how it works. A package sold by Broadcast Electronics of



**Fig. 4** When patching unbalanced circuits, correct polarization is necessary. Incorrect polarization will short out the program Bus.

Silver Spring, Md. contains a multi-deck cartridge tape machine and special telephone line couplers and sequencers. Announcements or statements are recorded on cartridges and placed in the machines. A release is sent out over the wire services stating that Joe Doe has a statement to make, call News Line phone number. Or a similar item on the News wire. The station desiring the statement, sets up its recording equipment to record from the telephone line, then direct dials the listed number. The recorded statement will come on the line, which the station can record and use on the air.

Find out the number of the national party headquarters and other useful numbers before election day. Call those numbers during the evening. You should be able to get much useful program information. It will cost only the price of a phone call. But remember, there will be many calls to those numbers that night, so if you get a busy signal, be patient...try again.

### After the Ball Is Over

A few days after the election, all those involved should get together and have a critique of what went well, poorly, or flopped. Keep a record for the next year, but don't expect next year to be identical. Save the drawings of special hookups, setups and operating techniques. While next year won't be identical, if any of these do get used again, you won't have to work it out from scratch.

In small market radio . . .

# Election coverage can improve your image

By Phil Whitney\*



Fig. 1 Some of your greatest listener interest moments will come when you deliver part of your news from campaign headquarters. WINC newsman is seen here interviewing Representative Robinson (R-Va.) at campaign headquarters.

The coverage a small market radio station gives to the election night coverage can result in an image of competence for the station or a blank, which costs you listeners and prestige. It depends upon management, the program director and the engineering staff using imagination and a knowledge of the community they serve to plan and activate an exciting program which must be as tight and as interesting as that which the station's best DJ's originate on their respective programs.

In order to make an election program merit high ratings, there must be as many sources of information and background used as the station can muster. A sustained recitation of the voting result figures can be as deadly as an obituary list in a rock show. Since most people are human, they want to hear about the human side of all the statistics, too. They want the voices of those involved. They want a pace maintained as much as in a top record show. They want mobility, which radio can offer, and they react best to an imaginative approach to the entire program planning.

## Program Sources

What program sources are available to the small broadcaster? The following list assumes a network affiliation and certain other available sources which may not be accessible in all markets, but some stations utilize all of these.

- Network news feeds for national results.
- Newswire for national results and state reports.
- The local newspaper for local results and tabulations.
- The local radio amateurs for reporting outlying and sometimes inaccessible precinct results.
- The local TV cable system which originates its own programming.
- Prerecorded candidate interviews.
- Telephone beeper reports and pickups of candidates' reactions to election results.

\*General Manager, WINC, Winchester, Va.

- Remote Broadcast Pickup transmitter installations at each candidate's headquarters.
- Prearrangement with other radio stations to exchange beeper feeds of results on beeper phone at regular intervals.

#### Planning Ahead

Two or three weeks before election night, the station news chief or the program director maps out the station's coverage. Most station personnel expect to put in some overtime on that night, including members of the office staff who tabulate results. Election headquarters are contacted and arrangements for on-the-spot feeds are made. Either remote pickup transmitters are assigned to these points or Telco lines are ordered. And that ordering must be well in advance.

Each staffer has his assignment at least a week in advance so that

he can gather whatever material he will need for background and for his interviews on campaign issues and events.

All candidates are contacted ahead of time and asked to have a prepared victory or ceding message for use when called.

The leading stations in each market affected by the election, whether district or state, are contacted in advance and newsfeed exchanges are arranged. Most stations will be glad to exchange beeper feeds to fill out their local coverage, providing you get to them before the competition.

#### Newspaper Cooperation

In many markets the daily or weekly newspapers will cooperate. The fact that station announcers mention that they are reporting from the city room of the newspaper has certain advantages for them

and pooling efforts helps both paper and station. Most newspaper staffs work full-shift on election night and have some arrangements for feeding results in and tabulating them. One radio man at a mike in the city room is often sufficient to gather most local results and the busy atmosphere there adds excitement to the broadcast.

#### Hams In The Act

In some communities where there is an active radio amateur or citizen's band club, these groups are happy to offer their services in the public interest and cooperate by stationing units at remote polling places (sometimes there are not even telephones), to call in results to their control unit which can be at the broadcast station. This sometimes facilitates getting results which would not otherwise be available until the following day. (Don't put any of these transmis-

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sions on the air directly!) Both the newswires and network services fill in with the national results and the state wire provides information and background on state activities.

### Cable Coordination

There are arrangements between broadcasters and cable systems to pool staffs and present simultaneous feeds. Such an arrangement is easier when the station ownership is also that of the cable system. Since tabulations are more elaborate in the cable's local origination studio, generally on a large board, it is somewhat easier for the station announcer to quickly make comparisons or to check a tally. The shortcoming is the tendency for the announcer to refer to the fact that some of his audience can see the figures and when he says, "Notice the difference between column three and five," or some such un-



Fig. 3 Self-supporting microphone leaves your hands free when reading election results and wire bulletins.

conscious reference, the radio audience begins to feel that something is missing!

The key to the integration of all these sources into a smooth and interesting production lies in the hands of the station program director, newsman or "director", for he must be conscious of many simultaneous activities and record those which he can, for use when an opening occurs, or be ready to cut and switch to a remote point for a dramatic statement. His planning ahead of time pays off. His instructions to each participating staff member concerning what he needs

from him must be explicit for a professional production.

Common sense and organizing the team ahead of the game pay off. If the station's staff is small, sometimes the cooperation of campaign workers at each of the candidate's headquarters can be solicited. These people are often lucky and intelligent and will be glad to originate broadcasts from their respective bailiwicks if given instructions. election night on campaign issues can often be used during the long hours when the votes are being counted. Candidates, campaign managers, candidates' wives and family members all make interesting or human interest actualities which can be used when things are a little dull.

### Many Happy Returns

Election night coverage on the radio is one of its most saleable items. Doing a good job not only pleases the sponsor, it helps build the station image of responsibility and news leadership.

**Editor's Note:** As Phil says, organize before the game. For those new to the game, let me say that it can be a real slice of variety. If properly planned and executed, it might even lead to remembering that there are some programs best presented by radio...and that community coverage on a regular basis can be as vital at renewal time as is billing time.

If this year's elections helped your station put together a new and profitable election day and night format, drop us a line and describe your system. We may all be proud of it!

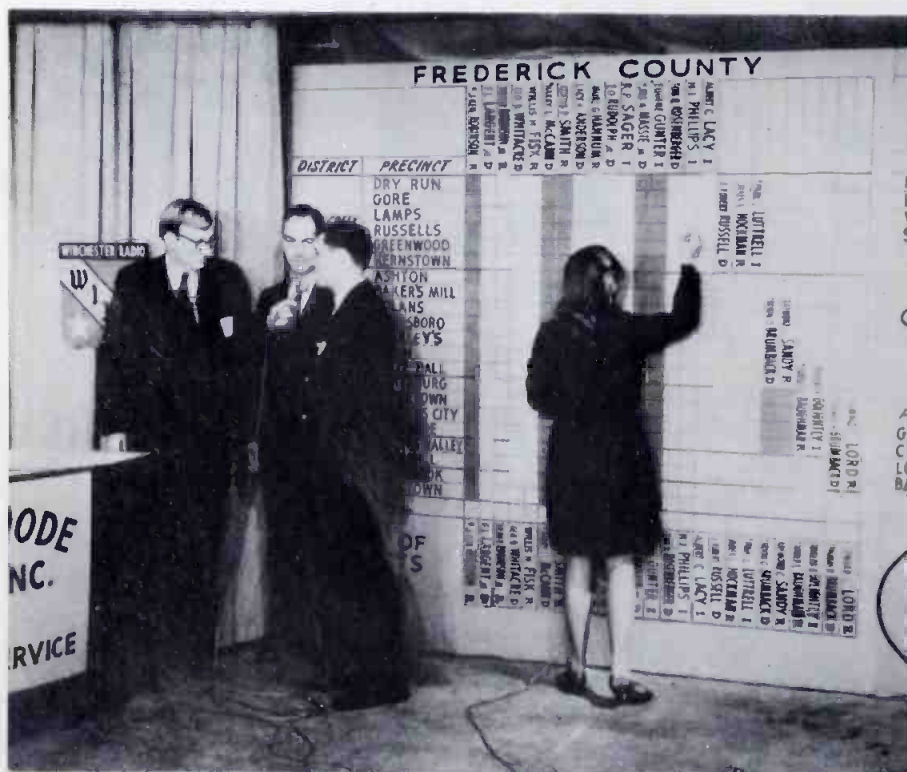


Fig. 2 The large totals board shown here is being used to report results to cable TV viewers and radio listeners. Both staffs can combine, but care should be taken so as not have the radio listener being told to "look" at the vote totals.



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# Automation can assist your election reporting

By Morris Courtright\*

Here we are once again in the midst of preparations for that uniquely American quadrennial circus called elections. And, for the broadcaster, this particular replay is especially interesting, to use a polite term.

Somehow or other the offering of political advertising at the lowest unit rate regardless of time or frequency takes the edge off the desire to invest in even a moderately sophisticated system to tabulate election results. But, be that as it may, all stations will shortly be involved in the hassle of gathering and broadcasting the returns for every office from that of President to that of local dog catcher.

Familiar to all of us are the efforts of the networks and many large market stations to not only report results as fast as possible, but also to even predict the outcome of the various races based on early voting trends compared to past trends. Paced by the spinning tapes, riffling cards and blinking lights of sundry computer systems, vote totals will be mastigated, analyzed and ballyhoosed, not only by candidate, but by election district, demographic group, voter heritage and, perhaps, even by the type of polling place and weather at the time of voting.

Which is all very well, but given the current state of small to medium market radio and TV stations across the land, the problem is

rather academic for these, the majority of stations. Beset by renewal difficulties, equal time pressures and similar familiar rulings and requirements most stations are as interested in a sophisticated, expensive computerized voting analysis system as the dust bowl farmer would be in the latest freeze dried food processing gear.

Nevertheless, the job of election coverage remains and as usual the ever resilient broadcaster will shoulder his burdens and deliver the goods. The crux of the matter here is how to do the best job within the limits of the resources available. And that is our goal, help find the best way for your station to do the job.

## Is Automation Economical?

Admittedly automation oriented, we immediately seek succor from our hard working companion the computer, and a field of endeavor called statistical data processing. And as rapidly as we petition this electronic font of all wisdom we stumble over our other familiar small market companion called economics. In short, can we afford it? Thus, as in most engineering troubleshooting tasks, when all else fails read the instruction book.

The first step, then, is defining the goals to be achieved. Self evident is the primary goal: report who was elected to what by how much. The second well acknowledged goal is to be first in your area to make the report. Third, perhaps, is to be able to accurately predict the winner. If one is not too choosy, the first goal can be achieved by merely waiting for the election



Fig. 1 Traditional direct method of reporting (and some of its inherent problems).

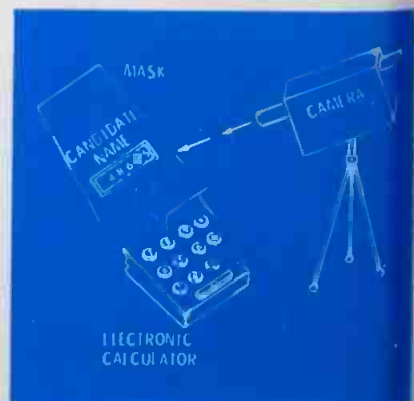


Fig. 2 A simple, inexpensive way to have a sophisticated looking display of election results with easily changeable totals.

\*BE Automation Editor and head of Courtright Engineering, Flagstaff, Ariz.

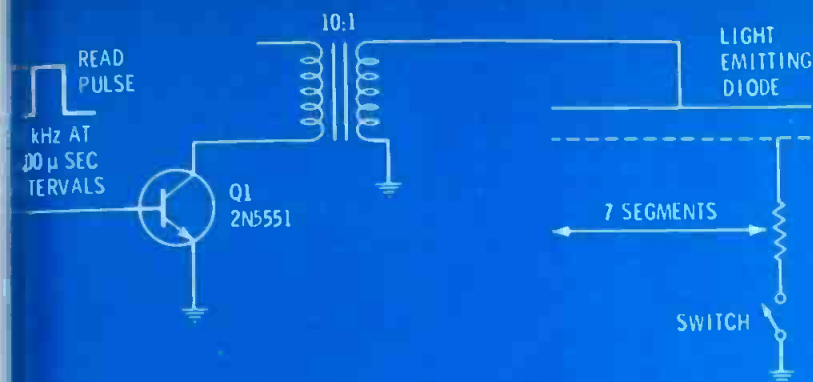


Fig. 3 Banks of LED's can be wired with switches to manually control numbers displayed.

mark to release results. Of course, it completely ignores the second goal since such releases can take days or weeks; besides what station wants to be beat to a headline by the local newspaper.

The third goal is the one that everybody would like to meet, but it is also the one that entails the greatest cost.

#### Vote Predictions

So we will take what is often called the usual engineers approach and start at the finish. That is, what is involved in predicting results.

Obviously, you will need a mighty good memory and more than a modicum of intuition, or else a computer. The memory and intuition we can not speak for, but the machine can be provided by almost any data processing service at a cost of a few dollars to a few hundred depending on the trade-off arrangements made by your car salesman. However, before becoming overconfident in the machine, we must realize this is merely the beginning.

Before you can do any predicting you must have something called a stochastic (or probalistic) model of the variables affecting the election process. And, this is where the fun begins! Unless your computer service happens to have a handy program on the shelf, which is doubtful, you will soon learn how expensive it can be to develop such a model. So, as far as small to medium market broadcasting we can have predictions to intuition and the networks. Don't leave the

computer, however, it can still be useful as we will see later.

#### Tabulating Results

The goal of timeliness of reporting, often achieved by being first to the phone booth with a dime, can be furthered by the methods used to gather and tabulate voting results. So, this is where we will concentrate our efforts: ways and means of tabulating election results.

Gathering returns, the basis for any tabulation, varies widely from state to state and even precinct to precinct, and the method actually employed at your station is probably best left to the choice of local management who knows the particular situation and arrangements. In general, however, it usually takes the form of staff members joining the party poll watchers and obtaining individual results as they are announced in the precincts. It is what we do with the raw data when it comes in that makes the difference in reporting.

The simplest approach, long used in small markets, ranges from pencil and paper to grease pencil and tote board. Perhaps the most direct approach, it is limited only by the speed and accuracy of your addition and your ability to make mental comparisons to determine, or guess, trends.

Given an adequate excess of dollars, data terminals could be installed to eliminate the phone call, but for our purposes the telephone call or two-way radio contact is probably the method that will be

used. Thus, we finally get down to data handling techniques. Using the tote board approach results can be totalled and easily read, displayed or announced over the air. While rather unsophisticated, this will satisfy the goal of reporting returns and will be widely used.

#### Enter Automation

The first step in "automating" is use of adding machines or small calculators. Not only are they handy for the addition, the calculators can be also the source of a nice display. Using one of the many small electronic calculators such as Sharp, Canon or Heathkit with nixie or neon tube display, you have an inexpensive, yet sophisticated looking display for small market TV. Place a black mask around the display area, focus your camera on it, and superimpose or key it to the bottom of your video. A neat, simple and cheap way to get an impressive looking display that changes as you total in new results.

#### Visual

##### Display Systems

For the more technically inclined staff, one of the numerous digital display tubes can be built into displays with the tube number controlled merely by switching rather than a complex decoder. A bank of these built into a panel along with candidates names provides a professional looking display with all the "automation" provided by the operator. Light emitting diodes, for example, can be arranged with simple switches to ground the desired segments to make the numerical display.

The ultimate, of course, would be to drive such displays with a computer or display the computer output on a CRT device. Again, methods that will not find widespread use in the small to medium market.

#### Vote Tabulations

In these markets, about the only question left is what to do with the vote data between receipt of the telephone call from the polls and broadcast of the data. Here, machines can help without costing an entire arm and leg. Use of adding

machines and desk calculators is rather obvious, so we will be concerned here with computers and data processing service.

Any computer can be programmed to add and keep track of different totals and provide tabulations of these totals. (Remember, the expensive trouble develops only when we try to get the machine to predict results for us.) So most any data processing service can easily provide the means of computing vote tabulations for the small station. Two reasonable approaches are possible: 1) Do all the work at the data center and phone information back and forth; 2) install a terminal in the station so the operator can input data directly and get answers back right in the station. Considering the goal of trying to be first with the results, the second approach is well worth investigating.

The actual program and computer used will vary widely depending on the brand of hardware and soft-

ware used by the data center; however, the most common time share language is probably BASIC. Using this and a fictitious three candidate race in a four precinct district the computer program can be developed.

First we envision a  $3 \times 6$  matrix where each of the three rows is for a candidate, the first column for candidates names, columns 2 to 5 for precinct totals and column 6 for the district total. When a precinct total is phoned in, the operator types in the data. The computer then stores it in the appropriate spot in the matrix, computes the new totals, and immediately prints out a tabulation which can be read or displayed on the air.

A partial program would look something like this; where P is the precinct vote, C the candidates name and T the total vote:

```
50 FOR L = 1 TO 3
51 PRINT C(L)$
52 FOR K = 1 TO 4
53 PRINT "PRE-
```

```
CINCT"; K; "VOTES";
54 INPUT P(L,K)
55 LET T(L) = T(L)
P(L,K)
56 NEXT K
57 NEXT L
58 FOR M = 1 TO 3
59 PRINT C(M)$, T(M)
60 PRINT
61 NEXT M
```

The program is easily expandable, and should be, to include more candidates names and totals as well as various conversational statements to the operator telling him what to do.

#### Automated On-Air Operations

Last, but by no means least, are those stations who have automated the on-air operations. Assuming one method or another has been used to gather and tabulate the election results, the question now is getting them on the air through the tight format automated programming. Here the solutions range from live feed override, if your system has it, to a manual fade or even panic stop in the case of simpler systems. In most cases, however, it will be a case of fading the automation down, hitting the stop button, reading the results, hitting the start button and bringing the automation back up.

The stop and start button of most automation systems can be remotely wired so that a mic and control switches can be placed most anywhere in the station. Another possibility, if delay is not critical, is to record the results on a cart and have the automation call it up in turn. The handiest one, though, seems to be the buzzer device offered by at least one manufacturer for his system. This device allows you to dial up the automation from any phone and take over live remote merely by buzzing the automation.

So, as with any automation task, processing and handling of election results can be accomplished in seemingly myriad of ways from simple to sublime. The tools are available; you need only select those that will work best in your market.

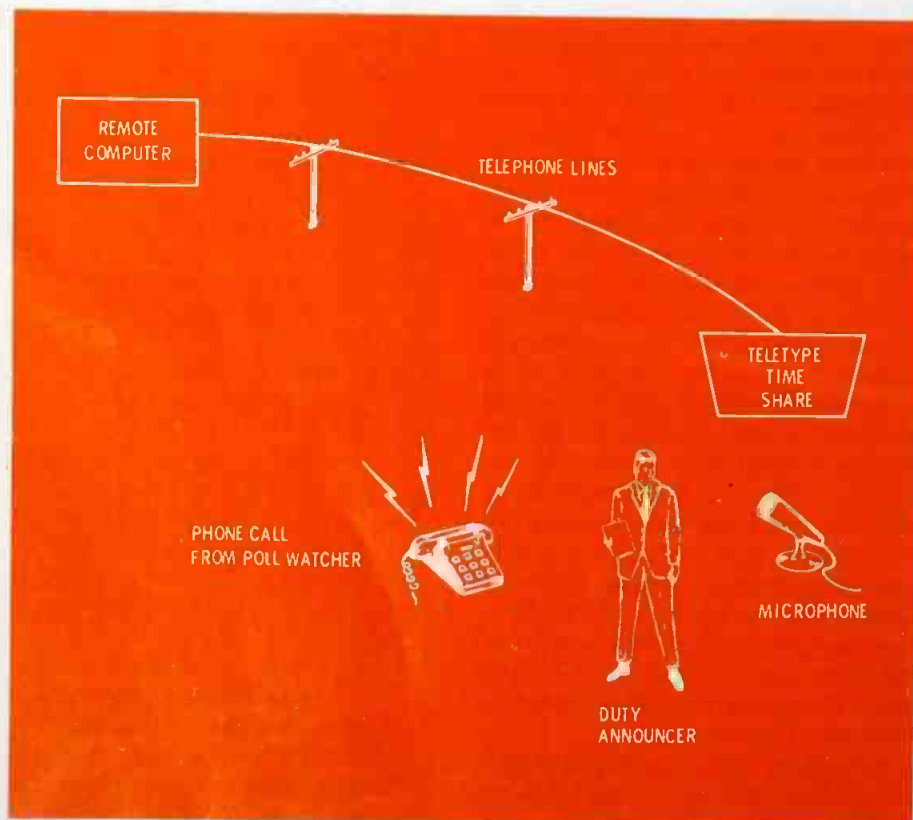


Fig. 4 Two approaches: Install a terminal in the station so the operator can input data directly and get answers immediately on updated totals; or phone information back and forth.

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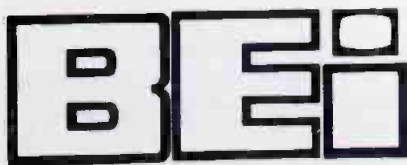
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# A Review of the New AM, FM Operator Rules

The Commission has adopted new rules permitting the use of operators holding classes of license below first-class radiotelephone, for non-directional AM stations with transmitter power in excess of 10 kw, for most AM stations employing directional antennas, and for FM stations with transmitter power in excess of 25 kw. At the same time, the new rules proposed additional requirements on all AM and FM broadcast stations which are intended to bring about improved operating and maintenance practices.

The Commission acted in response to a petition by the National Association of Broadcasters (NAB). The Engineering Department of NAB has prepared a summary of the new requirements, which is reprinted below by permission. In addition, BROADCAST ENGINEERING has prepared (1) a quick reference table to provide a ready means for each licensee to determine both the new requirements and those which continue in effect for his station, and (2) a simple step-by-step instruction sheet which **must be posted at the operating position** wherever an operator of lesser grade is employed as the duty operator.

Effective July 14, 1972, the Commission has amended the appropriate Rules concerning the operator licensing requirements for AM and FM broadcast stations. The new rules provide basically for the following:

*Text compiled by the Engineering Staff of the NAB and reprinted here by their permission. Data by A.D. Ring & Associates.*

## General Requirements

### Non-Directional Low-Power AM & FM Stations

Stations utilizing non-directional antenna systems and operating with transmitter powers of 10 kilowatts or less, or FM stations with transmitter output power 25 kilowatts or less—no changes from present requirements; i.e., duty operators must have third class permits endorsed for broadcast station operation (or higher) and at least one first class radiotelephone operator employed either full time or on a contract basis.

### Directional Stations With Critical Antenna Systems

Stations employing directional antenna systems whose station authorization specifies tolerances for antenna and sample loop current ratios and phase angle relationships which are less than 5 percent and 3 degrees, respectively, must have a first class radiotelephone licensed operator on duty at all times. (No operator relaxation is contemplated for this type of station.)

### Directional and High-Power AM/FM Stations

Standard broadcast stations employing transmitter output power in excess of 10 kilowatts, or employing directional antenna systems, or FM broadcast stations with power greater than 25 kilowatts, may employ operators holding a third class permit endorsed for broadcast station operation for the routine operation of the station, providing the following conditions are met:

- (i) The employment of at least one first class radiotelephone licensed operator on a full time basis. One such operator shall be designated in writing as the station's chief operator with specified responsibilities.

- (ii) That inspections of the transmitting apparatus shall be made within two hours after the commencement of operation with or change in directional radiation pattern.
- (iii) That a review of the station's completed operating logs be made promptly by the chief operator.
- (iv) That switching to or between directional radiation pattern does not involve adjustment of the transmitter tuning or phasing controls.
- (v) That the station make at least monthly field strength measurements at the licensed monitoring points.
- (vi) That a partial proof of performance for each directional radiation pattern be made on an annual basis.

Standard broadcast stations employing directional antenna systems that do not desire to use lesser grade operators and FM broadcast stations with power greater than 25 kilowatts will not be required to comply with the above provisions.

## Operator Requirements And Responsibilities (AM)

### Non-Directional

A station using a non-directional antenna with authorized power of 10 kilowatts or less shall have at least one first class radiotelephone operator, readily available at all times, either in full time employment, or, in the alternative, the licensee may contract in writing for the services on a part-time basis of one or more such operators. Signed contracts with part-time operators shall be kept in the files of the station and shall be made available for inspection upon request by an authorized representative of the Commission. A signed copy of contracts shall be forwarded to the Engineer in Charge of the radio dis-

Revised Section 73.93(g) of the Commission's rules now requires that a notice similar to the following be posted at the operating position of all radio stations whenever a lesser grade operator is on duty:

Duty operators holding second-class licenses or third-class permits endorsed for broadcast operation are permitted to make only the following adjustments:

1. Turn the transmitter on and off
2. Compensate for voltage fluctuations in the primary power supply (to maintain station power within the licensed value)
3. Maintain modulation levels within prescribed limits
4. Change power as required by the license
5. Change from directional to non-directional operation and vice versa, or change from one directional pattern to another. (You are not permitted to tune the transmitter final amplifier or to make any adjustment to the antenna phasor.)

The transmitter must be turned off immediately whenever the limits listed below are exceeded, if a first-class radiotelephone operator is not present:

#### Non-Directional Operation (AM):

##### Antenna Base Current\*

Night			Day		
Lower Limit	Licensed Value	Upper Limit	Lower Limit	Licensed Value	Upper Limit
_____ A	_____ A	_____ A	_____ A	_____ A	_____ A

#### Directional Operation (AM):

##### Common Point Current\*

Night			Day		
Lower Limit	Licensed Value	Upper Limit	Lower Limit	Licensed Value	Upper Limit
_____ A	_____ A	_____ A	_____ A	_____ A	_____ A

##### Antenna or Remote Antenna Current\*

	<u>Night</u>			<u>Day</u>		
	<u>Lower</u>	<u>Licensed</u>	<u>Upper</u>	<u>Lower</u>	<u>Licensed</u>	<u>Upper</u>
<u>Tower No.</u>	<u>Limit</u>	<u>Value</u>	<u>Limit</u>	<u>Limit</u>	<u>Value</u>	<u>Limit</u>
1	_____ A	_____ A	_____ A	_____ A	_____ A	_____ A
2	_____	_____	_____	_____	_____	_____
3	_____	_____	_____	_____	_____	_____
4	_____	_____	_____	_____	_____	_____
etc.	_____	_____	_____	_____	_____	_____

\*The following base current for non-directional operation and the common point current must be no more than 5% below the licensed value. Antenna or remote antenna current must be no more than 5% either above or below the licensed value.

radiotelephone operator shall record the following observations in the station maintenance log for each directional radiation pattern used:

- (i) The effectiveness of this requirement is suspended pending final action in Docket #18471
- (ii) Section 73.93(h)(1) requires that the indications at the transmitter, if a directional antenna station, of the common point current, base currents, phase monitor sample loop currents and phase indicators shall be read and entered in the operating log once each day for each pattern. These readings must be made within two hours after the commencement of operation for each pattern.

- (iii) Common point current.
- (iv) Antenna base currents.
- (v) Sample loop currents or remote antenna base currents and phase monitor indications.
- (vi) Antenna base current ratios, and remote antenna or sample loop current ratios, and the deviations in these ratios, in percent, from the licensed values.

A station authorized to use the same directional radiation pattern during all hours of operation shall record these observations with successive readings not less than 12 hours apart.

- (4) A partial proof of performance shall be made once each calendar

year, with intervals between successive proofs not to exceed fourteen (14) months. The report of such proof measurements shall be prepared and filed as specified in paragraph (b) of Section 73.47.

- (5) Field strength measurements shall be made at the monitoring points specified in the station authorization at least once each 30 days unless more frequent measurements are required by such authorization. The results of these measurements shall be entered in the station maintenance log. The licensee shall have readily available, and in proper working condition, field strength measuring equipment to perform these measurements.

\*The partial proof of performance is to consist of at least 10 field strength measurements including the point designated as a monitoring point, taken at a distance of from 2 to

in which the station is located within three (3) days after the contract is signed.

A station using a non-directional antenna, during periods of operation with authorized power in excess of 10 kilowatts, may employ operators with third class permits endorsed for broadcast for routine operation of the transmitting system if the station has in full-time employment at least one first class radiotelephone operator.

#### Directional

A station using a directional antenna system, which is required by station authorization to maintain the ratios of the currents in the elements of the system within a tolerance which is less than 5 percent or the relative phases of those currents within a tolerance which is less than 3 degrees shall employ first class radiotelephone operators who shall be on duty and in actual charge of the transmitting system during the hours of operation with such a directional radiation pattern.

A station whose authorization does not specifically require the maintenance of phase and current relationships within closer tolerances than specified above may employ third class permit holders with broadcast endorsement for routine operation of the transmitting system if the following conditions are met:

The station must have in full-time employment at least one first class radiotelephone operator.

The station shall be equipped with a type-approved phase (antenna) monitor fed by a sampling system installed and maintained pursuant to accepted standards of good engineering practice.

At least once each day, 5 days each week, unless required more frequently by the terms of the station authorization, or, rules governing operation by remote control, a first class

10 miles from the antenna on each radial measured in connection with the latest complete adjustment of the directional antenna system. These measurements shall be analyzed in the manner prescribed in Section 73.186 of the rules.

An operator holding a third class permit endorsed for broadcast station operation, may make adjustments only of external controls, as follows:

- (1) Those necessary to turn the transmitter on and off;
- (2) Those necessary to compensate for voltage fluctuations in the primary power supply;
- (3) Those necessary to maintain modulation levels of the transmitter within prescribed limits;
- (4) Those necessary to effect routine changes in operating power which are required by the station authorization;
- (5) Those necessary to change between non-directional and directional or between differing radiation patterns, provided that such changes require only activation of switches and do not involve the manual tuning of the transmitter final amplifier or antenna phasor equipment. The switching equipment shall be so arranged that the failure of any relay in the directional antenna system to activate properly will cause the emissions to terminate.

It is the responsibility of the station licensee to insure that each operator is fully instructed in the performance of all the above adjustments, as well as in other required duties, such as reading meters and making log entries. Printed step-by-step instructions for those adjustments which the lesser grade operator is permitted to make, and a tabulation or chart of upper and lower limiting values of parameters required to be observed and logged, shall be terminated immediately whenever the transmitting system is observed operating beyond the posted parameters, or in any other manner inconsistent with the rules or the station authorization, and the above adjustments are ineffective in correcting the condition of improper operation, and a first class radiotelephone operator is not present.

When the lesser grade operators are used for any period of operation using authorized power in excess of 10 kilowatts, or using a directional radiation pattern, the station licensee shall designate one first class radiotelephone operator in full-time employment as the chief operator who, together with the licensee, shall be responsible for the technical operation of the station. The station licensee shall

notify the Engineer in Charge of the radio district in which the station is located of the name and license number of the designated chief operator. Such notification shall be by letter within three days of such designation. A copy of the notification shall be posted with the chief operator's license.

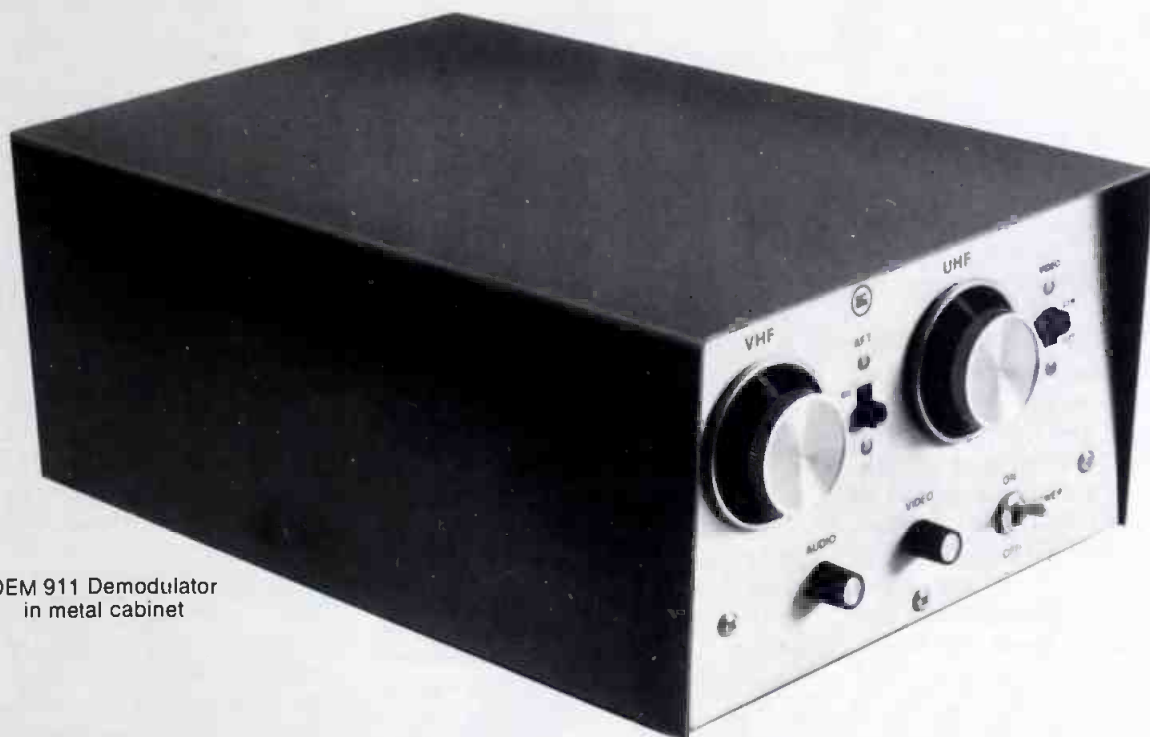
- (1) An operator designated as chief operator for one station may not be so designated concurrently at any other standard broadcast station.
- (2) The station licensee shall vest such authority in, and afford such facilities to the chief operator as may be necessary to insure that the chief operator's primary responsibility for the proper technical operation of the station may be discharged efficiently.
- (3) At such times as a regularly designated chief operator is unavailable or unable to act as chief operator (e.g., vacations, sickness), the station licensee shall designate another first class radiotelephone operator as acting chief operator on a temporary basis. Within three days of the date such action is taken, the Engineer in Charge of the radio district in which the station is located shall be notified by the licensee by letter of the name and license number of the acting chief operator, and shall be notified by letter, again within three days of the date when the regularly designated chief operator returns to duty.
- (4) The designated chief operator may serve as a routine duty transmitter operator at any station only to the extent that he does not interfere with the efficient discharge of his responsibilities as listed below.
  - (i) The inspection and maintenance of the transmitting system including the antenna system and require monitoring equipment.
  - (ii) The accuracy and completeness of entries in the maintenance log.
  - (iii) The supervision and instruction of all other station operators in the performance of their technical duties.
  - (iv) A review of complete operating logs to determine whether technical operation

STANDARD BROADCAST				
	Non-Directional (Transmitter 10 kW or less)	Non-Directional (Transmitter over 10 kW)	Directional (Unrestricted)	Directional (Restricted License)*
Minimum Grade Duty Operator	3rd Class Permit Broadcast Endorsement		3rd Class Permit Broadcast Endorsement	First Phone
Operator Instruction	Licensee Responsible to Insure That Duty Operator is Properly Instructed Printed Step-By-Step Instructions For Reduced-Grade Duty Operator, Including Table or Chart of Permissible Parameter Values, Must Be Posted at Operating Position			Licensee Responsible To Insure that Duty Operator is Properly Instructed
Supervisory Operator	Chief Operator (First Phone License) Must Be Designated			
Operating Log	Routine Entries By Duty Operator If Remote Antenna Ammeter is Defective Base Current Reading By 1st Class Operator	Routine Entries By Duty Operator If Remote Antenna Ammeter is Defective, Base Current Reading By 1st Class Operator, Chief Operator Must Review and Sign Oper. Log Daily		All Entries By Duty Operator
Maintenance & Maintenance Log Performance Measurements Field Strength Measurements	Maintenance & Maintenance Log: First-Class Operator Performance Measurements By a First-Class Operator		Maintenance and Maintenance Log: First-Class Operator Field Strength Measurements At Monitoring Points Monthly (More frequently if required by license) by a First- Class Operator; Annual Partial Proof of Performance by a First-Class Operator; Performance Measurements By a First-Class Operator	Maintenance and Maintenance Log: First-Class Operator Field Strength Measurements (Where Required) By a First-Class Operator; Performance Measurements By a First-Class Operator
Inspections	Daily, 5 Days Each Week By A First-Class Operator		* Daily, Five Days Each Week By a First-Class Operator And Record in Maintenance Log For Each Pattern: (i) Common Point Current; (ii) Antenna Base Current; (iii) Sample Loop Currents or remote antenna base current & Phase Monitor Indic.; (iv) Antenna Base Current Ratios, etc.	* Daily, 5 Days Each Week By A First-Class Operator

\*Restricted License: Requiring Maintenance of current ratio tolerances to less than 5% or phase angle tolerances to less than 3°

\* The Inspection Requirements for a Directional Antenna operated by Remote Control are Unchanged:  
Daily, Seven Days Each Week by a First-class operator for each pattern, within two hours of commencement of operation for each pattern

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of the station has been in accordance with the rules and terms of the station authorization. After review, the chief operator shall sign the log and indicate the date of such review. If the review of the operating logs indicates technical operation of the station is in violation of the rules or the terms of the station authorization, he shall promptly initiate corrective action. The review of each day's operating log shall be made within 24 hours, except that, if the chief operator is not on duty during a given 24 hour period, the logs must be reviewed within two hours after his next appearance for duty. In any case, the time before review shall not exceed 72 hours.

The operator on duty at the transmitter or remote control point, may, at the discretion of the licensee and the chief operator, if any, be employed for other duties or for the operation of another radio station or stations in accordance with the class of operator's license which he holds and the rules and regulations governing such other stations: **Provided, however, that**

such other duties shall not interfere with the proper operation of the standard broadcast transmitting system and keeping of required logs.

At all standard broadcast stations, a complete inspection of the transmitting system and required monitoring equipment in use, shall be made by an operator holding a first class radiotelephone license at least once each day, 5 days each week, with an interval of no less than 12 hours between successive inspections. This inspection shall include such tests, adjustments, and repairs as may be necessary to insure operation in conformance with the provisions of Rules and the current station authorization.<sup>4</sup>

<sup>4</sup>The Rules governing the so-called 2-hour directional antenna inspection requirement have been amended to specify that such inspections be made by the holder of a first-class radiotelephone license. The logging rules have also been amended to require the chief operator to review, sign, and date the results of the review of the operating log.

#### Maintenance Logging Requirements

The amended rules require that the common point current, antenna base currents, sample loop currents or remote base currents, phase indications, and antenna base and sample loop current or

remote antenna base current ratios and the percentage of deviation of these ratios from the authorized values as well as the results of field strength measurements at the monitoring points specified in the station authorization be entered in the maintenance log. This is in addition to all other required entries.

#### Operator Requirements And Responsibilities (FM)

A station with authorized transmitter output power of 25 kilowatts or less shall have at least one first class radiotelephone operator readily available at all times, either in full time employment, or, in the alternative, the licensee may contract in writing for the services on a part-time basis of one or more such operators. Signed contracts with part-time operators shall be kept in the files of the station and shall be made available for inspection upon request by an authorized representative of the Commission. A signed copy of contracts shall be forwarded to the Engineer in Charge of the radio district in which the station is located within three (3) days after the contract is signed.

A station with authorized transmitter output power in excess of 25 kilowatts may employ first class radiotelephone operators, second class operators, or operators with the third class permits endorsed for broadcast station operation for routine operation of the transmitting system if the station has in full time employment at least one first class radiotelephone operator and complies with the following:

- (1) The station licensee shall designate one first class radiotelephone operator as the chief operator, who, together with the licensee, shall be responsible for the technical operation of the station. The station licensee shall notify the Engineer in Charge of the radio district in which the station is located of the name and license number of the designated chief operator. Such notification shall be by letter within three (3) days of such designation. A copy of the notification shall be posted with the chief operator's license.
- (2) An operator designated as chief operator for one station may not be so designated concurrently

COMMERCIAL FM			
		Authorized Transmitter Output Power: 25 kw or less	Authorized Transmitter Output Power: Over 25 kw
	Minimum Grade Duty Operator	3rd Class Permit Broadcast Endorsement	3rd Class Permit Broadcast Endorsement
	Operator Instruction	Licensee Responsible to Insure That Duty Operator is Properly Instructed Printed Step-By-Step Instructions For Reduced-Grade Duty Operator, Including Table or Chart of Permissible Parameter Values, Must Be Posted at Operating Position	
	Supervisory Operator		Chief Operator (First Phone License) Must Be Designated
	Operating Log	Routine Entries By Duty Operator	Routine Entries By Duty Operator Chief Operator Must Review and Sign Operating Log Daily
	Maintenance & Maintenance Log Performance Measurements Field Strength Measurements	Maintenance & Maintenance Log: First-Class Operator Performance Measurements By a First-Class Operator	
	Inspections	Daily, 5 Days Each Week By A First-Class Operator	

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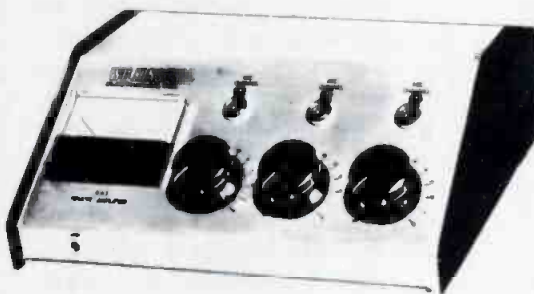
AM TRANSMITTERS - 250 W  
1 KW - 5 KW - 10 KW - 50 KW



LIMITERS - Mono and Stereo



ACC AMPLIFIER - Mono and Stereo



REMOTE AMPLIFIER



FM TRANSMITTER - 10W - 50W  
250W - 1 KW - 2.5 KW - 5 KW  
7.5 KW - 10 KW - 20 KW - 40 KW



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rently at any other FM broadcast station.

- (3) The station licensee shall vest such authority in, and afford such facilities to the chief operator as may be necessary to insure that the chief operator's primary responsibility for the proper technical operation of the station may be discharged efficiently.
- (4) At such times as a regularly designated chief operator is unavailable or unable to act as chief operator (e.g., vacations, sickness), the station licensee shall designate another first class radiotelephone operator as acting chief operator on a temporary basis. Within three days of the date such action is taken, the Engineer in Charge of the radio district in which the station is located shall be notified by the licensee by letter of the name and license number of the acting chief operator, and shall be notified by letter, again within three days of the date when the regularly designated chief operator returns to duty.
- (5) The designated chief operator may serve as a routine duty transmitter operator at any station only to the extent that it does not interfere with the efficient discharge of his responsibilities as listed below.

- (i) The inspection and maintenance of the transmitting system, including the antenna system and required monitoring equipment.
- (ii) The accuracy and completeness of entries in the maintenance log.

(iii) The supervision and instruction of all other station operators in the performance of their technical duties.

(iv) A review of completed operating logs to determine whether technical operation of the station has been in accordance with the rules and terms of the station authorization. After review, the chief operator shall sign the log and indicate the date of such review. If the review of the operating logs indicates technical operation of the station is in violation of the rules or terms of the station authorization, he shall promptly initiate corrective action. The review of each day's operating logs shall be made within 24 hours, except that, if the chief operator is not on duty during a given 24-hour period, the logs must be reviewed within two hours after his next appearance for duty. In any case, the time before review cannot exceed 72 hours.

An operator holding a second class license or third class permit endorsed for broadcast station operation, may make adjustments only of external controls, as follows:

- (1) Those necessary to turn the transmitter on and off;
- (2) Those necessary to compensate for voltage fluctuations in the primary power supply;
- (3) Those necessary to maintain modulation levels of the trans-

mitter within the prescribed limits.

It is the responsibility of the station licensee to insure that each operator is fully instructed in the performance of all of the above adjustments as well as in other required duties, such as reading meters and making log entries. Printed step-by-step instructions for those adjustments which the lesser grade operator is permitted to make, and a tabulation or chart of upper and lower limiting values of parameter required to be observed and logged, shall be posted at the operating position. The emissions of the station shall be terminated immediately whenever the transmitting system is observed operating beyond the posted parameters, or in any other manner inconsistent with the rules or the station authorization and the above adjustments are ineffective in correcting the condition of improper operation and a first class radiotelephone operator is not present.

The operator on duty at the transmitter site or remote control point, may, at the discretion of the licensee and the chief operator, if any, be employed for other duties or for the operation of another radio station or stations in accordance with the class of operator's license which he holds and the rules and regulations governing such other stations; **Provided**, however, that such other duties shall not interfere with the proper operation of the transmitting system and keeping of required logs.

At all FM broadcast stations, a complete inspection of the transmitting system and required monitoring equipment in use shall be made by an operator holding a first class radiotelephone license at least once each day, 5 days a week with an interval of not less than 1 hour between successive inspections. This inspection shall include such tests, adjustments, and repairs as may be necessary to insure operation in conformance with the provisions of this subpart and the current station authorization.

### Operating Log

The amended rules require that each completed operating log shall bear a signed and dated notation by the station's chief operator of the results of the review of that log.

EDUCATIONAL FM				
	Authorized Transmitter Output Power: 10 watts or less	Authorized Transmitter Output Power: 10 watts up to 1 kw	Authorized Transmitter Output Power: Over 1 kw up to 25 kw	Authorized Transmitter Output Power: Greater than 25 kw
Minimum Grade Duty Operator	Third Class Permit Broadcast Endorsement			3rd Class Permit Broadcast Endorsement
Operator Instruction	Licensee Responsible to Insure That Duty Operator is Properly Instructed Printed Step-By-Step Instructions for Reduced-Grade Duty Operator, Including Table or Chart of Permissible Parameter Values, Must Be Posted at Operating Position			
Supervisory Operator				Chief Operator (First Phone License) Must Be Designated
Operating Log	Routine Entries By Duty Operator	Routine Entries By Duty Operator	Routine Entries By Duty Operator	Routine Entries By Duty Operator Chief Operator Must Review and Sign Operating Log Daily
Maintenance & Maintenance Log Performance Measurements Field Strength Measurements	Maintenance and Maintenance Log: Second-Class Radiotelephone or Radiotelegraph Operator Performance Measurements Not Required	Maintenance and Maintenance Log: Second-Class Phone Operator Performance Measurements By A Second-Class Phone Operator	Maintenance & Maintenance Log: First-Class Operator Performance Measurements By a First-Class Operator	
Inspections	None	Daily, Five Days Each Week By A Second-Class Telephone Operator	Daily, 5 Days Each Week By A First-Class Operator	

# Preview of TV at the summer olympics

Joseph Roizen

television coverage of the quadrennial Olympic games has become a vast undertaking, that it actually requires the four years between the events to get ready for the succeeding one.

Unlike the situation in Mexico, West Germany has a well developed national network, known as the A.R.D., which operates nine independent regional broadcasting systems on a non-commercial basis. This extensive network is supported by the federal government, mainly through the sale of television licenses to the more than fifteen million owners of home television receivers.

The second network, Z.D.F., which is purely commercial reaches the same viewers through eighty major transmitters and over three hundred satellites. There is even a

growing number of third network stations operated by the A.R.D. as well. German television uses the 625 line, fifty field, CCIR standard and the PAL color system.

In order to accommodate the Olympic television requirements, a new agency consisting of representatives from both the A.R.D. and Z.D.F. was set up. This organization, which is based in Munich is known as the D.O.Z., and is headed by two eminent veterans of the television industry, Dr. Walter Schwarz, Vice President of Engineering and Carlheinz Mandl, Chief Engineer. Both Dr. Schwarz and Mr. Mandl made extensive investigations of the technical set up in Mexico City during that Olympiad, before returning to Munich to begin planning this year's television coverage.

The Munich Games will undoubtedly surpass all previous records as far as television coverage is concerned. The German Olympic Committee has already assembled the largest technical crew with the most expensive equipment ever consigned to an international event. The most modern technology from both at home and abroad is being shaped with Teutonic thoroughness into a communication conglomerate that staggers the imagination. A hundred and fifty color cameras spread over thirty-three venues, some of which are nearly 600 miles from the main site in Munich, will feed a specially built television center where 85 quadruplex VTR's and 12 slow motion disc recorders will accumulate, edit, distribute, and disseminate the all color coverage, throughout Europe and to every

## About the author

Joseph Roizen is the President of Telegen, the licensee and distributor of SECAM/60 in North America. Prior to founding Telegen, Mr. Roizen spent over 2 years with Ampex Corporation and four years with the television division of Paramount Pictures. He held various positions from Project Engineer to Manager of Video Products for Ampex International. During this time, Mr. Roizen contributed to the development of color television and video tape recording equipment, particularly in the editing and color recording areas. He holds a number of patents in these fields.

Starting with the Summer Olympics in Rome in 1960, Mr. Roizen has acted as a technical consultant for six sets of games—the last major activity being at the XIX Olympiad in Mexico in 1968 where he was technical director for Ampex activities involving all networks. He has written over 100 articles which have been published in the major international journals and magazines. He was awarded an Emmy Citation for recording the Nixon/Kruschev debate in Moscow in 1959 and the Wireless World Premium for a paper on color television recording in Britain in 1961.



Fig. 1 Don Schollander, U.S. multiple gold medal winner, in an on the spot interview using the VR-3000 portable VTR. Such scenes will be typical of the 1972 coverage.

**Fig. 2** A typical Olympic setup for electronic editing of daily events into completed evening program for transmission. Conrac monitors are used in this shot for picture quality control.



other continent via microwave networks and simultaneous satellites. The intervening growth of television in the participating countries will guarantee a one billion plus audience to the events that attract international interest. The largest single audience to ever view any public spectacle.

#### **Primary Coverage**

For the first time in the history of the Summer Olympics, television coverage will be entirely in color. The DOZ have installed one hundred and twenty Fernseh KCU-40 and KCR color cameras, which are distributed through twenty-four mobile vans and twelve fixed studios. This equipment will be used to cover the Olympic contests taking place at thirty-three different venues. Most of the locations are within the Oberwiesenfeld complex on the outskirts of Munich. However, most of the aquatic events will take place near Augsburg and Kiel. Relay links ranging up to six-hundred miles will be required to bring those images to the television center.

All of the television pictures from the various venues coming through individual mobile vans or fixed studio installations, will be relayed by microwave units to receivers on the lower deck of the Munich Television Tower (Fernsehturm). This almost 900 foot tower located near the television switching center within the Olympic site, will act as the major relay point for incoming and outgoing signals. The upper deck of the tower adjacent to the television transmitting antenna, will provide a superb platform for a few TV cam-

eras that can scan the whole area from a unique angle.

Signals arriving at the tower will be sent by cable to the DOZ master control room and distributed to individual control rooms set up specifically for various participating networks. At this point images and sound meeting selected national interests are combined and processed for distribution to the appropriate recipients. Processed picture and sound is routed via cable back to the tower and then by microwave to a variety of distribution points.

In addition to the DOZ, who are responsible for origination, recording, and control of the TV signal, another German federal agency, Deutsches Bundespost, handles all of the microwave facilities, that relay the signals to and from the venues and to the national and international links. Microwave signals from the tower will connect with the local television studios in Munich for distribution to the German national networks. Other signals will be relayed to Frankfurt to feed the Eurovision Network for Western Europe and through the switching center in Prague to the Intervention Network of Eastern Europe and the Soviet Union.

Intercontinental communication will be handled by three satellite tracking antennas, located at the Raisting ground station, a short distance from Munich. Back up satellite transmitting facilities, which are now part of the EBU Network, will be available in case of special needs. These tracking stations are located at Goonhilly Downs in the UK, Plumeur Bodou in France, Buitrago in Spain, and Fucino in Italy. Receiving stations

in Asia, Africa, and North and South America will complete the link with the local distribution network.

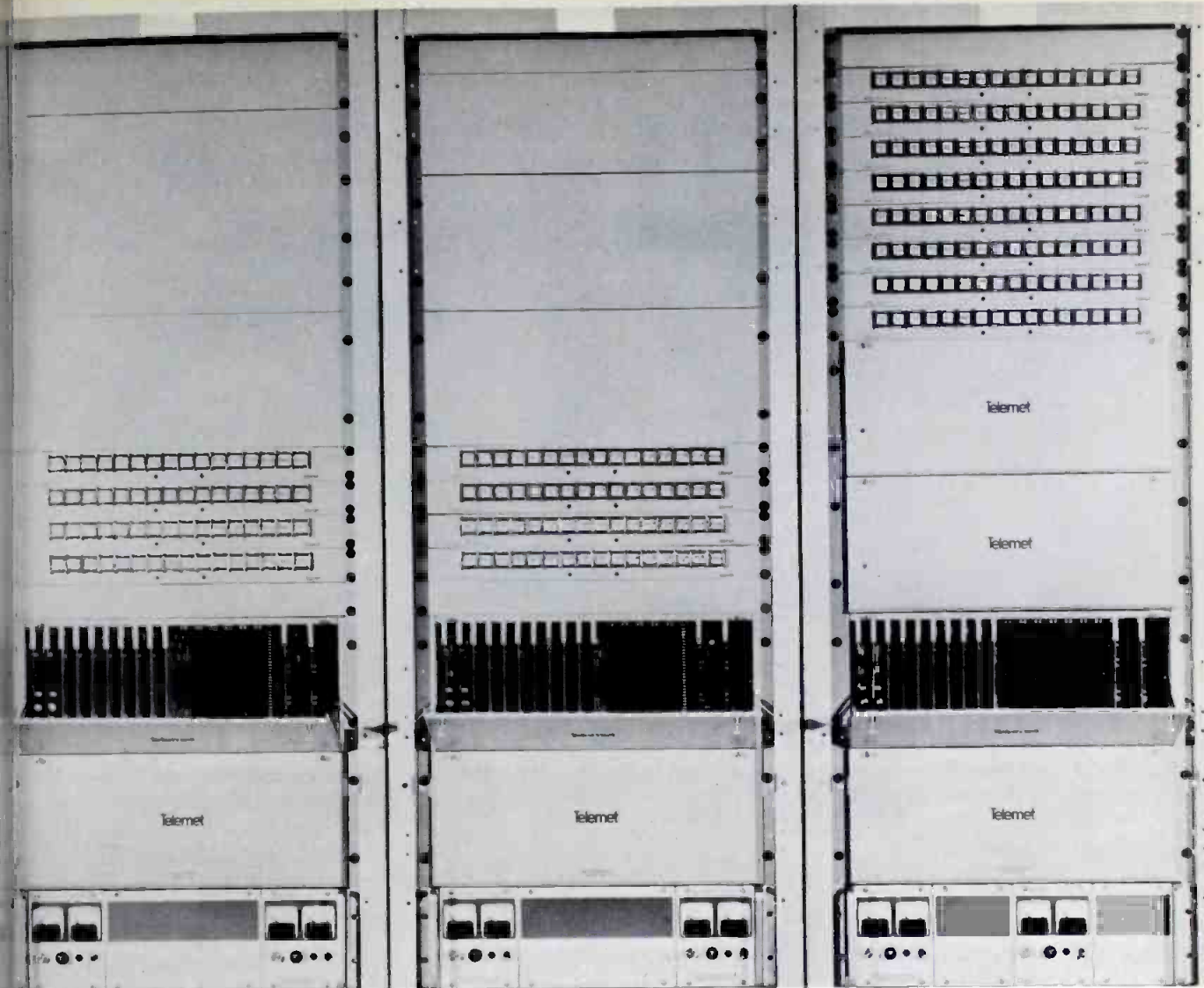
In the United States the AT&T satellite ground station at Andover, Maine will relay the signals to the American Broadcasting Company's New York television control center for distribution on the ABC network. ABC have obtained exclusive coverage rights for the Munich Olympics for four years ago.

#### **Cameras**

The major "workhorse" color camera of the Munich Olympics undoubtedly will be the KCU-40. One-hundred of these units have been delivered by Fernseh GMB, a division of the Bosch Corporation in West Germany. Fernseh have been building television cameras since the early thirties and this is their latest color model which is used in many studios throughout the world. The KCU-40 is a three-plumbicon camera which is capable of producing good pictures in as little as five foot candles of light.

The unique feature in the camera is the use of a separate luminance channel which gives improved definition even though the pickup is only RGB. The improved definition is a combination of minimum optical losses in the beam splitter, very low noise amplifier design and horizontal and vertical aperture correction combined with comb filtering. Like most modern color cameras a KCU-40 can be fitted with variety of zoom lenses and accessories that provide automatic registration, color manipulation without affecting white balance, black level color decontamination and aperture correction. The viewfinder is tiltable and can be set to high peak light output to overcome ambient light conditions. The standard cable for the KCU is on 1/2" in diameter and up to 2500 feet can be used. Under special circumstances a very light 1/4" cable can be substituted for runs up to 300 feet or a 3/4" cable will allow a 3700 foot length to be attached.

Camera frequency response  $\pm 5$  dB to 5 MHz in the luminance channel and  $-1$  dB to 3 MHz in the red channel.  $-4$  dB to 3 MHz



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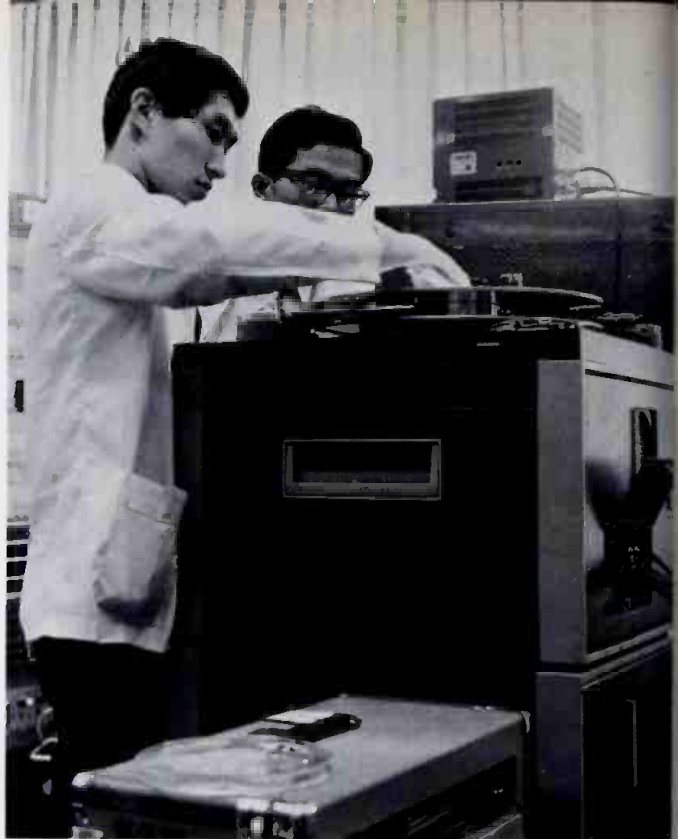
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**Fig. 3** The DOZ have installed two Ampex RA-4000 automated programming editors that use the newly developed address code editing technique. Each frame is assigned a specific number that can be selected by visual readout or by digital pre-selection.



**Fig. 4** The slow motion disc recorder shown here was used by the NHK at the Mexico City Games. This was the first use of color slow and stop motion disc recording at an Olympiad.

the blue channel. With aperture correction the depth of modulation at 400 lines resolution is adjustable to 100 percent. An unweighted signal to noise ratio of 45 dB is also specified.

For more flexible field coverage where hand held portability is required Fernseh have developed the KCR camera twenty of which have been delivered to the DOZ. The KCR uses three 1" plumbicons in a shoulder mount arrangement somewhat similar to the Philips PCP-90. The camera head rests on the cameraman's shoulder with a small adjustable electronic view finder in front of the operators left eye. The use of 1" plumbicons permits the camera to operate with high sensitivity and the full picture quality of studio cameras. Much of the camera is compatible with the KCU units and can therefore under some conditions be connected to a KCU CCU with standard cables. The KCR may be operated either with an interconnecting cable or as an RF "wireless" version.

#### **Video Recording**

Olympic Games occurring in one part of the world unfortunately don't conveniently fall in the right

time slot for viewers in other countries or on other continents. Even where the time for air transmission of the events is convenient the events themselves tend to have peak periods of activity with rather dull waiting times. Television time is very costly and the networks obviously need to pack in the greatest entertainment and information density to keep the viewers interested. To accommodate both of these time difference and time value requirements, most of the Olympic events will be seen by viewers in a recorded and edited form rather than the direct live pick up. To accomplish this, rooms full of video tape recorders registering billions of magnetic wiggles on endless ribbons of brown plastic tape or shining metal discs will be used.

It is estimated over a thousand hours of quadruplex video tape will be required to record the thirty-five events that stretch over the fourteen days. All of the recording will be done on 2" transverse quadruplex video tape recorders most of which have been supplied by Ampex Corporation. The DOZ decided over a year ago to install forty-two AVR-1 recorders which represent the latest third generation

quad VTR's in use today. The AVR-1 has some very unique features which led to its selection primarily it meets or surpasses the technical signal specifications that are now the established norm throughout the broadcasting industry. Tapes made on the AVR-1 can be interchanged and played on other quad machines such as the VR 2000 or the 1200. Through the use of vacuum columns that provide buffer sink in the longitudinal passage of the video tape and a very stable servo operation, rapid start up time is possible. The AVR-1 will produce synchronized stable images in 250 mil. sec. from stand by conditions. This is a particularly useful feature in complex editing of the video tapes that will be generated. The AVR-1 also incorporates time base corrector which permits the machine to handle non-synchronous switches at the input with minimum loss of picture information.

Forty-three other quad recorder of the VR-2000 or 1200 type will also be on site in various recording centers in the DOZ television building. With the AVR-1's, Ampex have supplied several RA-4000 automated editing systems which

work on the new frame address  
 that is rapidly being standard-  
 ized in the video recording field.  
 This technique utilizes a unique  
 number to identify every frame of  
 television information on the video  
 tape. The standard method is to  
 record in the cue track of the VTR  
 a continuous time code of hours,  
 minutes, seconds and frames which  
 can later be used for selection of  
 editing points by digital read out.  
 The address code can be displayed  
 on a monitor by a character genera-  
 tor. The editor then selects the  
 specific edit points by storing these  
 time addresses in a memory de-  
 vice, rehearsing the sequence to  
 make sure it is correct, correcting  
 entry and exit point with frame  
 frame precision then executing  
 the edit by auto manipulation of the  
 VTR's through the RA-4000.

A television trick which seems to  
 have become a popular habit with  
 viewers is instant replay particu-  
 larly with regard to time base expan-  
 sion of the original event through  
 slow and stop motion sequencing.  
 The DOZ have installed six HS-  
 100's to cover their pool require-  
 ments, while an additional six HS-  
 100's are being brought in by other  
 networks to take care of their indi-  
 vidual needs. Considering the price  
 and complexities of this machine,  
 it certainly attests to the value  
 that is placed by program produc-  
 tion people on this capability. The  
 HS-100 stores on magnetic discs 30  
 seconds of elapsed time which is  
 continuously updated as the new  
 television information appears.  
 Four magnetic heads successively  
 record a single field for every rota-  
 tion of the disc, incrementally step-  
 ping from the outer to inner periph-  
 ery while laying down the individu-  
 al fields. On command the operator  
 can stop the recording, thus freez-  
 ing the previous thirty seconds of  
 picture material after which  
 through proper selection and in-  
 dexing the recorded information  
 may be replayed in any of four  
 modes, accelerated display (double  
 speed), normal display (instant re-  
 lay), selectably variable slow mo-  
 tion, or freeze frame/stop motion.  
 Since only a single field at a time is  
 being replayed in the slow/stop  
 motion mode logic circuitry in the  
 machine must reconstruct the  
 proper sequences for interlace and  
 color field continuity so that a  
 normal display is obtained. The



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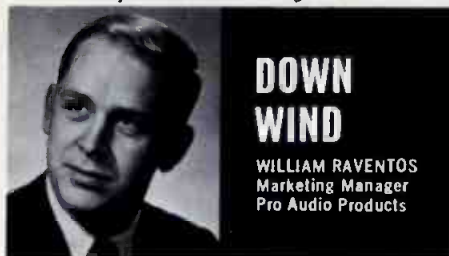
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Several years ago, Electro-Voice introduced a windscreen material for microphones we call Acoustifoam™ that offered a substantial improvement over the bulky silk and wire constructions then in use.

Recently a number of windscreens similar in appearance to Acoustifoam have arrived on the market. But not all plastic windscreens are alike. A number of characteristics of foam plastic can strongly influence the effectiveness of the material as a windscreen and the performance of the microphone hidden inside.

The material used in Acoustifoam is carefully controlled for density and porosity, and goes through a number of extra processing steps required to meet the standards set for it. In addition to reducing the sounds of air turbulence near the microphone (thus serving as an effective windscreen) it must have no appreciable effect on microphone frequency response, level, or polar response at any frequency.

The passive nature of this material is assured by the extra processing of the basic foam after it is molded. Look closely at most ordinary foam (and even some foam sold as windscreen material) and you will see bright highlights from tiny flat surfaces that cover many of the pores in the foam. Each closed pore in the foam acts as a reflector of sound, and as a barrier, and will significantly alter microphone response and even output level in extreme cases. High frequency roll off of up to 20 db at 10 kHz has been measured with some foams.

The method used to "open up" these closed pores is called reticulation, and is a chemical treatment that dissolves the very thin pore walls without substantially altering the heavier foam connecting material. Another test for foam is to blow gently through the material. If any resistance is felt, the foam is insufficiently porous for windscreen use.

Pore size (after reticulation) is also a significant part of windscreen design and can have an effect on the ability of a windscreen to satisfactorily reduce wind noises to the lowest possible value. Thickness of the windscreen itself also has an important bearing on its wind noise reduction capability. Foam of insufficient thickness will prove less effective in controlling wind noise.

While windscreens may seem simple and uncomplicated devices, in truth their design must match the sophistication of the microphone inside if full benefit is to be obtained from both microphone and windscreen.

For reprints of other discussions in this series,  
or technical data on any E-V products, write:  
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Circle Number 32 on Reader Reply Card

disc recorders may also be integrated with standard quad VTR's so that edited final tapes can include slow/stop motion sequences in them.

To provide for the multiplicity of languages that are needed to cover Olympic events, six Ampex MM-1000 audio recorders are also tied in with the video system. The MM-1000 uses 2" wide longitudinally oriented tape with multi-head stacks that allow up to sixteen high quality audio channels per recorder. The machines provided to the DOZ have a capacity of seventy-two separate audio channels which permit the commentators from different countries to make a synchronous commentary with the picture information on a completely separate audio track.

#### Transcoding

All of the color television images generated by the DOZ cameras in Munich will be on the 625 line/50 field scanning standard using phase alternation line (PAL) color encoding. To make these images usable in countries with different line and field rates and other color encoding methods it is necessary to transcode.

Fernseh have installed for the DOZ six optical standards converters which will provide outputs of 525 line/60 field NTSC as used in North America and Japan, 525 line/60 field PAL M used in Brazil and 625/50 SECAM (Sequential and Memory) the color standard used in France, Luxembourg, Eastern Europe and the USSR.

Where the same line and field rate is used, standards conversion can be fairly simple as the original signal can be separated by the use of a precision decoder into its luminance and chrominance components Y and R-Y, B-Y. By careful band separation and comb filtering the luminance signal can be cleaned up and applied with the extracted color difference signals to a color encoder operating in the desired mode.

When there is a difference in the line and field rate as well, the transcoding problem becomes very complex. The Fernseh converter uses optical integration to achieve the changeover from 625/50 PAL to 525/60 NTSC. The PAL signal is separated into its luminance and chrominance components with the

luminance signal applied to a small monochrome display kinescope. The chromaticity signal is processed and displayed in coded form on a second display tube. Two vidicon camera tubes scanning at 525/60 rates pick up the modulated rasters. The output of these two vidicon channels now represent the luminance and chrominance signal which will be used to drive the NTSC encoder and produce a standard NTSC composite signal. Since there is a 10 Hz difference in field frequency between the decoded PAL display tubes and the vidicon pick up tubes, special AGC circuits are used to minimize the flicker that might develop in the transcoder.

Transcoding may be done at either end of the transmission line and in this case will probably occur either at the DOZ center in Munich or the satellite ground station at Raisting.

#### Summary

This will be an Olympiad of superlatives, more athletes from more countries competing in more events than ever before. The television coverage will be equal to the task. It too will feature more cameras in more locations feeding more recorders supplying more viewers with more and (hopefully) better pictures. Thirteen simultaneous events can be handled, an army of over 3000 engineers and technicians will be there to manipulate the monitor and maintain the 30 million dollars worth of television equipment that has taken four years to plan, purchase and place on site only to be dismantled a few weeks later.

But while it's all working, mankind's living room will be flooded by a living color model of how the pursuit of excellence on the playing field or the technical arena can be conducted in peaceful competition to the benefit of all.

The author wishes to gratefully acknowledge the invaluable help of Karlheinz Mandl and Karl-Heinz Schulte of the DOZ, Richard Walker of Intertec, Inc./Munich, Henri Zahn and Hans Groll of Fernseh GMBH, Gregg Perry and Dave Chapman of Ampex Corporation, and last but certainly not least Donna Roizen, Video Consultant who assembled the manuscript under trying conditions.

# WHUN Survives Flood Waters

By Jeff Bixby, CE, WHUN AM-FM, Huntingdon, Pa.

We knew it was going to be one of those days. Our general manager was on vacation, the FCC was reportedly making an inspection at nearby radio station, and it was raining. As the water continued to rise, and one by one, the roads into Huntingdon began to close, it became clear that we were in for trouble.

At about 10:00 Thursday morning, in the absence of our manager, I took over station operations and began what was to be a 40 hour day. It was June 22, 1972.

## First Things First

I sent my assistant, Tom Henrie, and Andy Biddle, the son of one of our owners, out to the AM transmitter some three air miles away to check on the water conditions out there. The main road to the transmitter had already been flooded out, so they took the "scenic route", a bone-jarring 20 mile plus drive over the mountain on nearly impassable dirt roads.

Finally, they called in, about two hours after they started, and the telephone line was left open all afternoon. At that point, the water was just at the concrete base of the tower. We decided to hold off for a while and try to get an idea on how deep the flood would be. Meanwhile, we mapped out just what could be done if and when the water threatened the transmitter.

We agreed that if, for any reason at any time, telephone contact was lost, the transmitter crew would make one attempt to call our unlisted "hot-line". If the connection could not be quickly restored, they were to leave immediately. We felt that the transmitter was not worth risking any lives. While the water watch continued, I received a call from a worried relative who reported that four "older" folks were at a summer cottage near the river, about ¼ mile from the transmitter. Andy went down to check, and reported that they had moved to higher ground, and were fine.

Chalk-up one much relieved family.

The water continued working its way toward the top of the concrete base, so I told the announcers to announce that WHUN-AM would probably be forced to leave the air, but that WHUN-FM would stay on. The FM transmitter, high and dry atop a 200 foot ridge, was in no danger.

At 4:30 Thursday, the water had reached the top of the concrete, and I decided to sign the AM transmitter off and have Tom begin to dismantle the equipment and remove it. At 4:31 that work began. By 6:00, the transmitter had been stripped of all major (and expensive) components to about the four foot level, as had the equipment rack. The modulation and power transformers, the modulation reactor, most big capacitors, the PA cubicle blower, the remote control unit, our new Belar AMM-1, and the audio driver and frequency control units were safely stored on hay bales on the second floor of a nearby barn.

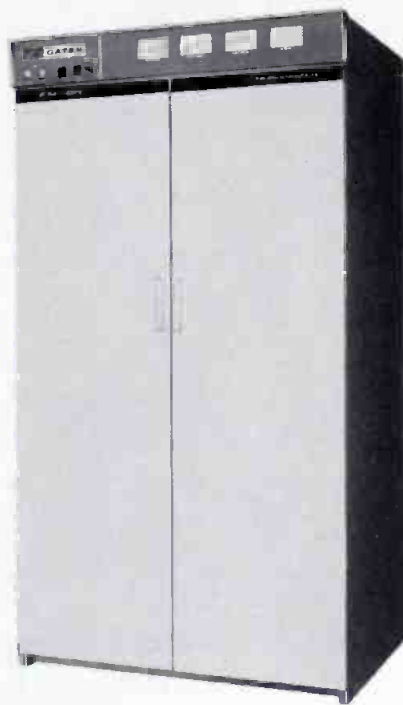
After making sure that the four older folks and the people who owned the barn would be safe, Tom and Andy began the long trek home. By then, all the approaches into town were closed. They had to leave the 4 wheel-drive Bronco at the edge of town and walk (and wade) the rest of the way. When they left, the water was within one foot of rise of the building base and coming up fast.

## Public Service Radio

WHUN-FM stayed on the air all that night and the next with staff members, wives and girl friends working 10 to 15 hours at a clip. Tom Henrie was back at the station ready to work after a brief nap.

Late Saturday morning, the water receded enough for our manager to get into town, and for Tom and I to get out. I jury-rigged a CB antenna on the Bronco and installed a borrowed radio in it. (My

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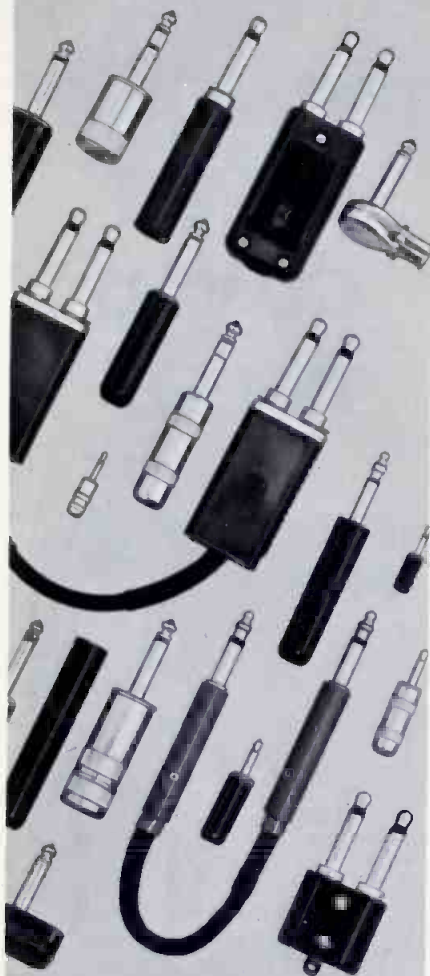


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Datsun pick-up already had a CB in it.) We made arrangements for a local CB'er to keep a listening watch for us, and our two truck convoy left for the transmitter, always being certain that the first truck was safely past each obstacle before the second tried it. That way, if one had gotten stuck, the other was in a position to either help or provide a way back to town. Late that afternoon, we got over the mountain on washed out dirt roads and arrived at the transmitter site.

#### After The Crest

Inside the building, the water had crested at better than 30 inches! Mud covered everything. Tubes and other spare parts were strewn from one end of the building to the other. The antenna tuning unit in the "dog-house" had been completely underwater. A blade of grass lay draped over the tower some 12 feet above ground. Of five cement block buildings in the area, ours was the only one left standing; the others had been leveled.

#### Citizens Band Help

We made a quick assessment of the damages, and radioed a request to the station via our CB'er friend for a portable generator and a space heater. Within two minutes of this radio call, two other CB'ers had offered a total of three generators. One of these had his generator mounted on his International Scout, and he left town promptly to bring it to us. The other station truck, a 4-wheel drive Chevy, accompanied him bringing a heater, some fuel, and a second generator.

CB radio was, for several days, our only contact with the station. The co-operation of these CB operators was excellent, and without it, we would most likely still be off the air.

Our first step was to run the heater to dry things out while we cleaned up the debris. It made a good excuse to throw out some of the items that had been in the way for years, but which we'd been reluctant to simply junk. As the mud dried, it was removed with rags, stiff brushes and a vacuum cleaner.

Sunday morning, our distributor met my wife near town with a load of wire, spray contact cleaner and lubricant and other supplies. While

one man stayed at the transmitter cleaning, the other made runs to town taking components which had been exposed to water to the drying ovens at the Huntingdon Owens-Corning Fiberglass Company. Also, on Sunday morning another borrowed CB rig and an antenna was installed at the station to give direct communication with the office for the first time. It was to remain our only link until Telcel was able to restore service on Thursday morning.

By Monday morning most of the clean-up of the transmitter itself was done. Two students from nearby Juniata College arrived to help re-set the oversize (and weight) transformers. At 7:00 Monday evening, the power company had restored our 3 phase power, and we were nearly ready to test. After the main power feed from the service entrance to the transmitter had been replaced on Tuesday morning, we applied power.

It was now that the lack of sleep began to show.

#### The Hot Smoke Test

A fuse in the power rack of the transmitter wouldn't hold, and it took us better than two hours to find the cause. A blower motor at the top of the transmitter which had been clear of the water by at least 4 feet had absorbed enough moisture to short the winding to ground.

Since our transmitter has a solid state power supply, we felt we could operate without the blower until a replacement was ordered. But suddenly the frequency control unit, which had been jury-rigged to power the night before to allow it to heat-up and stabilize, began blowing fuses. We traced that to an arc over in the unit's rectifier tube socket.

After a trip into town for a dinner and a replacement socket, we connected the dummy load, and, using a broom stick, we "lit it off". Lo and behold, it held: first in low power, then in high!

Needless to say, our already high opinion of the Gates BC 5-P2 climbed even higher. At midnight we tested into the antenna and everything worked. 5:45 Wednesday morning saw an almost normal sign-on.

We still had no phone lines, but



Fig. 1 Tape line on transmitter indicates the high water mark at the transmitter site.



Fig. 2 CE Bixby shown "tuning" the program line.



Fig. 3 This antenna tuning unit was completely under water.

We had arranged to borrow an FM radio with a 600 ohm line level output from neighboring WTRN. The output from this radio was patched to our AM transmitter and we broadcast our FM signal. This system worked so well, we decided to stay with it even after our lines

were restored, until Telco had been able to equalize the loop.

WHUN-AM was finally back on the air. Damage to operating equipment included one fan, one tube socket, and one RF base current meter. Total time out of service, short of one week. (From 4:30

Thursday afternoon, the day of the flood until 5:45 the next Wednesday morning.) Total man-hours: who counted?

To the best of our knowledge, there is no formal training for broadcast engineers in flood damage repair, so for what it may be worth, Tom and I, who winged it all the way, offer the following tips:

1. No transmitter is worth the risk of a life. Save what you can, expensive gear first, but leave yourself plenty of time to get out.

2. When you are able to get back into the transmitter, take two vehicles. One serves as the way back if the other gets stuck. Both should be equipped for radio communication, both with each other and someone in a position to send help. Keep the station informed of your progress. It makes them feel better, and if they're sure you're safe, they are less likely to send out a search party needlessly.

3. When driving out to the site, if there is doubt as to the road con-

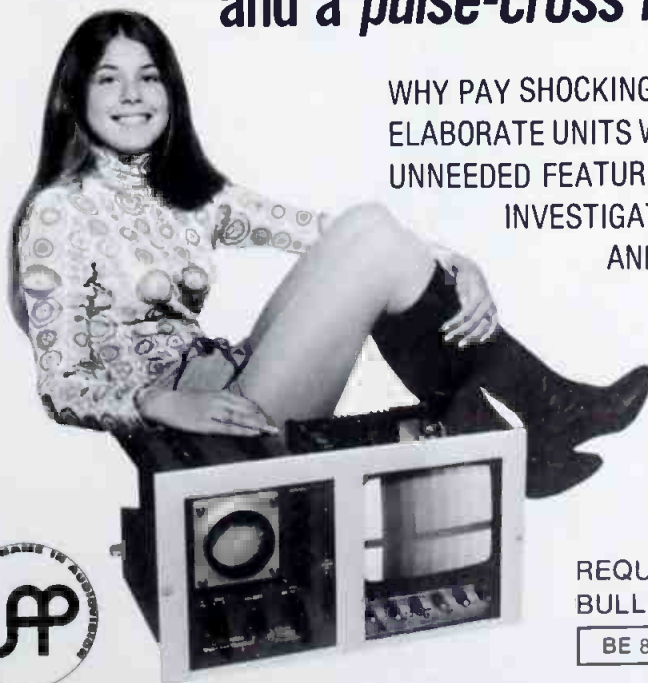
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ditions, the vehicle least likely to get through should lead out. If it gets stuck, the better truck is in a position to help, or to get back to the station. If the better of the two leads out, and it gets stuck, there will be little the other can do. Be

sure the lead vehicle is safely through an obstacle before the other starts in. There's no point in having two trucks if both are stuck.

4. Establish **IN ADVANCE** just exactly what is to be done if com-

munications breakdown. For example, who will call whom, and what will be done if the connection can't be promptly restored. The importance of planning in advance, especially where safety is concerned, cannot be over stated.

5. Once the safety of engineering personnel is assured, the key are hard work and improvisation. We had to jury-rig CB radios, power from the portable generator, a program feed, and countless other lesser expedients.

6. As always, too many people tend to be worse than not enough. Two men can get a lot done, but four men seem to spend a lot of time tripping over each other.

7. After you're back on the air, continue to baby-sit the transmitter, even after normal remote controls are working. Exposure to water may have damaged protective circuits. It is always a blow to lose the modulation transformer. I would be worse to lose it right after all the work which was done to save it.

8. If your antenna system has been underwater, it might be a good idea to have the riggers check the tower and guy wires. The combined force of the water and the wet ground may have weakened the guy anchors. We also found it advisable to ask our consulting engineer to come up and check things over. He will verify that our antenna resistance hasn't changed, that the tuning unit is working well, and will go over the transmitter looking for things we may have overlooked.

9. Finally, don't forget to say thanks to the people who helped. In our case, the list includes WTRN, several CB operators, our distributor, the man who delivered the generator, and of course, the power company (Penelec) and Ma Bell. It also includes sincere thanks to Tom. Without his help on Thursday, we'd be buying a new transmitter. Without him later, I'm sure I'd still be putting the thing together.

Hopefully, you'll never have to clean up after a flood. If you do, Tom and I hope this helps.



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# ENGINEER'S EXCHANGE

## Surprise Ending For A Strange Day

This month's column is a bit unusual, considering your usual series. But it should serve as a reminder that anything can happen in this business and that we are always ready to share your experiences.

So let's back up a few months and retake a moment in the history of KTLK.

It was April Fool's morn in '72

... we won't forget and neither will you

The Chief was at home (a night off so rare) nursing a Scotch with infinite care.

Down at the studio the music was bright, the jock had the feeling it was just right

When all of a sudden without a clatter, the meters went to zero ... what's the matter.

Tuned up the auxiliary, dialed again the main, but all efforts were in vain

Called up the chief and cried the old blues, he will undoubtedly know what to do.

On the call was out and the evening shattered, from that moment on nothing else mattered

With the chief on the phone they tried once again, then he said with a groan, "I'll do what I can".

He called on his aide, the transmitter type, to get there quick and fix it right  
Five minutes, six minutes waiting for sound ... then it came up with a bound.

Sounds all right, he said with a smile, and prepared to relax for a while

But the phone again cried a warning, and all he was thinking was of sleeping and morning.

You're not going to believe this said the voice on the phone, there's a car in the phone lines tall and alone

"A car in the phone lines," he cried in dismay, how in the world did it get that way?

Oh, I know, he said with a grin, it's April Fools and you're doing me in!

It's no joke he heard with disgust, its nose is in the air, its tail in the dirt.

The phone cable is wrapped with loving care, around the bumper high in the air.

The chief sat down, his head in his hands, now how do I explain this to the Man?

"Morning Boss. Say, a funny thing happened .....

No. Broadcast Engineering is not for looking poetry from the field. But we did think this one fit. It was submitted with picture by Norm Smith, CE of KTLK, Denver, Colorado as a once in a lifetime poem for a once in a lifetime happening.



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August, 1972

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Circle Number 34 on Reader Reply Card

*Spotmaster*

## AD1B Audio Distribution Amplifier



The solid state AD1B distributes audio signals to five separate points within a studio system or to telephone lines. Output level controls are individually adjustable. Adding our AD1B-X channel extenders allows up to 25 channels to be accommodated, with input metering and audio monitoring for all 25 provided by the AD1B. Both units meet traditional SPOTMASTER standards of performance and reliability. Response is essentially flat from 40 to 20,000 Hz with low distortion and noise and 60 db channel isolation. Input transformers are standard; the user may specify either balanced output transformers or unbalanced emitter follower outputs. Write for details.

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Circle Number 25 on Reader Reply Card

# NEW PRODUCTS

(Use circle number on reader service card for further information.)

## Rapid City Station Needs Help With Equipment Info

The disastrous flood that hit Rapid City, South Dakota in June is probably only a dim memory a series of news reports now lost in the swift current of yesterday's five o'clock news.

Radio station KKLS was probably hardest hit among the Rapid City stations. Chief engineer Bill Spitzer reports that KKLS was back on the air within one week. Engineers from sister stations worked around the clock in that effort.

Bill says that KKLS is rebuilding with the rest of Rapid City under the theme "The Rock of the Black Hills Will Rise Again!"

But Bill has asked BE to pass along a note on help that is still needed. The station's records and files were lost to the flood waters. He needs as much information as manufacturers and equipment suppliers can send so he can put together a new industry equipment file. The KKLS address is: Box 3087, Rapid City, SD 57701.

Meanwhile, the new KKLS FM transmitter site will be at an elevation of 3,850 feet... truly on top of the rock.

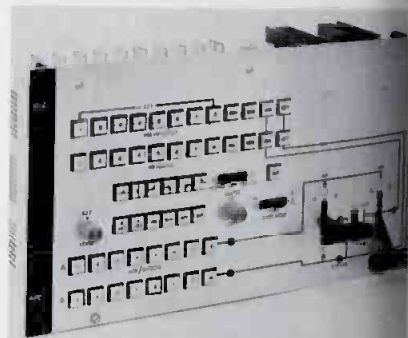
### Compact Video Production Switcher

Cohu, Inc., Electronics Division, San Diego, California, introduces a totally new compact production video switcher.

This solid-state switcher has all electronics housed in less than one cubic foot of space under a 19" 3

10.5" panel.

Additive or non-additive mix is selected by a front panel switch. Sync is held constant through dissolve. Mix, effects, inserts, dissolve to inserts or effects, wipe, key, external keying and self-keying are standard modes of operation. The video flow path permits fading of titles and effects. Audio follow video logic allows only one audio source to be selected at a time.



Vertical interval switching and full color timing permit quality productions for color or monochrome video signal inputs under every switching and preset condition. The switcher has 8 synchronous and 2 nonsynchronous inputs. All synchronous inputs may be composite or non-composite. Independent programmable sync adding circuits are provided for each input.

The matte generator will provide any shade of gray or a preselected color with variable luminance and permits matting in the self-key mode. All mix/effects may be previewed. Pushbuttons are softly illuminated and the video flow path has path indicator lights.

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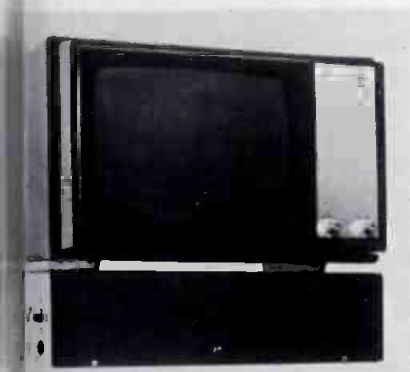
or, a background generator is available.

Circle Number 70 on Reader Reply Card

### Teletype Soft Copy

The Ann Arbor Terminals Model 20A Video Terminal Controller provides silent soft-copy display to any typewriter terminal. For both computer and timeshare users, it offers all the advantages of a "teletype replacement" terminal without the inherent disadvantages of teletype operation and slow speeds.

Input rates up to 1200 baud are accommodated with the Model 20A. A Print Disable switch permits the operator to work soft until ready for printout or listing. Operation in the display mode is very fast and absolutely quiet.



The display format is 32 characters by 8 lines, with switch-selectable roll or page mode operation. In roll mode, the display screen acts as an endless piece of paper. In page mode, the display screen functions as a typewriter with a command-movable non-destructive cursor.

The Model 202A may be installed in less than 3 minutes, with



"I'M READY FOR ANY DARKHORSE CANDIDATE THAT MAY ARISE."

a simple plug-in connection. Size, exclusive of CRT display, is only 12½ × 5½ × 3½ inches. Power requirements are 115 V AC, 60 Hz.

Circle Number 71 on Reader Reply Card

### Custom Consoles Cabinet, Racks

Amco Engineering Company, an old line company in the communications cabinet and console housing business, has decided to focus on the needs of the broadcast industry. Many of their consoles and

racks are already in use in government communication complexes.

Because Amco uses a modular approach to their cabinets and consoles, they can put together RF proof layouts to meet almost any need, and that includes a choice of 17 colors as well as trim options. What's more, these units each start with basic, simple units. And the add-ons and options allow the buyer to select a simple or sophisticated rack, cabinet, desk, or console

(Continued on page 52)

### 8 CHANNEL AUDIO CONTROL

**B-801** monaural  
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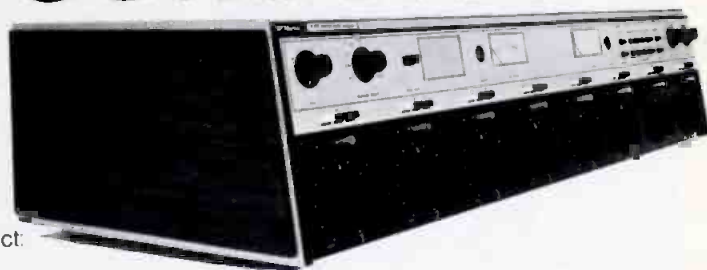
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# consoles



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Circle Number 12 on Reader Reply Card

## New Products Begin On Page 50

### FREE CATALOG

#### HARD-TO-FIND PRECISION TOOLS

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

#### TOOLS



**JENSEN TOOLS**  
4117 N. 44th Street, Phoenix, Ariz. 85018

Circle Number 23 on Reader Reply Card

## NEW FOR BROADCASTERS

### (1) AUDIO/VIDEO FAILURE ALARM

The type AA202 alarm unit will silently monitor your audio or video lines for low level or loss of signal. Power is provided to operate external lamps, relays, or audible alarms when levels fall below the selected threshold. Price is \$62.50

### (2) TELETYPE ALARM RECEIVER

The type TT101 teletype alarm receiver detects the 5 and 10 bell bulletin and EBS signals sent over the news service wires. Power is provided to operate external lamps, relays, or audible alarms upon reception of an alarm signal. Price is \$70.00

**AUDIO ENGINEERING CO.**  
4112 Oak Lane  
Gary, Indiana 46408

Circle Number 13 on Reader Reply Card

arrangement that will complement the decor and electronics of any communications system.

(Broadcast Engineering's Tech Data department of this issue includes Amco catalog information.)

Available in this system are the low silhouette, an auxiliary desk console that is used with selections of three different types of desk top

cabinets—vertical and slope front racks, with variations of writing surface assemblies for operator convenience and maximum efficiency.

To complete the system are variety of accessories including blowers, wire mold, hardware casters and associated supplies.

Circle Number 72 on Reader Reply Card

### Professional Cassette Demagnetizer

Nortronics Company, Inc. manufacturer of magnetic heads and professional accessories has announced the availability of their new QM-Series<sup>TM</sup> Magnetic Head Demagnetizer for cassette recorder/players.

The Cassette Demagnetizer is a unique accessory designed to remove residual magnetism from magnetic heads utilized in cassette machines. Model QM-240 develops enough flux to effectively demagnetize heads without any possi-

bility of permanently magnetizing or physically damaging the face of the head or other machine parts. This 900 operates on a 110-120 VAC, 50-60 Hz and is supplied with an AC cord.

Circle Number 73 on Reader Reply Card

### Audio Distribution Amplifier

CBS Laboratories introduces new audio distribution amplifier. The Model 1601 has 16 balanced audio outputs from one high or low impedance bridging input. Op-amp integrated circuits are used, and the unit provides 40dB gain with

# consoles



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ation between outputs in excess 10dB. Only one-rack unit high, Model 1601 eliminates costly, bulky modular audio distribution systems.

BS Laboratories' new amplifier provides high frequency boost and roll-off equalization for a variety of special applications, such as, low-frequency compensation for telephone line loss.

Radio and television broadcast stations will find the Model 1601 particularly useful for distributing program and monitor circuits throughout studios, control rooms, conference rooms, etc.

The 1601 is also applicable for public address audio distribution in auditoriums and theatres, transportation terminals, government and educational installations.

Circle Number 74 on Reader Reply Card

#### Remote Line Coupler Driver

DMC is introducing a new remote line coupler driver to add to their line of audio line and loop driver amplifiers.

This time and money saver unit offers 900 Ohm output with DC isolation for direct coupling to telephone lines, and it includes lo-Z microphone and bridging inputs. Also, 600 Ohm audio loop output. Levels are read on a horizontal VU meter.

Circle Number 75 on Reader Reply Card

#### Automatic Receiver/Recorder

A new equipment innovation has been announced by Plectron Corporation of Overton, Nebraska. The company has now introduced a microphone to its unique receiver/recorder products.

Since its unveiling in 1970, the receiver/recorder has continually demonstrated the capability of automatically taping incoming radio messages in the absence of the operator. The unit's flashing red light indicates a message has been received and is on tape for the operator's instant replay.

Now with the addition of an easy-to-reach, side mounted microphone, a complete voice log can be kept by receiver/recorder operators. A company spokesman described the convenience and operation of the microphone and switch

as a valuable safety factor while driving. The operator has no notes to take, or pages to turn. Instead he can keep his eyes on the road. Now equipped with microphone, the receiver/recorder is certain to double in service while maintaining its low cost advantages.

Circle Number 76 on Reader Reply Card

## Letters

(Continued from page 9)

### Dear Editor:

Regarding the letter of N. Moss, an alternative solution the static problems on meter faces can be solved in several ways.

Plastic meter faces are more susceptible to static charges than glass faces. To determine if a meter cover is charged, simply run your hand or a handkerchief across the face of it. If the needle deflects in any direction, there is a charge on it.

A simple solution is to apply General Electric Anti Static polish (ET90X25) on the face, let it dry and wipe it off.

A more promising solution for meters whose covers can be removed is to create your own anti static mixture. Take a small glass and fill it with 1 oz. of Joy or Mr. Clean and add 1 oz. of water to it.

**SEND YOUR  
LETTERS TO THE EDITOR  
to  
Broadcast Engineering  
1014 Wyandotte  
Kansas City, Mo. 64105**

Mix slightly so as not to create any suds and then dip a kleenex into it and wipe the solution on the inside and outside of the meter face. Let dry and then replace it.

I have found this to work satisfactorily on many meters, including VOM's and VTVM's.

**Len Petrulis  
WOPA-WGLD-FM  
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Circle Number 14 on Reader Reply Card

## FCC Changes Translator Rules

A new 6-page Form 345 is coming for licensees or permittees for assignment of license or construction permit of translator stations and related auxiliary stations (translator microwave relay stations or UHF translator boosters), has been adopted by the Commission.

The new form has been designed to obtain only basic information required to determine the legal, financial, and other qualifications of proposed assignees of translator stations, the Commission said.

The Commission intends for the new form to be used only where translators and their related auxiliaries are to be assigned and no other type of station is involved. Where a TV or FM station is to be assigned along with its associated translators, the Form 314 will be used as in the past.

Form 315 will continue to be used for requesting consent to transfer of control of the licensee of a translator station.

The form, subject to review and approval by the Office of Management and Budget, should be available on or about October 2, 1972.

In the same action, the Commission amended Section 1.578(b) of the rules to conform this section with other rules amended June 30, 1971 (Sections 1.57 through 1.574) which contained 15-day major change provisions. The June 30 amendments provided that within 15 days after acceptance of an application for filing, it could be declared to be a major change. Before the amendments, the rules read "after tender for filing."

The amendments became effective in July.

Further changes in the television broadcast translator station rules (Part 74) to provide for notification of permanent discontinuance of TV translators, and for submission of an application for changes in input frequencies of translators, have been proposed by the Commission (Docket 19121).

The proposed amendments would require the licensee to notify the FCC in Washington, D. C., and the Engineer in Charge of the radio district in which the translator is located prior to permanent discontinuance of a TV translator, and to immediately send the station license and other instruments of authorization to the FCC for cancellation.

The changes also provide for submission of a form application (FCC Form 346) for a change in input channel whether or not a change in primary station is involved. (A primary station is the television station being rebroadcast.)

The changes supplement the Commission's proposal of January 15, 1971, requiring the licensee of a translator which is inoperative for 10 days or more, regardless of the reason, to notify the Engineer in Charge of the radio district in which the station is located, in writing and advise when the station resumes operation.

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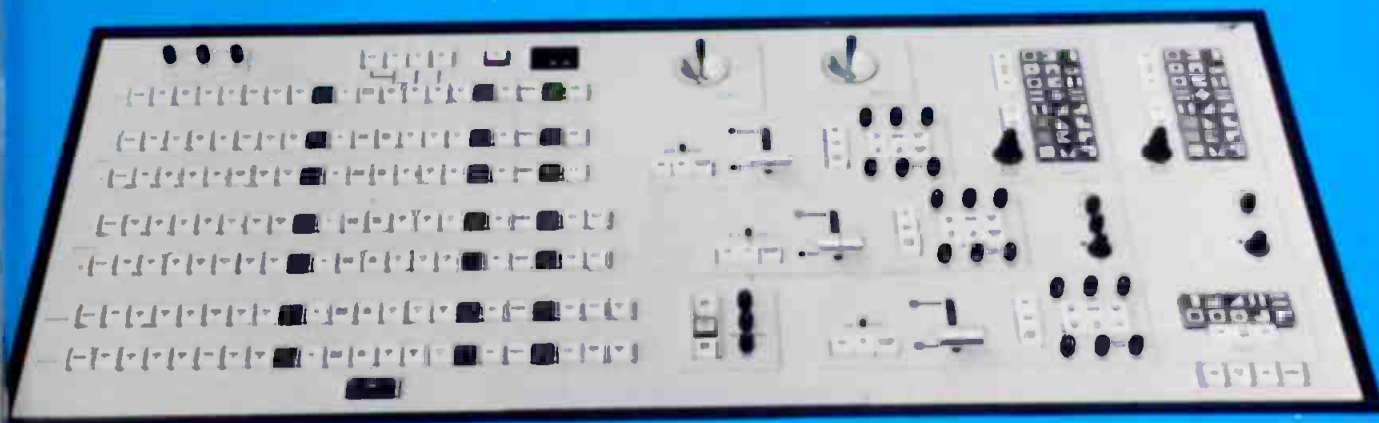
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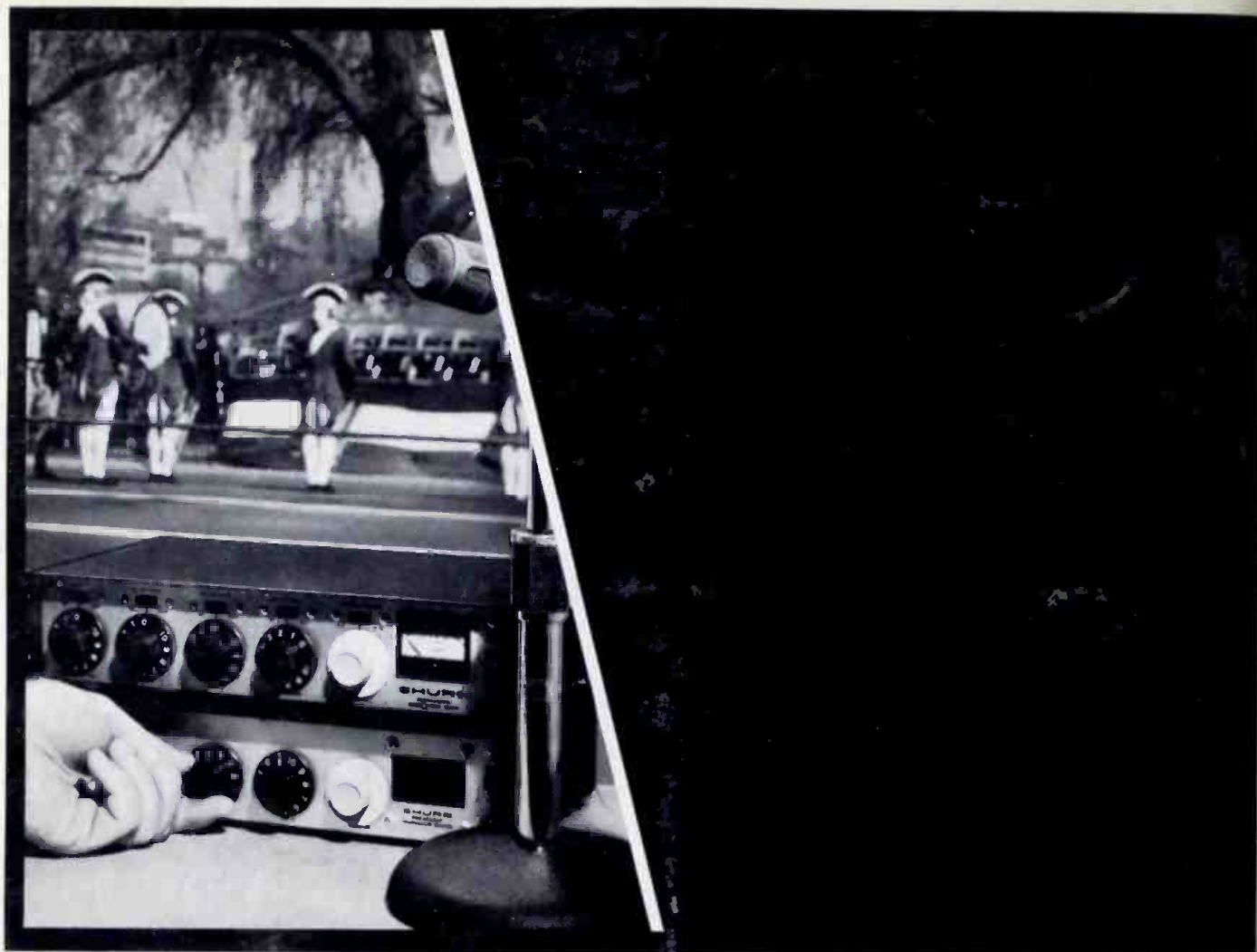
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