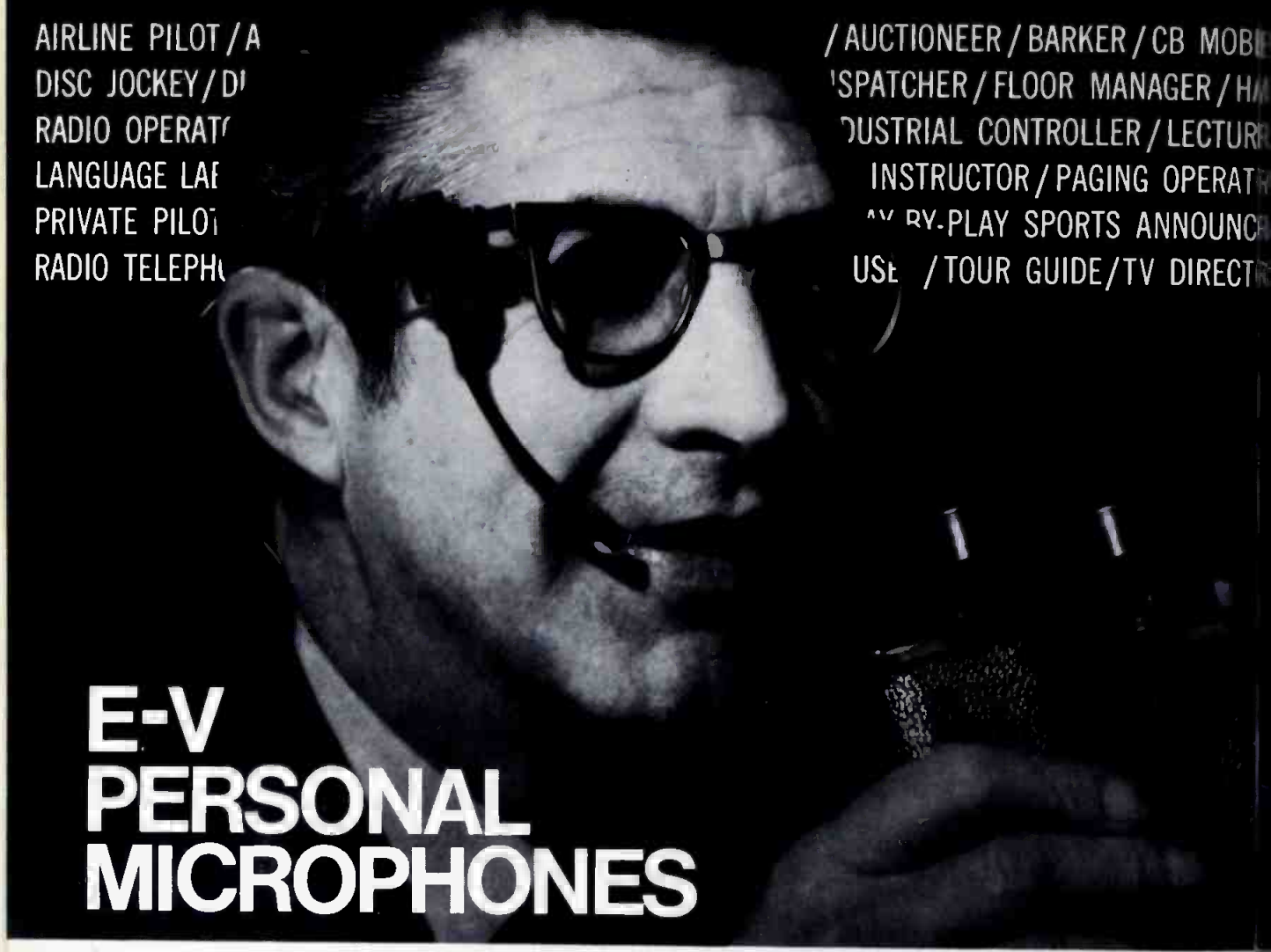
July, 1972/75 cents

BROADCAST ENGINEERING

he technical journal of the broadcast-communications industry

AGC amplifier update page 14

Spurious signal test
Set lighting tips
Cable Engineering



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

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

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Electro-Voice personal microphones headsets introduce a new era of flexibilit communications. They are easily adapte most RF transmitters and receivers for ha free, wire-free communications. And permit the user to concentrate on the jo hand, rather than on the microphone. each can be serviced in the field if nee without sophisticated tools.

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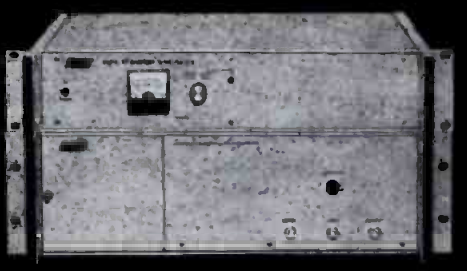

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July, 1972, • Volume 14, No. 7

BROADCAST engineering

The technical journal of the broadcast-communications industry

in this issue...

ABOUT THE COVER

Pat Finnegan shown adjusting the stereo AGC and limiting amplifiers at station WLBC. WLBC is a full time stereo maximum power station in Muncie, Ind.

DEPARTMENTS

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

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

Controlled Circulation postage paid at Indianapolis, Indiana.

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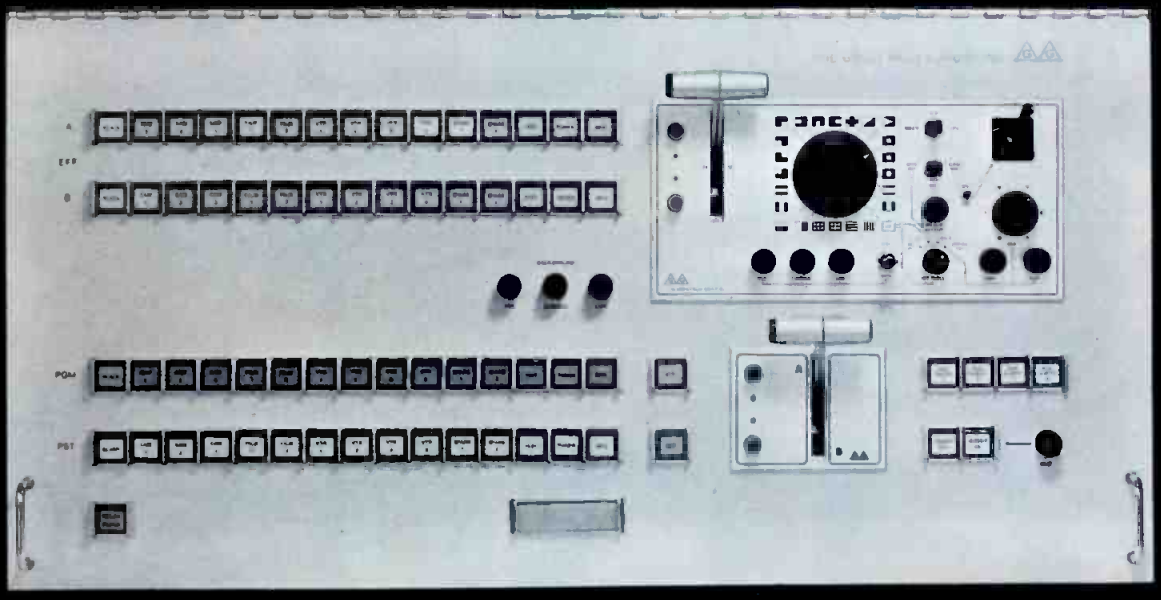
NEW! MODEL 1400-11 SWITCHING SYSTEM



FEATURES

- 15 INPUTS (COMP OR NON-COMP*)
- 23 WIPE PATTERNS
- INTERNAL/EXTERNAL KEYING
- COLOR MATTE
- PGM/PST MIXER
- COLOR BLACK GENERATOR
- CUT-BAR
- CHROMA KEY CONTROL
- AFV SYSTEM*
- DOWNSTREAM KEYER*

*OPTIONAL EQUIPMENT

DESCRIPTION

Model 1400-11 represents an unusual value in a medium-sized switching system. The video mixer operates between the PGM and PST buses; this arrangement provides most of the operating features of a 6-bus switching system in only 4 buses. The basic versatility of the 1400-11 can be increased with optional equipment such as an audio-follow-video system or a downstream insert keyer. The keyer, which is inserted in the PGM path, allows captions to be made at any time without use of the special effects system.

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DIRECT CURRENT FROM D. C.

JULY, 1972

by Howard T. Head

Supreme Court Upholds CATV Origination Requirement

The U.S. Supreme Court has reversed a Court of Appeals ruling which had held that the Commission had no authority to require CATV systems to originate programming. Commission rules requiring program origination by systems having more than 3500 subscribers had been appealed to the Court by a large cable system in the Midwest.

The controversy left the Supreme Court almost equally divided. Four justices concluded that the Commission was within its authority in requiring program originations, while four others found themselves equally convinced that the Commission had exceeded its authority. The deciding vote was cast by Chief Justice Burger, who, swaying like a willow in the wind, found himself disagreeing with the Commission's views in requiring originations but, like Voltaire, defending the Commission's right to do so.

Thus, the Commission's rules requiring CATV program originations become the law of the land. The Commission is expected to issue deadlines shortly for actual compliance.

The Supreme Court decision came just a short time after the District Court for the Southern District of New York had held that CATV systems were not subject to copyright liability for the carriage of broadcast station programs. An earlier Court decision reached the same conclusion, but in the earlier case no carriage of distant signals was involved. The new decision expands the concept to provide freedom from copyright liability even for the carriage of distant signals.

AM and FM Operator Requirments Reduced

The Commission has issued the actual text of new rules permitting the routine operation of high-powered AM and FM transmitters and AM directional antennas by third-class operators holding a broadcast endorsement. The previous rules had required a first-class operator for these categories of operation.

In issuing the new rules, the Commission has made every effort to improve the maintenance procedures in the technical operations of stations, especially in the case of AM directional antennas. The station must have in regular fulltime

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his is the new, unique Setchell arlson 10-inch monochrome ideo monitor...the *only* profes-ional-quality 10-inch monitor. gives you **13% more viewing area than tandard 9-inch monitors, 26% more** when sed in a dual rackmount configuration.

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Circle Number 7 on Reader Reply Card

(Continued from page 4)

employment a qualified first-class licensee, who is to be notified in writing of his authority over the station's technical operation and over lesser grade duty operators. He must perform or supervise all maintenance, review the daily operating logs, and make a daily personal inspection of the technical plant. He may not be assigned other duties which would conflict with his primary responsibility.

If an AM directional antenna license specifies current and phase tolerances tighter than the standard 5 percent and 3^0, the use of third-class operators is not permitted. Monitoring points must be read monthly, and a "partial" proof of performance consisting of ten field strength measurements in each required direction must be made annually.

A proposal that AM directional stations be required to install type-approved phase monitors is being held in abeyance pending the conclusions of a Commission inquiry into the requirements for type approval.

AM Stereo Tests Proposed

The Commission has been asked to authorize experimental testing of AM stereo operation by a station on the East Coast. The only regular stereo operation presently authorized is the pilot subcarrier system in the FM band.

The system proposed for testing transmits the left channel information on the lower sideband and the right channel information on the upper sideband. Satisfactory results are claimed even with two inexpensive receivers, one tuned slightly below and the other slightly above the carrier, although properly-designed equipment would be expected to provide improved results.

A similar system has been tested for some time by a station in Tijuana, B.C., just across the Mexican border from San Diego.

Land Mobile Sharing of Two Television Channels Cleared in Los Angeles

The Commission has issued final approval for the sharing of television Channels 14 and 20 by land mobile operation in the Los Angeles area. The sharing of these channels was part of the Commission's earlier decision on land mobile operation in the UHF band, but treaty requirements with Mexico made it necessary to obtain Mexican concurrence for any sharing within 250 miles of the border.

At one time, experimental land mobile operation was proposed in the Los Angeles area on TV Channel 6, but in this case the Mexican authorities declined to concur, presumably because of the fact that Channel 6 is in use in the Tijuana area. Proposed UHF sharing in Detroit and Cleveland is still awaiting the concurrence of Canada's Department of Communications (DOC).

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LETTERS TO THE EDITOR

Protect Your Station

Dear Editor:

Here is an old and quite effective way to protect single items of equipment with their own power feed. While it was designed for mobile service, there is no reason why it will not work for anything with its own feed, like consoles, racks (although not the individual items) and transmitters. Simply insert a switch in the power leads, then hang a line-voltage relay across the switch. Shut off the gear by this switch. The relay will close, but the power flow will be very small. Now connect, via another switch, an alarm so that if the line relay opens, the alarm cuts loose. Unplugging the equipment, cutting the cable, or turning the gear off—in short, almost any tampering will produce an alarm. Using a battery alarm will stop people who cut primaries, but beware, because every power failure at night will trip it. No reason to have the alarm relay in the same room with the gear, as long as you do no paralleling of feeds before the relay. If the gear has its own feed from the main power board, I see no reason why the relay should not be at the individual breaker out there, and the main fuse panel is not the usual place to look for a burglar alarm trip.

As for alarms, a circuit to the police is good, but usually expensive unless you're across the alley. A loud alarm is good in some neighborhoods. Another effective device, if your police are alert, is a light which cannot be seen from inside the building. Nothing too fancy, or bright, but in most towns the cruiser will pass at least once an hour, and an hour will be just starting if the yeggs are after heavy stuff. This is likely to result in arrests rather than scared-off crooks, and you might get a bunch I'm interested in who raid two-way and other remote sites around New England. I suspect they go elsewhere in the winter.

Name Withheld by Request

Get Added Assurance From Janitor Service

Dear Editor:

Theft, destruction, or fire are always a problem with every station manager and chief engineer.

We have, hopefully, solved these problems at WKTV. Our janitorial work is performed between sign off and sign on six nights a week. The seventh night is covered by one of

(Continued on page 9)

The all-in-one medium.

Okay, so you've just finished airing your documentary on the bicycle boom. A few days later you get a call from the president of a local men's club and he wants to show it at their weekly meeting on Tuesday. "Sure," you say, and send him the film.

Or, after hearing about a contest for documentaries, you immediately pull a film you did on an old house in town which has been converted into a recreation center for teen-agers. Because it's on film, you can enter it as is, something you couldn't do if it had been shot on tape.

Flexibility is one of the many beauties of film. Once a film is in the can, it can go and show practically anywhere. On the screen. At sales meetings. In flight. Off the beaten path.

So you can see that calling film the all-in-one medium is more than just a catchy phrase.

EASTMAN KODAK COMPANY ATLANTA: Bob Baker 404/351-6510/ CHICAGO: Dick Potter 312/654-5300/DALLAS: Frank Reinking 214/351-3221 /HOLLYWOOD: John Waner 213/464-6131/NEW YORK: Bill Reddick 212/262-7100/SAN FRANCISCO: Joe Semmelmayer 415/776-6055.

film

FCC Lowers Operator Requirements for AM, FM

Rules pertaining to operator requirements for AM and FM broadcast stations (Sections 73.93, 73.265, 73.565) have been amended by the FCC to permit AM stations with directional antenna systems, AM stations with non-directional antennas and power in excess of 10 kilowatts, and FM stations with power in excess of 25 kilowatts to employ persons holding third class operator licenses, endorsed for broadcast station operation, for routine operation of the transmitter, provided the licensee employs at least one first class radiotelephone licensed operator on a full-time basis and meets other stated requirements (Docket 18390).

Although the rule will preclude the station's chief operator from holding the same position at more than one broadcast station in the same service, the Commission will give consideration to granting a waiver to an operator to serve as chief operator at more than one standard or more than one FM broadcast station upon a satisfactory showing that the stations are sufficiently geographically close to each other, that the operator can discharge all required responsibilities, and be readily available to make necessary repairs and adjustments in case of malfunctions at each station.

The new provisions become effective July 14, 1972.

Under the amended rules, the licensee must designate in writing a first class license holder as chief operator of the station, responsible for technical maintenance and the supervision of lesser grade operators. At stations with directional antenna systems, a first class operator will be required to record daily (with certain exceptions) observations of base currents, remote base currents, sample loop currents, and the computed tower current ratios. This is a function that cannot be entrusted to lesser grade operators, the Commission said, since base current readings can usually be observed only by entry into the antenna tuning house where the operator may be exposed to potentially lethal RF voltages. The interpretation of the information obtained and any necessary adjustments are beyond the competence of a lesser grade operator, the Commission declared. Lesser grade operators will be permitted to make changes in radiation patterns as required by the terms of station authorizations, provided the changes can be made by simple activiation of switches and do not require manual tuning of the equipment.

In order to preclude the possibility of interference to other stations, switching equipment must be arranged so that any failure of a relay in the directional system will cause the station to go off the air.

Existing rules require that FM stations with more than 25 kilowatts output power, AM stations with non-directional antennas and power in excess of 10 kilowatts and all AM stations using directional antennas have first class operators on duty and in charge of the transmitting apparatus. Stations not in these categories may be operated by persons with lesser licenses, provided the station has

Operator Requirements

Continued on page 53

"SORRY, BUT THE FCC HASN'T RELAXED OPERATORS REQUIREMENTS THAT FAR YET."

ur engineers performing equip-
ent maintenance.

Besides providing security, our
nitorial duties are performed with
irtually no interference from
orking employees.

heldon F. Storrier
ice President WKTV
tica, N.Y.

Editor's Note: There probably is too much trust in the broadcast industry. With concentration on good sound and sight, two things are often left to chance: burglar protection and fire safety.

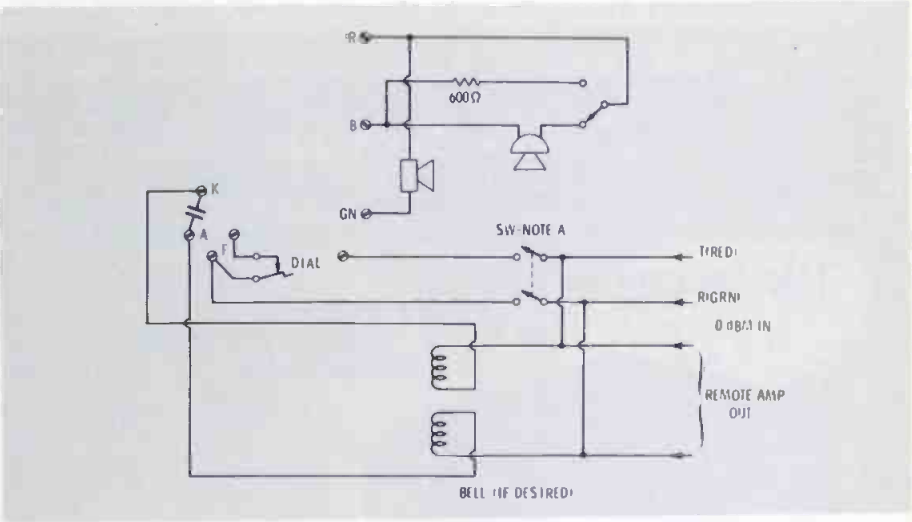
Because many stations are located in remote sites, police patrols may not even exist . . . nor do fire hydrants. I certainly don't have all the answers, but I'm sure that we can collect enough ideas from the field for us to put together some ideas that could be used in large, medium, or small market stations.

Unfortunately, total equipment and facility protection seldom receive fair treatment. You can do something about it. Drop us a line and share your experiences, good or bad. Write to: The Editor, Broadcast Engineering, 1014 Wyandotte, Kansas City, Mo. 64105.

Telephone Tip

Dear Editor:

The schematic shown is a corrected Figure 3 (May, BE, pg. 14).



A further note on Figure 3: Should the hang up switch be bypassed with a switch as shown, a further step must be taken to remove the shorting contacts across the earphone (R & GN) which are closed when the phone is on the hook (disconnect).

Clint Tinsley
Meridian, Idaho

INDUSTRY NEWS

Quad Committee Formed

To the interested FM operator, much of today's information seems garbled. To a few who are already broadcasting quad programs, it may seem clear. Their various contentions and the voices of manufacturers will be heard by an Electronic Industries Association (EIA) committee established recently.

Known as the National Quadrophonic Radio Committee, thei objective will be to evaluate th final and present technical conclu sions to the FCC. The Commis sion already has named four of it staff to serve as observers to th committee.

The Committee's tentative or ganization closely parallels that o the EIA National Stereophoni Radio Committee, which in 196 developed system proposals fo compatible stereophonic radi broadcasting which were forward ed to the FCC and formed the basi of today's FM stereo broadcastin system.

Norman Parker, corporate staf scientist, Motorola, Inc., will serv as chairman of the quadrophoni committee panel on system specifi cations. Five other panels of th Committee will cover intercon necting facilities, broadcast trans mitters, broadcast receivers, fiel test, and subjective aspects.

An organizational meeting o Panel 1 will be held at EIA head quarters, in Washington, May 9 Organization of the other panel will be discussed at this meeting Early industry response to th Committee indicates that it wil have broad representation.

GE Joins Quad

The General Electric Audi Electronics Products Departmen has announced that it filed a techni cal report with the Federal Com munications Commission coverin field testing of its four-channel dis crete FM broadcasting system The tests were conducted at th Company's FM station, WGFM at Schenectady, New York, durin non-broadcast hours last fall.

The transmission of the GE sys tem reportedly is compatible wit existing monophonic and stereo phonic radio receivers and musi systems. The system transmit four discrete full-frequency 30 15000 Hertz audio channels b adding an ultrasonic sub-carrie above the present stereo sub-ca rier used for FM-stereo broadcas ing. Both matrix and discrete fou channel records and tapes may b broadcast using the GE system.

FCC And FTC Make Formal Agreement

The Federal Trade Commission nd the Federal Communications ommission have established liai- on procedures under which both gencies will exchange information nd maintain regular staff contacts n matters of mutual concern.

The agreement, which was gned by FCC Chairman Dean urch and FTC Chairman Miles /. Kirkpatrick, provides that the TC will excercise "primary juris- iction over all matters regulating nfair or deceptive advertising in ll media, including the broadcast ledia." It specifies that the FCC will continue to take into account ertinent considerations in this rea (false and misleading advertis- ng) in determining whether broad- ast applications for license or re- ewal of license shall be granted or enied and in the discharge of other tatutory responsibilities."

The general counsels of both gencies were designated liaison fficers and assigned the responsi- ility of maintaining a flow of infor- nation on matters of concern to oth agencies. They will also deter- nine when formal meetings are ecessary.

The agreement establishes a ormal framework for cooperative ctivities between the two agen- ies, which have been carried on nformally over a period of years. Essentially the FTC is concerned vith advertising content, and it has been FCC policy to forward to the FTC complaints in this area. The FCC's responsibility derives from the fact that broadcast licensees are responsible for all material aired on their stations. The Commission in its policy statement on programing in July, 1960, emphasized that it was the licensee's responsibility to eliminate "false, misleading, and deceptive matter."

In previous cooperative efforts, the Commission has distributed FTC bulletins on questionable advertising to aid licensees in monitoring commercials.

"MAY I SEE YOUR LICENSE?"

Don't Miss Our Direct Current

Page 4

FCC Tells ABC . . . . Prime Time Is Iron Clad

The FCC has denied a request by ABC for a waiver of the prime time access rule in order to present three and a half hours of Olympic coverage on ten week nights running from August 28 to September 8.

Because of the time difference between Munich, Germany, site of the summer Olympics, and New York, very little of ABC's coverage will be "live." Films of the competition (from 69 to 106 hours daily) will be edited and aired each day. During the entire Olympic schedule, ABC proposed to televise a total of 66½ hours of coverage, including 47 hours during prime time.

The Commission, noting that an earlier request by ABC had been denied in October 1971, because it was too general and asked for a blanket waiver for all the dates involved, said that "it is obvious" that a grant of the new request "would amount to an expansion of network control of prime time . . . well beyond anything we have had occasion to consider in the past several months . . ." The Commission stated that presentation of three and a half hours of Olympic material on ten evenings is not essential because it would be impossible to completely cover all of the events.

Since most of ABC's presentation will be recorded for broadcast, the Commission said, the program need not necessarily be presented at any particular time. It pointed out that a maximum of prime time programing was permissible even without the waiver. Assuming more time is required, the Commission said, there is "no basic reason" why the material could not be presented later in the evening.

ABC had contended that all of the arrangements for coverage and sponsorship had taken place before the prime time rule was adopted (its contract with the Organizing Committee was announced April 1, 1969; the rule was adopted in May 1970, and became effective October 1, 1971) and were based on three and a half hours of prime time coverage.

NAB Urges New Operator Rule

The National Association of Broadcasters urged the Federal Communications Commission today to adopt promptly its proposal to rescind rules which require radio stations to man their remote control pickups and transmitter links with qualified operators.

Though "laudatory," NAB said, withdrawal of the remote control and STL rules are but a "small fraction" of the steps necessary to bring all of its rules "into harmony with today's operating concepts and technological advancements."

It said the Commission should follow up its initial action by proposing, as NAB has recommended, rule changes that "streamline the operation and utilization" of other broadcast services.

NAB included with its comments a 40-page-plus filing urging the Commission to grant operator relief on such operations as TV remote control, inter-city relays and aural station links.

Radio Appointment

Three broadcast executives have been appointed to two-year terms on the Small Market Radio Committee of the National Association of Broadcasters.

Appointed by Vincent T. Wasilewski, NAB president, are Archie Harrison, Jr., president and general manager, WJMA, Orange, Va.; William J. Ryan, general manager, WNOG, Naples, Fla.; and A. Rock, general manager, WSMN, Nashua, N.H.

They will serve until the conclusion of the Association's 1974 annual convention in Houston.

Rules Adopted For Multiplex Microwave

Amendments of Part 2 of the rules, concerning methods of determining the necessary bandwidth and the occupied bandwidth for frequency modulated microwave radio relay systems carrying frequency division multiplex (FDM) speech channels, have been adopted by the Commission (Docket 18878).

The changes are important to the manufacturers and users of microwave equipment and are intended to provide more efficient use of the radio spectrum. The FCC said the changes would provide more meaningful methods for calculating the necessary bandwidth and measuring the occupied bandwidth for FM microwave systems.

The Commission stated that it was concerned with the relationships, particularly in certain FDM/FM systems, between baseband loading, message channel arrangements and carrier frequency deviation, and how these factors affect the determination of necessary or occupied bandwidth. The changed rules will apply to equipment type acceptance or to license applications when equipment is to be operated under the specified modulation conditions.

The present FCC action began with a rulemaking proposal, released June 19, 1970, suggesting two formulas to be used in specifying the root-mean-square noise loading for testing and in calculating the necessary bandwidth for transmitters carrying multi-channel telephony.

As a result of comments received in the proceeding, the Commission said, it had made several changes in the rules stating a standard method for determining necessary bandwidth, including the determination of the peak deviation of frequency modulated microwave relay systems, loaded with a baseband of single sideband, suppressed carrier, telephone message channels. Appropriate definitions and an exception to the formula for necessary bandwidth are also included.

"IS HE A SOLID-STATE ENGINEER, MOM, LIKE DADDY?"

Send Your Industry News To Broadcast Engineering

above and 15 dB below normal will be within range of the AGC amplifier.

Disadvantages

The straight AGC amplifier does have its shortcomings. For successful operation, the input levels should be continuous and not vary too greatly in level extremes. Should the program material contain long pauses, whatever compression has been put into the amplifier will become expansion, even to the point of full amplifier gain. Circuit noises, background noises or crosstalk can be raised to a very undesirable level. When the program level hits again after high expansion, the amplifier will go into deep compression. The resulting noise and level variations in the program heard after the AGC has taken place is known as the "breathing effect." If the amplifier is misadjusted, this effect can be heightened. For example, if the amplifier is adjusted so that normal program levels cause 30 dB of compression, in the absence of input signal, the amplifier gain will expand 30 dB!

The Gated AGC

The breathing effect is overcome to a large extent in the Gated Type AGC amplifier. The compressor and expander sections, although operating the same variable gain stage, are separate sections. The expander has its own buffer amplifier, rectifier and operates somewhat differently as its function is the reverse of the compressor. The expander will allow only 10 dB of expansion. Should the amplifier input be cut off, it will not expand to full gain. Instead, it will return the output level to normal level.

The control bias from the expander may control the variabl gain stage either directly or ind rectly, depending upon amplifie design. In one type circuit, the bia works against a control stage, an this control stage operates the var able gain stage. The gate (thresh old) voltage on the expander rect fier will prevent it from operatin until the input level drops lov enough for this gate to be ove come. The control amplifier share a common cathode resistor wit the variable gain stage which nor mally holds the variable gain stag in 10 dB compression. The expan der control voltage when in opera tion, will cause this control tube t shut off, removing the 10 dB o compression, which in the outpu circuit is 10 dB of expansion.

When compression takes place the expander bias is off and al lowed to leak off. Should the inpu level to the amplifier be cut off, th expander cannot operate until th signal comes within range so it threshold can open the gate. O course, without signal, the com pressor is also inoperative, and th amplifier gain will drift back t normal. Many of the most moder AGC amplifiers use some form o gating, although it may be called b another term.

The Memory AGC

This type of AGC contains som other refinements over the Gate AGC and contains memory o storage circuits. Besides the nor mal AGC actions, these also offe advantages in programing that con tains long pauses, such as in dra matic presentations.

The first memory constantly stores level information and anoth er circuit compares the presen levels with those of the preceding 10 seconds before a "decision" i made to change the gain up o down. This feature is helpful ir bridging long pauses without leve variations occurring as would hap pen in a straight AGC. The 10 sec ond delay will bridge these gap nicely and maintain an even leve on the output.

The second memory comes into operation after there is a 10 second pause or longer. Once it senses there is a very long pause, it will

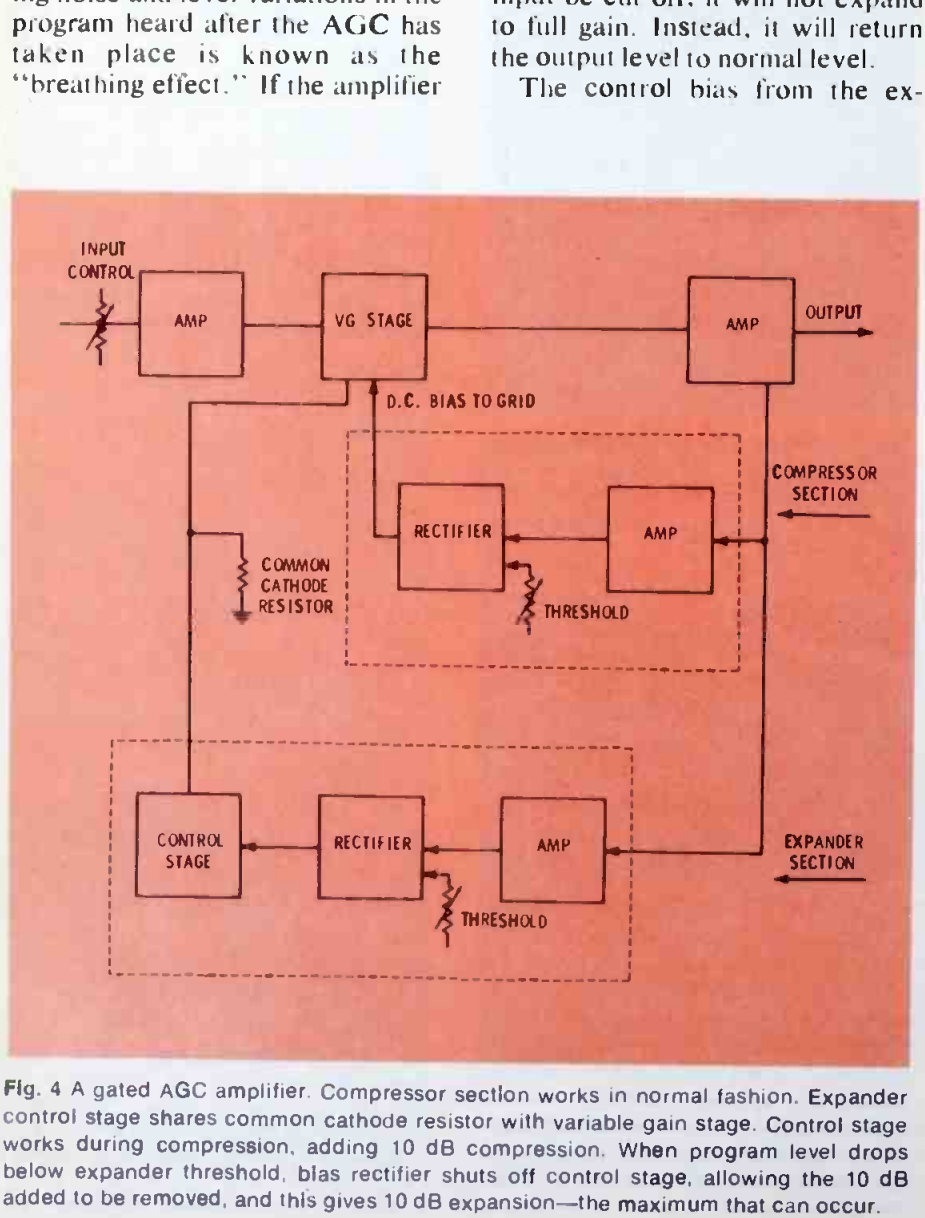


Fig. 4 A gated AGC amplifier. Compressor section works in normal fashion. Expander control stage shares common cathode resistor with variable gain stage. Control stage works during compression, adding 10 dB compression. When program level drops below expander threshold, bias rectifier shuts off control stage, allowing the 10 dB added to be removed, and this gives 10 dB expansion—the maximum that can occur.

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slowly drift the amplifier output level to its normal level. This is sometimes called a "reset to zero function."

The memory AGC does have one disadvantage. Some stations use a 10 second announcement. If the announcement had low levels, some or all of the announcement could be "in the mud" before the memory "decided" to change the gain.

General Shortcomings

AGC amplifiers are not a cure-all for program level problems. When misadjusted or operated improperly, they can compound level problems. A properly adjusted amplifier will greatly assist in maintaining relatively constant program average levels. As with most equipment, the AGC amplifier will provide its most satisfactory performance when operated within its normal limits.

Since low program levels will be expanded or increased and high levels will be compressed or lowered, the dynamic range of the program content will be narrowed. This narrowing of the dynamic range will detract somewhat from many musical type programs where a wide dynamic range is often preferred.

There is still another shortcoming, but this is mostly psychological. Many operators and announcers tend to lean on the AGC as a crutch. Consequently, very little or no attention is paid to levels at all. When levels are allowed to go outside the range of the amplifier, the AGC cannot be expected to correct them properly. When such conditions are allowed to occur, the defects in the program are sometimes very obvious.

The more sophisticated AGC amplifiers are attempting to cure many of the normal AGC shortcomings. It is a difficult job because of the great variety in program formats. To allow for greater variations, more controls and functions are being made adjustable. For example, there is both an input and an output level control, and the time constant is made selectable by a front switch to provide a short, medium, and long. The expansion and compression may be switched on or off individually.

Location

AGC amplifiers can be placed in any program path in which some automatic control over the levels is desirable. These are most generally medium to high level units and can be placed in paths with levels from −30 dB to +30 dB. The first obvious location is the program line to the transmitter. When placed in the transmitter program line, the AGC amplifier should be followed by a peak limiter or peak controller. The AGC should be adjusted to control the average program levels, with the limiter handling the peaks. The time constant of the limiter should be very short, and only 1 to 3 dB compression active on peaks. If the Limiter is a regular unit and if the time constants are selected for long values and greater compression levels, the Limiter begins to act more as an AGC and less as a Limiter.

An incoming remote broadcast line is another often used insertion point for an AGC amplifier. In many cases, non-broadcast people are handling the remote location, as in church remote. These may even be feeding the program from their PA System. Announcers on sports broadcasts sometimes hit it hard on exciting plays and the program levels vary considerably.

A recording booth, or recording equipment lineup in the Control Room can use an AGC amplifier to advantage. Quite often, incoming remote or network programs must be recorded for playback later. This recording is usually done while other programing is on the air. During such times, it is difficult for the Control Room operator to maintain complete level control over both programs at the same time.

Operation and Maintenance

The first step, of course, is proper setup according to the instruction manual. All models are not identical, so adjustments should be made according to your amplifier.

System levels should be set up and adjusted with the AGC in mind. The amplifier is designed to operate over a given range of input levels and will provide a given range of output levels. Many amplifiers have adjustable input and output pads, while others require external pads. Some of the newer models also provide an output control on the amplifier itself. Input and output levels should be adjusted so that the amplifier controls can be operated at midrange. If the external levels will not permit this, pads should be added so the levels will fall within this range.

Some amplifiers also incorporate a bypass switch, so that the amplifier can be bypassed should it fail. This switch connects the incoming line with the output line. When an amplifier is so equipped, it is wise to have both the input and output lines at about the same levels. When this is done, should it become necessary to bypass the amplifier, there will be no disruption of system levels. There can be a problem in this area if the pads in use are external to the bypass switch. By-passing in this case would insert the pads in the circuit and drop the output levels, resulting in a wild-scramble to readjust system levels.

How the amplifier is set up is most important to its operation. The initial setup adjustments can be made while using a tone as a program source. This will permit all controls to be set and adjustments placed somewhere near the specified values. Most of the older type amplifiers have only an input level control, and no output control. The input level should be adjusted with pads, if necessary, so that the input control can operate at midrange. It is better to use pads than to adjust a previous amplifier and thus upset system standard levels. If the system levels can allow the AGC control to operate at midrange without pads, so much the better.

With the input levels set and the input control at midrange, the compression should be that which is normal. Most AGC amplifiers have a compression meter or some other means of measuring the amount of compression. At this compression level, the amplifier

utput should be that specified in ie manual.

If the amplifier has an adjustable utput control, it should be set at iidrange for correct level. And if iis output level is higher than the ystem standard, pads should be sed to drop it to the system nor- ial. When there is no output con- ol, the output must use pads to educe the output. If the input level s dropped, the amplifier will not be perating properly.

At this point, the amplifier is set p within specifications according o sine wave input. Since program- ng is a complex waveform, final djustments to the AGC should be nade using selected program mate- ial. Select material that has a rea- ionably controlled program level, such as a good record and one that loes not have too great a dynamic ange. Feed this through the sys- em, setting the console VU for roper peaks. Observe the meter on the AGC amplifier. This meter should be fluctuating gently around the normal reading. If not, touch up the AGC controls until it does. Next, increase the output from the console to the maximum expected overage and observe the AGC meter. There should be greater compression.

Now, reduce the level on the console well below peak level, but still within range of the AGC. Expansion should take place. If the AGC is of the Gated Type, drop the console level to zero, the expander should not expand to full gain, but rather return the compression to the normal position. That is, the meter should rest at the position it reaches when the console is hitting normal peaks on the console.

Next, pick a musical selection which contains a wide variation of levels, observe the AGC while it is controlling this type of material. If the compression and expansion are where they belong, the amplifier is ready for general program material.

When one of the new models with everything adjustable is set up, besides the normal setups required, they should be touched up for the type program format a station uses. If Top 40 music, a shorter time constant may be used, while an average format may use a medium time constant, etc. The point of this: If the station has a Top 40 format, check it out on this material rather than a classical number. If all classical, don't use top 40 music to make the final adjustments.

AGC amplifiers often are used in the program line of FM Stereo stations. As with all stereo channels, each channel should be as identical. The setup procedure is the same, initially, as for a single system.

The initial setup should be with each AGC amplifier and channel separated from the other. Each should have identical compression and expansion ratios, and the input and output levels should be identical. If the input and output controls have markings, check these out to see if they read the same on both amplifiers. Sometimes, these do not agree. If they do not agree, the final settings should be written down and saved for future reference. Someone may come along and see these controls set at different markings, and thinking he is balancing the amplifiers, set them to the same markings.

There has been some controversy over how the amplifiers should be operated: independently or tied together. The author prefers to operate them tied together so that the channel with the highest level will take control of both AGC amplifiers. To tie the two AGC channels together, a simple jumper is run between control busses. Many

(Continued on page 52)

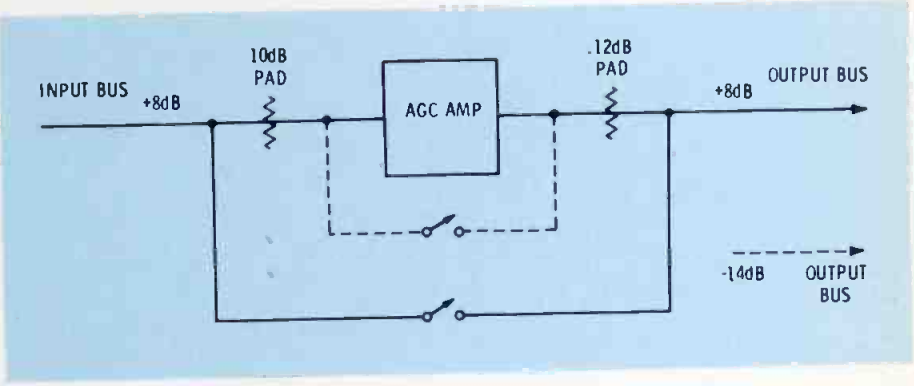


Fig. 5 By-pass switch should be wired as shown in solid line. Bypassing the AGC would cause no level changes on the output bus. Dotted line bypassing of AGC will insert both pads in output bus, dropping bus level by 22 dB.

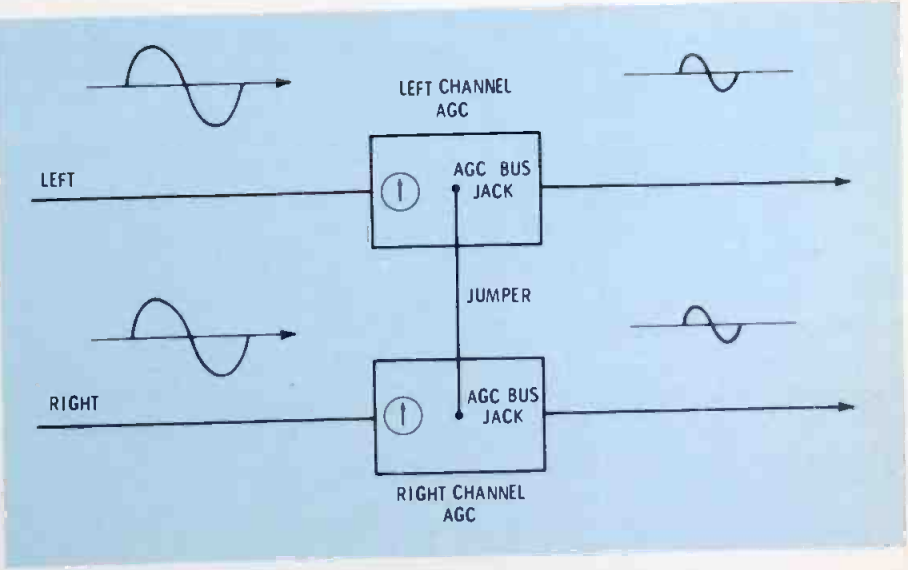
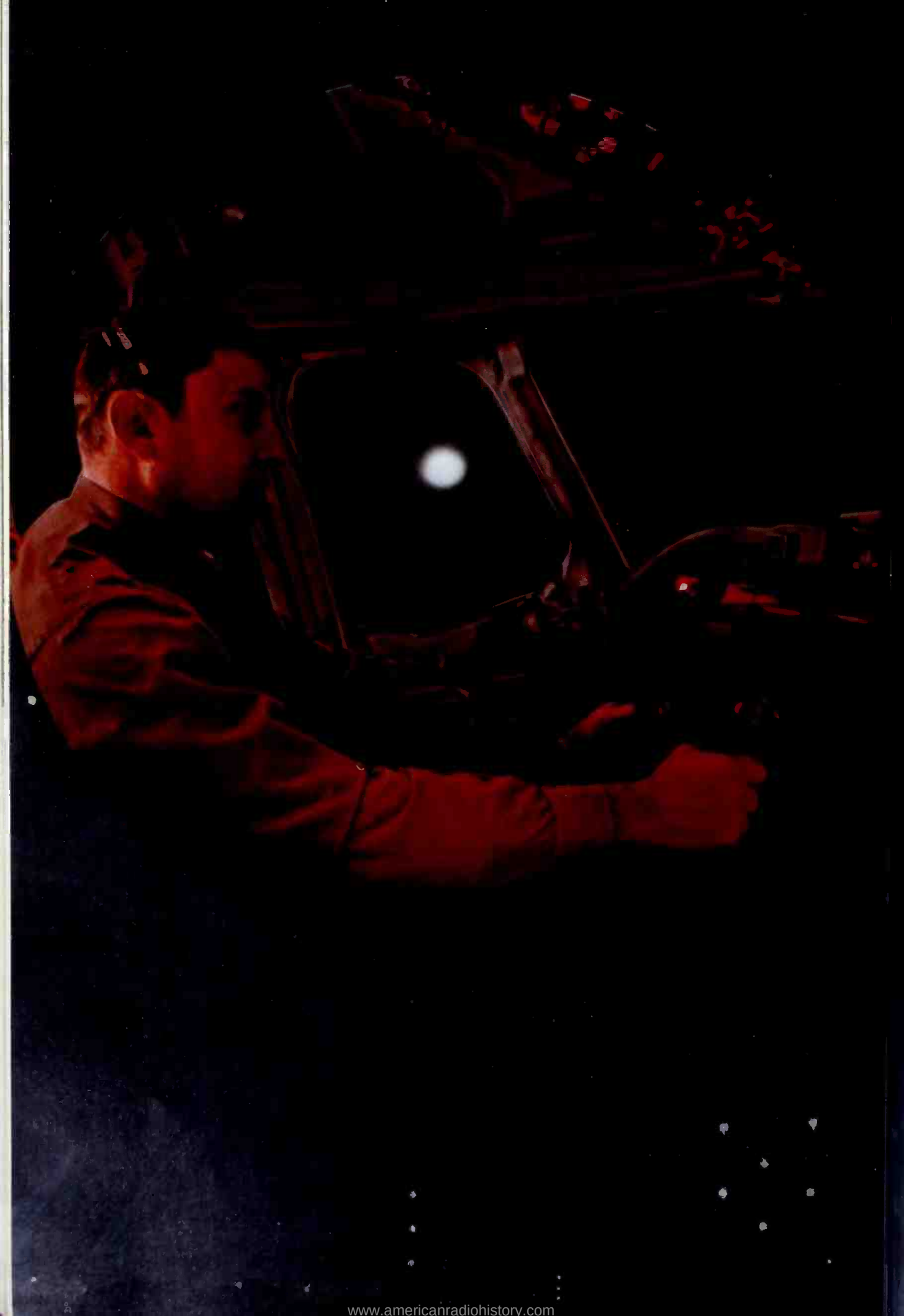


Fig. 6 Two AGC amplifiers used together for FM stereo. The AGC control bus of both are tied together. The channel with the highest input assumes control of both channels. Compression meters show identical compression.



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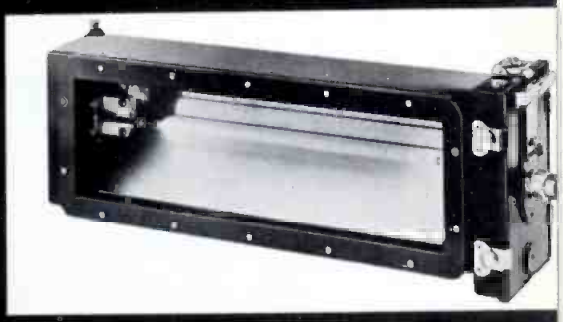

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Flash rate: 60 per minute
Day output: 100,000 candelas
Night output: 500-1,000 candelas
180° horizontal coverage, 10° vertical beam, sequential flash.

Fig. 1 Front view of the WSTM facility, a special design for FM radio.

WSTM makes its move

By Charles R. Strickland*

When WSTM started operations about five years ago, we occupied small converted offices which soon became inadequate. As the day approached when it would be possible to move into new quarters, much time and effort went into research and planning so that the new facilities would be a pleasant and efficient place to work. A plan developed which has pleased everyone at the station.

Various possible locations for the new studios were explored. The site finally selected is in a new office complex which offered ample parking, a flexible floor plan, easy access, and the possibility of placing the studio areas at the end of the building in order to minimize sound leakage problems. One of the factors involved in the choice was that we would be able to erect a sign proclaiming our presence to the 60,000 cars per day passing on a major expressway.

*Chief Engineer, WSTM, Louisville, Ky.

Planning started with the studio areas. The position of the showcase control room was obvious, facing the expressway and at the end of the building. A sound lock was included, and it was made large enough for the water cooler, soft drink machine, and coffee bar to be convenient for the announcers. The restroom is only steps from the control room. Next to the control room is the news room, placing the teletypes close at hand. The production room also opens into the sound lock.

Ample space was provided for present and future office needs. All offices feature panelled walls, carpeting, and acoustic ceilings. The receptionist's desk was placed so as to give her a clear view of both the front and rear doors.

Studio Construction

After much discussion with the architect in charge of the office complex, we decided on the type of studio wall construction. First, two-by-four stud walls were built. These were filled with fibergla sound blanket, then covered wi half-inch insulation board. Ne half-inch wallboard was mount by means of R-C channel, springy metal strip which preven sound conduction through t walls and also creates a small de air space.

Over the wallboard we install two-inch Tectum. This is a dens fibrous panel which was design for sound control, and is ve effective in deadening the studio Painted an off-white, the Tectu forms the finished walls. Its a pearance seems rather strange first, but actually the effect is rat er pleasing. One word of cauti when building soundproof wall Be sure all corners are given sp cial attention. Earlier experien indicated that if there is going to l a sound leak, it will probably be a corner.

The studio suspended ceilin are soundproofed with a thick lay of sound blanket. Windows b tween studios are double ¼" pla

ass with an air space between, oors are carpeted, and the doors e solid core.

We were fortunate in that four parate heating-air conditioning nits were standard for an area of ar size, so it was a simple matter put the control room and pro-uction room on different units. his eliminates any chance of ound leakage through the duct-ork.

Two conduit systems were in-alled, one for audio and the other r control and miscellaneous cir-uits. There is a junction box for ach conduit system in the control oom, news room, and production oom. The audio conduit contains 0 shielded pairs, while the control onduit contains 25 unshielded airs. Using this system, adding iring from one room to another is mply a matter of connecting to ne barrier terminal strips in the nction boxes.

In order to get the wiring to the ontrol room equipment it was necessary to raise the floor about four inches so that conduits could be run under the floor to the center of the room. Boxes set in the floor carry audio, control, power, telephone and monitor antenna circuits to the operating position. The two-by-fours holding the raised floor were anchored to the main concrete floor, then filled with tar for added firmness.

The Control Room

The first consideration in the control room design was human engineering. All controls were to be arranged logically and conveniently, and everything needed by the announcers was to be within easy reach. Two Sparta dual turntable cabinets were placed on each side of the announcer's position. In addition to the turntable, each cabinet contains a cutout which makes a very nice bin for albums. Wire dividers supplied with the cabinets separate each bin into three sections. It was decided to eliminate all equipment racks, so the rack space provided in the bottom portion of the turntable cabinets was used for the RF amplifier, frequency monitor, modulation monitor, EBS monitor, remote control unit, pilot frequency meter, and house monitor amplifier.

Our Collins board was raised to allow placing a pair of lighted switches under each mixer. Thus, the start and stop controls for each turntable and cart machine are just inches away from the associated mixer.

One cart machine was placed on each side of the board and a 100-cart storage rack was mounted on top of each machine. In this way the carts are in full view and within easy reach. A reel-to-reel tape recorder was placed at the end of the left turntable cabinet, equipped with casters and multi-pin connectors so it can be moved into the production room or news room if needed.

The control room desk was con-

ig. 2 Wendell Phillips at the controls in the howcase control room. See Figure 3 for oom layout and dimensions.

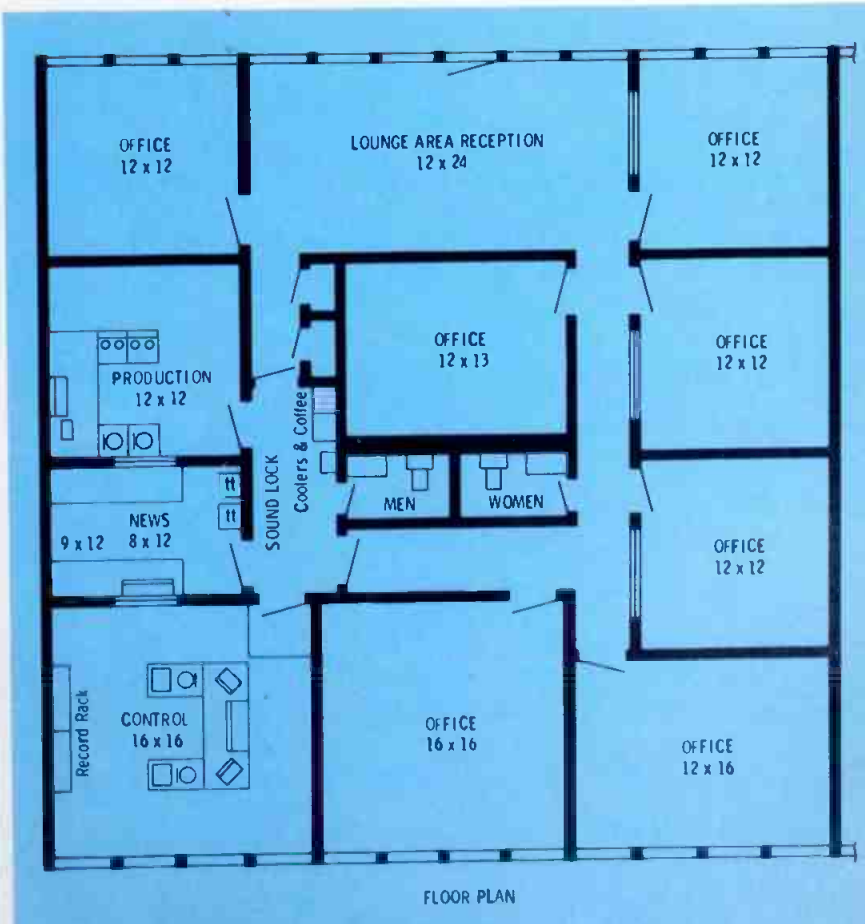

Fig. 3 The WSTM-FM facility layout.

structed of half-inch plywood and covered with Formica. The extra expense of the Formica is an excellent investment, as it will take the punishment which it certainly will receive. All wiring is concealed within the cabinets and desk.

In The News Room

Like any news room, the one at WSTM tends to be a busy place. In addition to UPI Audio, we have an Associated Press teletype, a weather wire, a beeper phone, a mobile unit, and two scanning monitors covering sixteen channels. It was necessary to mount one monitor receiver on each end of the desk to prevent confusion when both are active. A casette recorder has been quite satisfactory for news operations.

Remote controls allow the control room cart machines and reel-to-reel recorder to be operated from the news room. The small news room mixer also serves as a line amplifier for a weekly chruch remote broadcast.

Our broadcast telephone loops all terminate in the news room, allowing the telephone company to make line changes without disrupting control room operations.

Production Room

The production room board was once a monaural Gates Producer. A second program amplifier was constructed, the built-in monitor amplifier became a cue amplifier, and stereo monitor amplifiers were added. The original pots were replaced with professional attenuators with cueing. One mixer is permanently assigned to a stereo mike input; each of the other three mixers has its own ten-position selector switch. Through this arrangement, any one of the ten inputs to the board can appear on any mixer. A tone generator is provided for balancing.

A panel mounted in the top of the desk contains start and stop switches for two turntables, a cart machine, and two Scully stereo recorders. One Scully has multi-pin plugs so it can be moved out of the production room should more space be needed. Cables are provided so that the control room tape recorder can be quickly added if a third machine is needed. One office has been provided with mike connectors for use as an auxiliary studio.

Transmitter

All but the basic equipment has been eliminated from the remote transmitter location, placing everything possible at the studios for ease of maintenance. Equalized phone lines drive the mostly solid-state stereo transmitter through a FM stereo Volumax, eliminating most tube failure problems. The remote control unit, monitor amplifier, and tower light control panel complete the equipment complement. A dual-polarized antenna system was recently installed, with great results.

Several months of operation have shown our plans to be as good as we had hoped, proving the value of planning sessions in which the announcing, engineering, and office staffs all participated. Although our studios are part of a large office complex, a similar layout could be used in a station-only building.

Editor's Note: WSTM has developed a practical station facility. Most important though is that they placed a high priority on sound-proofing the studios. In some locations this is not enough. If heavy traffic rolls past your door, you should pay as much attention to your floors and equipment mounting.

If you have made major facility changes that were designed to put your station out of the dark ages of broadcast layout designs, we'd like to hear about it. We do pay for articles. Write to **Broadcast Engineering**, 1014 Wyandotte, Kansas City, Mo. 64105.

Fig. 4 The author and Chief Engineer doubling as newsman. His window opens on the control room. Record stacks at back of control room are visible.

Fig. 5 Down the line from the control room and the news room program director Allen Brown and Sharon Hancock put together a spot in the production room.

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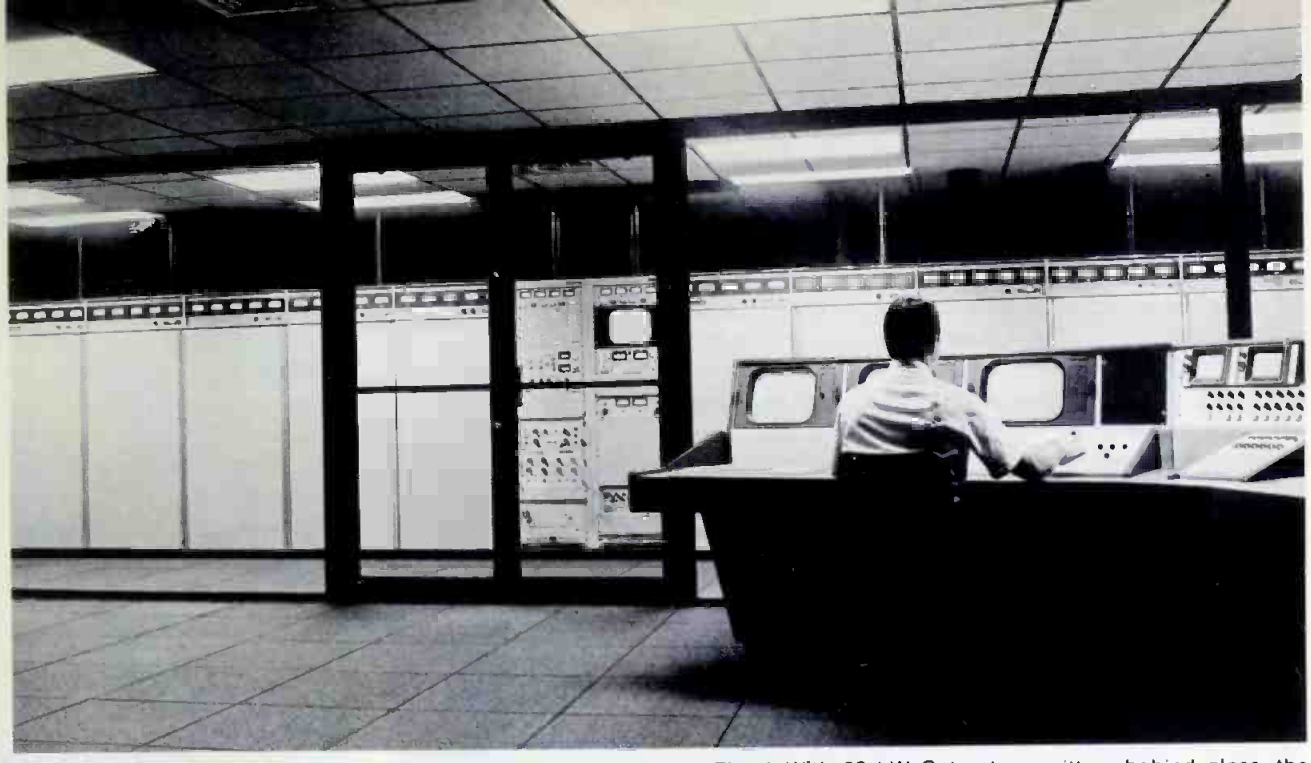

Fig. 1 With 35 kW Gates transmitters behind glass, the new control room lends itself to the professional attitude of educational KETC-TV.

KETC takes unique facilities approach

sing film and video tape equip-ent at the transmitting site akes KETC a breed apart as to ow goes into a full color opera-on.

With the recent completion of ie KETC-TV Broadcast Center t St. Louis, Mo., an entire new oncept in broadcasting facilities as been introduced.

KETC-TV, the Educational TV ommission Station, Channel 9, erving the St. Louis area is now perating from one of the finest ansmitting plants in the country . . one which is fully equipped to ccommodate not just transmitting nd terminal equipment, but also ouses playback film and tape fa-ilities, automated video and audio witching and network line termi-als normally located at the studi-s.

The inclusion of the film and ape equipment at the transmitting ite sets the KETC-TV Broadcast enter apart from normal transmit-ng facilities. Some 95 percent of he KETC-TV programming is lm, tape and network origin which manate from the Broadcast Center. The 5 percent of live broadcasting, produced at the studios at 6996 Millbrook in St. Louis, is micro-waved to the Broadcast Center via the passive reflector to the microwave receiving antenna at the base of the tower, then by waveguide into the building.

Companion to the film and tape facilities is automated switching which, according to Jack Vines, KETC-TV director of engineering, "improves the air look through smoother video and audio switching, allows clean transition between programs and IDs and synchronizes program timing and network joining."

In effecting the $1,350,000 refurbishing of KETC-TV facilities, the board of trustees and Robert C. Glazier, executive director for St. Louis Educational Television Commission, working in conjunction with Mr. Vines, have been guided by one common goal . . . the construction of a first class operation.

From studio equipment to transmitters, everything is new. There has been no upgrading of the antiquated monochrome system with which KETC-TV has been operating since its inception in 1954 and no attempt to utilize the transmitting equipment located atop the Boatman's Bank Building in downtown St. Louis.

Today KETC-TV beams color transmission twice the strength of its previous monochrome signal to an area of 60,000 miles, tripling its coverage in the grade B area and encompassing territories hitherto untouched by public television. Now Channel 9 reaches more than two and one-half million viewers in the grade B area alone and well beyond via CATV.

At the heart of the installation are two Gates' BT-35kW color television transmitters which operate in parallel and feed a combined 40.7 kW output into the antenna atop the newly erected 1,073 foot tower, for a full 316 kW effective radiated power.

The TV transmitters operate in parallel, supplying complete redundancy, which affords KETC-TV a transmitting system designed to operate without loss of air time.

The transmitters were the first items shipped to the KETC-TV Broadcast Center. Installation began before completion of the building. Construction of the block type Broadcast Center was started in the autumn of 1970. Occupancy began in April and the station began color-telecasting in November.

Architect Richard P. Stahl of Springfield, Mo., working from specifications mapped out by Vines, designed the three level, 9,000 square foot building which is constructed of tri-score blocks.

Housed on the first floor of the Broadcast Center are the control room, the glassed-in transmitter room, the film and tape room an the engineering shop.

The blower systems for th transmitters are housed in the lov er level beneath the glassed-i transmitter room. The system unique in that it could be locate within the transmitter cubicle space were at a premium.

Also housed on the lower lev are the electrical equipment roon the machine shop, maintenanc room, telephone equipment roon full bathroom and carport.

The upper level accommodate the storage area and a Gates mult ple transmitter RF switching sy tem, one of the first of its size an complexity, and the RF transmi sion line leading to the antenna a ray.

A permanent monorail from th tower to the switching room is i corporated for lifting large piece of equipment into the building from the building to the tower el vator for transportation up th tower.

Fig. 2 Film and tape room shown here includes computer flooring and acoustic ceiling.

ig. 3 Note the elevator waiting at the latform. Also, a permanent monorail is hown coming toward the building from ust above the tower elevator.

A unique feature in the planning of the KETC-TV Broadcast Center was preparation for the inclusion of a second educational television channel . . . Channel 40, the UHF channel which has been allocated to the St. Louis area by the FCC.

Although the installation of Channel 40 may be some two to three years in the future, the facility was designed to house a second channel at minimum additional cost.

KETC-TV's first class operation is reflected in more than just its facilities, its equipment and its expansion program . . . it is enhanced by its attractive coordinated interior decor. Gates' BT-35H transmitters have figured importantly in the KETC-TV Broadcast Center in ways other than just transmitting signals. The cabinetry, finished in "Gates' beige", has determined the color of all equipment in the adjoining control room, adding uniformity to the decorating.

Medusa plaster, painted an off-white, covers the walls and is accented by flat black trim used on the doors, trim and the exposed pipes and tubes. To amplify the modular appearance of the building, recessed black grids support the acoustical ceiling. The same grids are repeated in the computer flooring. Red carpeting covers the removable blocks of the floor, which has been designed for easy access to the crawl space beneath. This crawl area, which houses cables and doubles as a cold air return, eliminates the need for cable trays and trenches.

The sixth educational television channel to begin operation in the United States, KETC-TV is supported by the St. Louis County Cooperative School Districts, the Arts and Educational Council of Greater St. Louis, membership subscriptions and outlying school districts outside the St. Louis area, which pay a per pupil participation fee.

The tools of the trade:

Getting more out of your lighting equipment

By Herb Greele

About the author

Herbert W. Greeley has been, for the past nine years, Lighting Director of The Johnny Carson Tonight Show and has been associated with NBC for the past 23 years. His production credits read like the history of TV itself, starting with Milton Berle, Producers Showcase, NBC Operas and a multitude of quiz shows and commercials.

This article was especially adapted for **Broadcasting Engineering** from one section of a three-day seminar Greeley gave under Kliegl Brothers sponsorship. His participation in the seminar does not imply an endorsement of any company's lighting equipment.

A detailed course curriculum for the Lighting For Television seminar—as well as dates and locations around the country—is available from Kliegl Bros. For a copy, write Mr. Wheeler Baird, Kliegl Bros., 32-32 48th Avenue, Long Island City, New York 11101, or circle Readers Service Card 200.

If you're going to be a Lighting Director in television, or if you're simply going to be "the guy who does the lighting at the station", one of the basic sets of facts you must know is what the tools of the trade are.

While there are a lot of lighting instruments from which to choose, most of what you see used in TV stations around the country fall into one of three categories: Scoops, Fresnel spotlights, or Klieglights.

Each is used for a different purpose in television broadcasting. This article summarizes the capabilities of each of these three categories of instruments and offers some tips on how to use them.

Scoops: For General Or Base Lights

Walk into nearly any television station in the country and look up —you'll see more scoops hanging from the grids on the ceiling than any other single type of fixture. In fact, the quickest way to see where the main set in a studio is located is to see where the scoops are aimed.

Scoops are used to provide a smooth, soft, general light. Though manufacturers provide them in a variety of wattages, you see more 1,000 Watt and 1,500 Watt units than any other type.

A scoop does not focus. It simply floods a scene with diffused light. That doesn't mean it's uncontrollable, since there are two methods for adjusting the light output of a scoop. You can dim it, of course, on your dimmer control system; or you can put a spun glass filter, also known as a scrim, on it.

When dimming any front light you should stay within a 300°k dro in color temperature, which mean dropping to 7 points from full o your potentiometer. Dimming be low this point will cause, in th case of a 3,200°k lamp, a "blu lamp" to turn "red". This coul result in considerable trouble fo the video engineer in color balanc ing his cameras, especially involv ing flesh tones.

Second, the scrims are fine fo further diffusion of the fixture, al though they usually reduce by 3 percent the foot-candle reading o the scoop. The resultant light out put can be compared to a very haz sunlit day, a very soft light with n definite shadows.

Here's a good rule of thumb fo locating the scoop light you're usin as base illumination. Place th scoop 10 feet away from the perso being lit and hang it approximatel 10 feet high. This "isosceles trian gle arrangement" can be used suc cessfully in studios of limite height, say 7 feet high, where th base and the height of the isoscele triangle would now be 7 feet.

In terms of angle, the simples technique is also the best: hang th scoop so it approximates the cam era angle with which it is bein used. The reason for this is to ena ble the subject's eyes to be see without any ungainly shadows, an to de-accentuate lines and wrin kles. Steep angle lighting, except i the case of dramatic shows, is no advisable.

Fresnel Lens Spotlights For Concentrated Light

The fresnel (the "s" in the wor is silent) lens spotlight is a highl

Fig. 1 Putting a spun glass filter on the scoop softens the light output, but it also reduces the light output by 33%.

Fig. 2 The author is shown framing the light by adjusting the shutter of a Klieglight.

Fig. 3 Barn doors of a spotlight can be used to cut light off at the top, bottom or sides.

versatile instrument and one of the least understood tools of the television trade.

Fresnels are equipped with "barn doors" or metal flaps, and these devices are critical for control of the fresnel spotlights.

The barn doors can sharply define the circle of the fresnel lens so it becomes another shape. There are doors top and bottom of the fixture, and extenders on the sides, so almost any shaping is possible. The most frequent use of this shaped light is when there is a single speaker, standing at a podium, on camera. A fresnel spotlight is an excellent choice for a key light in such a situation and the light can be sharply cut off around the podium by adjusting the barn doors.

Besides the barn doors, and dimmer system control, the fresnels also have a spot-to-flood adjustment. This can widen the circle of the beam and generally add flexibility to the unit.

The most popular fresnel spotlights are models in the 1,000-Watt range (often called "aces"); 2,000-Watts (often called "deuces") and 5,000-Watts (often called 5k's). We use fresnels a lot for talk shows. For that purpose, here's a good rule of thumb:

Use 2,000-Watt Kliegl fresnels, set at full flood, focused on each of the participants in a talk show. That means one fixture per person for key lighting, with barn doors adjusted to prevent spill to the other people on the panel.

Each fixture should be about 10 feet away from the panelist and 10 feet high and aimed at an angle of about 45° . . . so the center of the spot is on the panelist's face. Using those distances, should give you a very useable 125 foot candles on each person you're lighting. For fill light, add a judicious number of scoops.

For Well Defined Cut Off Light

Klieglight is actually a trade name owned by Kliegl Brothers, but it means an ellipsoidal reflector spotlight.

We use Klieglights to provide well defined, precise light. Typically, the scoops give us our general illumination on, for example, a variety show and the Klieglight is used as a follow-spot on the main performer.

Klieglights, besides providing a sharp "circle of light", can be controlled with great accuracy. As with the scoop, the first method of control is through the dimmer control system.

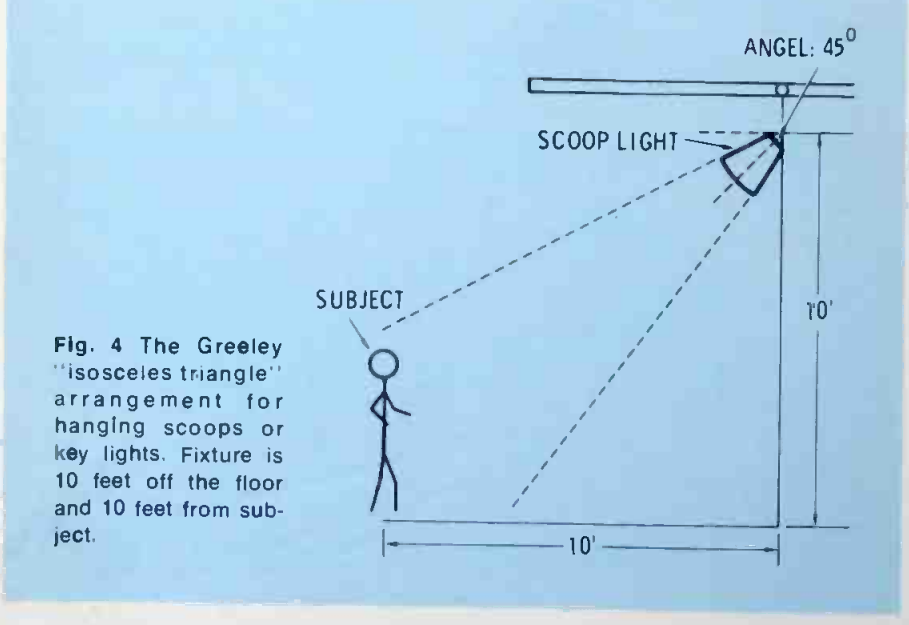

Fig. 4 The Greeley "isosceles triangle" arrangement for hanging scoops or key lights. Fixture is 10 feet off the floor and 10 feet from subject.

But unlike the scoop, the Kliegl light also has an internal shutte arrangement which allows you t frame the light. This framing cap bility has many applications in television studio. For example, th Johnny Carson "Tonight" Sho used a Klieglight as the key lightin on Johnny Carson when he wa seated at his desk. The Kliegligh shutters were arranged so that th top of the light area was sharply cu off. The reason for this was to elim inate the ugly shadow created b the boom microphone that wa used on the show. A separate cue with different lighting that als avoided the boom shadow, wa used when Johnny stood up.

Klieglights are sold in man packages, but the 750 or 1,000 Watt instruments are the mos popular. Lens sizes are 6" or 8" an a good TV facility will need both.

There are two other purposes fo the Klieglight that should be men tioned. One is to project patterns Patterns are a useful, dramatic de vise that can help a color or black and-white setting look more inte esting. You can buy the commer cial patterns or even make you own from aluminum pie plates, o sheet aluminum.

One good use for patterns, fo example, is in car commercials. W cut a cloud pattern and project it with a high wattage Klieglight, on blue cyc (set canvas background) Shot at an extreme angle, and hal hidden by the car, this provide dramatic accent to the commercial

The second major auxiliary pur pose for Klieglights is as a slas light. A slash light means exactl what it sounds like . . . light that i slashed across a television picture For example, suppose there was fireplace in a set, with a paintin centered over it. A Klieglight, wit the light framed so light and shad ow slash across the painting, help add dimension to the whole scene.

Editor's Note: For further lighti ing tips, we suggest you read th lighting article in the March, 197 issue of *BE*. Extra copies are availa ble on request.

SEVEN YEARS AGO AMPEREX GAVE THE TELEVISION INDUSTRY ITS FIRST PLUMBICON* TV CAMERA TUBE...

...LAST MONTH THE TELEVISION INDUSTRY GAVE AMPEREX ITS 20,000th ORDER* FOR THIS STILL UNIQUE, UNDUPLICATED DEVICE.

In the comparatively short span of time between its introduction and the total conversion of the broadcast industry to its use, the Plumbicon has enjoyed continuing professional acclaim and industry-wide endorsement as attested to by its receipt in 1967 of the coveted Emmy from the National Academy of Television Arts and Sciences, by the award of the David Sarnoff Gold Medal by the Society of Motion Picture and Television Engineers, Inc. to Dr. E. F. deHaan, the tube's developer and by the very practical and meaningful award to Amperex of purchase orders for twenty thousand Plumbicon tubes.

How do you say 'Thank You' for such support and such recognition? We feel that the most sincere way to show gratitude to an industry for its support of one's efforts is to rededicate those efforts for the further advancement of that industry.

We therefore pledge that we will continue to devote the greatest part of our energies to the task of keeping ahead of the uncompromising requirements of the television industry and to keep the industry ever supplied with better and better TV camera tubes. Electro-Optical Devices Division, Amperex Electronic Corporation, Slatersville, Rhode Island 02876.

Amperex®

TOMORROW'S THINKING IN TODAY'S PRODUCTS

Sold through
North American Philips Electronic Component Corporation

Early this year, Amperex delivered its 20,000th Plumbicon tube, through its distributor Satterfield Electronics, to WHA, educational TV station affiliated with the University of Wisconsin.

Fig. 1 The simple signal sampler built by the author includes meters for relative signal and modulation readouts.

Simple signal sampling for FM stations

WLIF staff uses sampling device to check out signals. The results are more than you'd expect.

By Dennis R. Ciapura*

Probably the most intangible and variable product any commercial vendor can market is the radio signal. While we routinely excite the airways with thousands of Watts of precisely generated and meticulously metered RF energy, what happens to the illusive electromagnetic salesman at ground level over rough or urban terrain is often disconcerting enough to make a Marconi photo shed a tear.

It is common knowledge that predicted field strength values will not hold true near power lines, etc. for AM broadcast frequencies, and that VHF-FM signals can vary 20 dB within a distance of 10 feet in urban areas. So, when checking system performance we endeavor to make our measurements under as near ideal conditions as possible and of course, monitor points are chosen accordingly.

Unfortunately, the broadcaster is unable to place all of his listeners in the same ideal reception areas.

Deviations from calculated field strength are predictable and just as calcuable as the free space values if all of the variables are known, but for practical considerations the number of variables may render any attempt at calculation near impossible. For example, if a local restaurant operator finds that he is unable to receive your beautiful music station on his background music receiver, he is not likely to be consoled by a mathematical treatise describing his geographic location and it's deleterious affect on VHF signals eminated from your point of transmission.

A more practical approach would be to quickly locate the suitable reception point that usually exists a few feet away with a portable device that actually measures the relative signal strength at any point. Fortunately a suitable device need not be as sophisticated and expensive as a broadcast field strength meter since we are interested primarily in whether an adequate signal exists at the location in question and not its absolute value. A suitable device for such investigations can be assembled in a

Fig. 2 The author chats with Annapolis resident while checking reception quality.

*Chief Engineer, WLIF/WTOW, Baltimore, Md.

A Chroma Keyer for Composite Signals?

Impossible!

CBS Laboratories did it. Developed the first practical Chroma Keyer for composite signal. Now, with the new NTSC Chroma Keyer you can: Key from a composite color video signal. Record on video tape and play back for post-production editing and keying. And tape talent when convenient and later key in the background material. Now, key your newsman over a network feed without that color-edge crawl.

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Edges are sharper and clearer because the CBS Laboratories Chroma Keyer eliminates color-edge crawl. The NTSC Chroma Keyer is a production tool that will save you time, save you money . . . and open up a whole new realm of programming possibilities. To discuss your station's requirements, call (203) 327-2000 or write:

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Circle Number 20 on Reader Reply Card

Fig. 3 On the AM side, WTOW engineer Bill Riley gathers AM readings and spectators.

evening for less than $40.00! We'll describe the simple signal sampler we use and some of its applications.

Construction

After considerable thought about what kind of signal strength indicator would be simple enough for anyone on a typical radio station's staff to use, we logically evolved the idea of a meter that only needed to be switched on and observed.

This obviates a logrithmic readout so that very weak and also strong signals could be observed on the same meter without decading circuitry and its attendant switches. While stable operation affording repeatable measurements is necessary, actual M.V./M. meter calibration is not. Ideally, the device should be able to work on the AM and FM broadcast bands for operations having both outlets.

Well, to make a long story short, we were unable to justify any complication beyond a portable AM-FM receiver with metered AGC voltage. An inexpensive VU meter was added to the audio output of the receiver for relative audio level measurements as well. The 50 μA signal level meter is switched to either the AM or FM AGC circuits for an indication of relative signal level. The receiver we used for the proto-type model derived its FM AGC voltage from ½ of the radio detector.

Many radios use a small reverse bias on the AM AGC detector for a delay characteristic, which will result in a negative meter reading with no signal input, and of course, sets by different manufacturers vary in supply polarity, voltage levels etc. sometimes resulting in an offset voltage. This may be largely corrected by using the mechanical zero-set adjustment on the meter to get a more nearly zero reading under no signal conditions. Since we are measuring the strength of the incoming signal relative to a previous reading with the same instrument or relative to the strength of another signal on the band, the actual meter accuracy is of little consequence, as long as the measurements are repeatable.

The reciever should be powered by mercury cells, thus providing an inexpensive, stable voltage supply. Even rather inexpensive portable receivers exhibit surprisingly good temperature stability, so variation in ambient temperature over a reasonable range is not a problem.

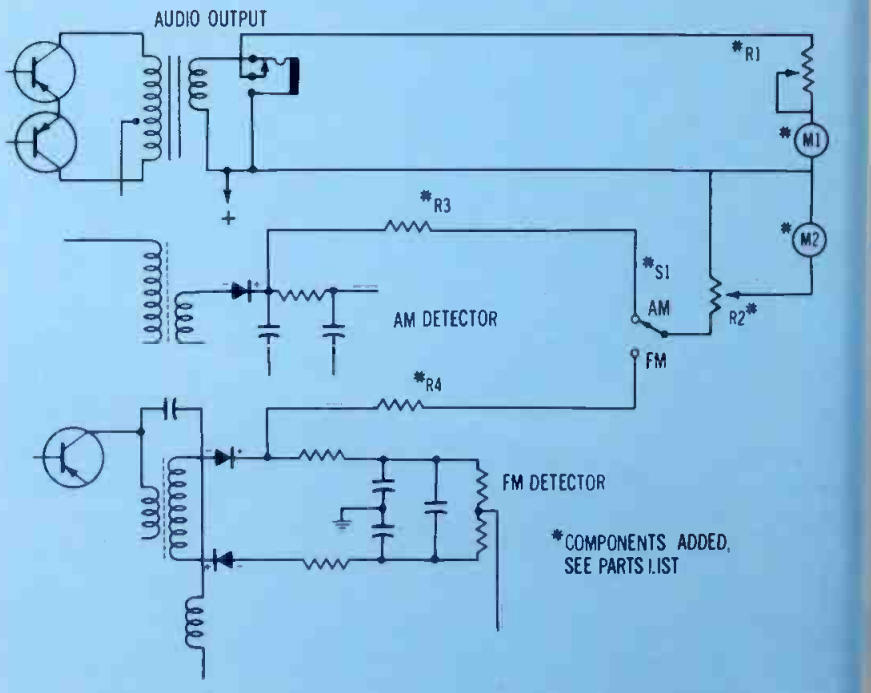
The receiver and meters shown in the parts list are representive of inexpensive units most stations ar likely to have on hand or can easil obtain.

Using the AGC circuitry as meter voltage source has the ac vantage of providing a logarithmi readout. If a standard signa strength meter is available fo comparative reading, the scale c the signal sampler may be calibra ed in actual UV or MV by adjus ing the calibration trim-pot for th desired metering range. The value shown in the diagram with the re ceiver listed produce a readabl meter range of approximately 1 μV to 1000 μV on both bands. Th circuitry is so simple that no diff culty should be encountered i adapting almost any receiver t signal sampling.

Application

We originally intended to use th signal sampler to pin down probler reception areas, but its simplicit and versatility made investigatio

Fig. 4 Partial schematic of the simple signal sampler circuitry.



Parts List

M1—Allied Radio Shack #22-019, miniature VU meter.
M2—Allied Radio Shack #22-017, miniature μa DC.
S1—SPDT toggle switch
R1—50 K Trim Pot
R2—500 K Trim Pot
R3—3.9 K ¼ Watt
R4—6.8 K ¼ Watt
Receiver is an AM/FM Allied Radio #12-674

ground level signal pheonomena s easy, we soon found manyun- seen applications for the de- e.

WLIF-FM and WTOW-AM are rt of Sudbrink Broadcasting rp., a company with directives m the top to provide the best ssible public service no matter w inconsequential a listener's estion or complaint might seem. s a result, we log all calls relative t reception problems. All callers lk directly to the engineering aff, and many reception problems e handled personally using the gnal sampler.

Most people are unaware of how sily VHF signals are reflected cause of their short wave-length. e public relations value of ac- tally checking signal level in nsely populated residential areas a statement of the obvious. The blic, in general, rarely has any ntact with the broadcaster other than through air personnel. A great deal of interest is always generated by station personnel working in the field and most residents are surprised that anybody really cares about how their signal is received in their neighborhood.

The unit can also be used to locate optimum reception areas indoors. A change of location can sometimes make the difference between good quality reception and almost no reception at all. The unit's antenna may be oriented vertically or horizontally to determine the best polarization for the receiving antenna at any location. We also found it both useful and interesting to pick out monitoring points near the edge of our prime coverage areas and log the variation in relative signal strength versus time of year, and weather conditions.

Our corporation operates an AM and FM in the Baltimore area, so the dual band unit described makes it easy for us to gather data for both stations quickly.

For FM measurements, the whip antenna should always be fully extended and in the same plane unless separate data is recorded for each plane. It is often useful to record the signal level of another station near the same frequency and direction for comparison. If the strength of both stations is down for a particular time period, we can be quite sure that the loss is a function of propagation conditions.

While the simple signal sampler is not a substitute for the professional signal strength meter, it does afford the broadcaster an inexpansive means of determining exactly what is happening to his signal at any place, indoor or out. We have been able to learn a great deal about signal propagation at ground level in our coverage area and have found frequent "in field" sampling yielding unexpected PR benefits as well. After a while it becomes difficult to go anywhere without taking the little device along.

A new approach fo

Spurious emission measurement

By James R. Stephenson, Jr.*

How To Save Time

As a condition attached to the construction permit of WRVR-FM, specifying operations with the Empire State Building Master Antenna, data was called for which would prove the absence of spurious emissions generated within the system. There is nothing new in this requirement, any station that has recently connected to a master antenna system is aware of it. What is new however, is the way in which this test has been accomplished at WRVR.

In the past, this task had been performed by connecting a tunable field strength meter to the system test port, and tuning from 50MHz to 250MHz. Each time a signal was found that was above the predetermined acceptable level, the transmitter under test would have to be turned on and off to ascertain if it was guilty of creating that signal. Needless to say, this process is quite time consuming.

A quicker method by which this test could be made has long been needed, and now that the results of the WRVR test have been accepted by the FCC, these tests need not be the long drawn out affair they have been in the past.

The measurements made for WRVR took place September 15th and 16th, 1971, between 9:30 pm and 2:30am. They were made by Fred Lender of Hewlett/Packard Company and myself. The Hewlett/Packard Spectrum Analyzer that was used for the test consisted of the 8554L RF Section, the 8552B IF Section, and the 141T Display Section. The results of the test were recorded on film by the Hewlett/Packard Model 195 Recording Camera. Total test time was five hours, compared to the average twelve hours required by the previous method.

The five hours used in our test are not a representative figure of the time in which this test could be done, as control photographs were made at approximately 9:30pm to 10:00pm. Then the tests were resumed shortly before midnight. So in actuality, only three hours were used for the test. As an added benefit, no other station on the antenna had to cease operation, even momentarily, as is required with the former method.

The equipment was set up on the 101st floor of the Empire State Building, just below the 102nd floor observation deck that many tourists are familiar with. Before WRVR signed off at midnight from its old transmitter location in the Riverside Church, which is in Upper Manhattan, a series of control photographs were made. Each of the ten stations previously operating on the master antenna were closely inspected and all signals other than those in the FM broadcast band were noted for future reference.

At midnight WRVR signed off from Riverside Church and the new transmitter was turned on into the master antenna system. The Spectrum Analyzer was set-up to check the FM broadcast band. Each station on the system was checked to assure that WRVR's new transmitter was not interfering with the other ten stations on the antenna, and that no intermodulation products were being created before the test was allowed to continue. It was confirmed within a matter of seconds that operation of WRVR's new transmitter into the Empire State Building Master Antenna did not cause any gross spurious emission, or intermodulatic products, so the test continued.

The area between 50MHz an 75MHz was inspected next. Th picture of the area of the ban made at that time, was then con pared to the one made previously No spurs were noted, but as adde insurance, the plate voltage of th WRVR American Electronic Laboratories FM-12KD transmi ter was switched on and off sever times and the CRT of the spectru was watched closely. Just as w had hoped, no spurs were presen The same procedure was then ap plied to the area of the band be tween 75 and the lower edge of th FM broadcast band with the sam results.

Inspecting The Band

The FM broadcast band wa then inspected. Each stations' cen ter frequency was set-up at scop center and the AEL FM-12K plate voltage was switched on an off. The hoped for results wer achieved, no spurs were found. photograph was then made of th entire FM band and compared t the photograph made of the oth ten stations made previously.

The area of the band betwee 110 and 150MHz, the area betwee 150 and 200MHz, and 200 t 250MHz were then checked as i the preceding paragraphs, with th same results. No spurious emi sions or intermodulation produc were found to exist.

The results of this test were the compiled and attached to the l cense application as an engineerin exhibit and sent to the FCC. Temporary Program Test Author zation was issued by the FCC Sep tember 27, 1971, and WRVR bega program test with its changed faci ities at 5:30pm that same day. A the same time, WRVR changed it

*Chief Engineer, WRVR-FM, New York.

Fig. 1 Fred Lender adjusts the spectrum analyzer in preparation for the emissions testing.

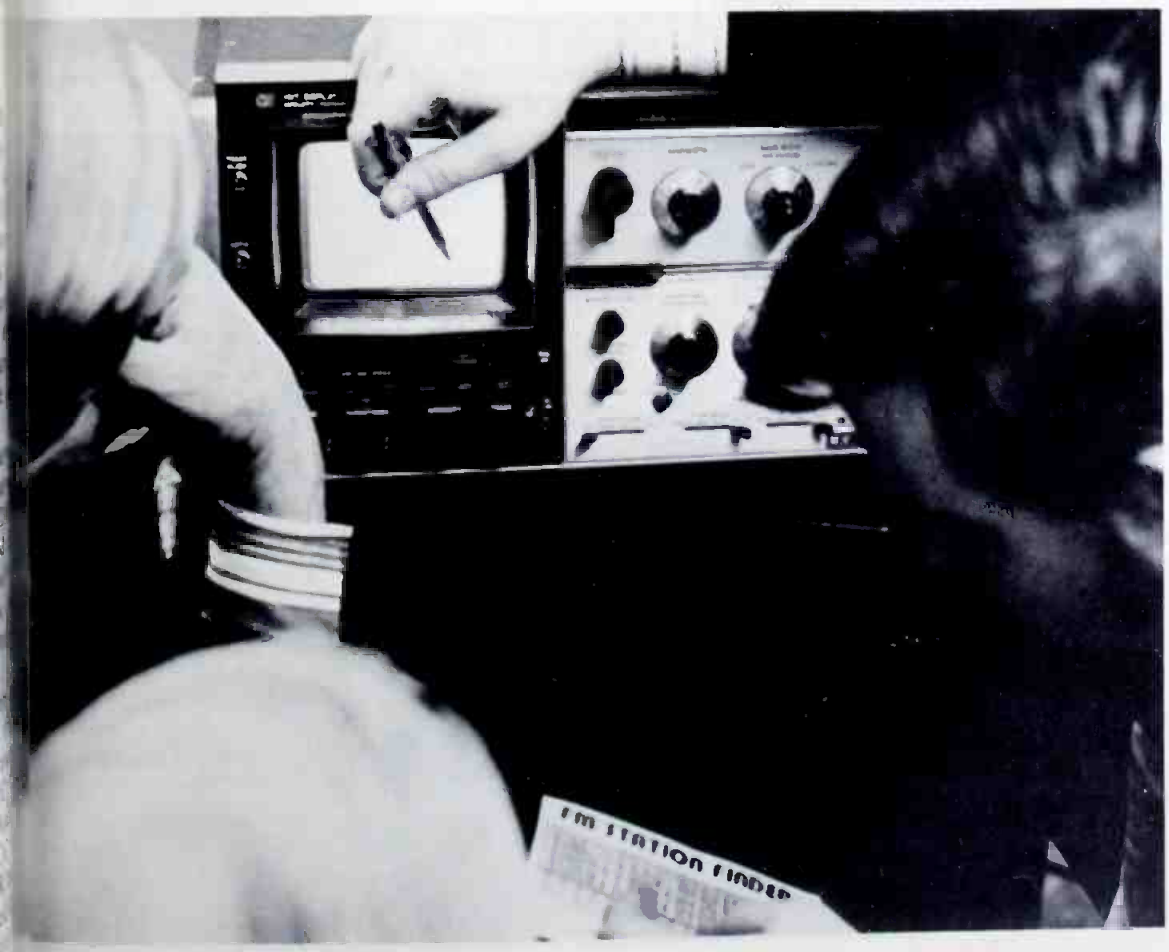


Fig. 2 Author uses local station guide to identify signals on the analyzer.

format from Classical Music to News and Public Affairs. WRVR's first commercial announcement was broadcast over our new facilities.

In January of 1972, the results of the WRVR test were accepted and authorization to continue program test was granted. Six months of operation into the Master Antenna at the Empire State Building without a single complaint of interference have also tended to confirm the results of the test.

My first experience with Spectrum Analyzing equipment had been as an Avionics Technician with the United States Coast Guard, where they were used to set-up Single Side Band Transmitters. Later as Technical Supervisor at an ETV Station in West Virginia, I was exposed to the 8554L Hewlett/Packard equipment. I assumed the position of Chief Engineer of WRVR in April of 1971, and soon discovered that the spurious emission test would be a necessity. On further investigation, I found that the common practic was to hire a consulting firm to ru this test and it was expensive.

When I purchased new tes equipment for WRVR, we dis cussed the possibility of using th 8554L to do the spur test. It wa agreed that the equipment wa capable of the test an Hewlett/Packard agreed to provid the equipment and technical hel when needed.

We hoped that by using the spec trum analyzer that it would be un necessary to have the other sta tions on the system to turn thei transmitters off a second time (i was necessary to have all station on the master antenna stop trans mitting for a four hour period fo WRVR's interconnection to th system) as is required by the pre vious method of spurious emis sions testing. The results of the tes were all we had hoped for. None o the stations involved lost air time and WRVR has satisfied the re quirements relatively quickly, easi ly and inexpensively.

Fig. 3 The FM broadcast band is captured on film by using a recording camera. Not the number of signals . . . plenty of reason for eliminating spurious emissions.

PEOPLE IN THE NEWS

New Faces At The Top

Thomas H. Winkofske has been named to the newly-ated position of project manager at Koss Corp . . . **thur I. Bruns** has been named to the new position of es administrator for Broadcast & Industrial Prod-ts group of the Telex Comm. Div. . . . **Tom Ferrara**, **e Green**, **Barry Wolfson** and **V. Frank Jones** have en appointed Altec regional managers . . . **Warren harles** has been appointed Director of Sales for the dio-Video Systems Div. of Philips Broadcast uip. Corp. . . . **Robert L. Keith** has been named asurer-controller of Ampex Corp. In his new posi-n, Keith assumes the duties of controller in addition his former duties as treasurer . . .

Allan L. Merken has been appointed President of the wly-formed North American Philips Electronic mponent Corp. . . . **Norman A. Neumann** has been pointed President of Amperex Electronic Corp. . . . rtronics Co., Inc. has announced the appointment three vice presidents, **Mervin Kronfeld, Greg J. halt**, and **Alan C. Kronfeld** . . . **Thomas R. Humphrey** s been elected to Vice President of McMartin In-ustries, Inc., in charge of engineering, marketing and les . . . **John L. Gafford** has been appointed to the psition of Engineering Manager, LPB Inc. . . . **Val letupski** has been appointed a Vice President of Vis-l Educom. Nietupski will be responsible for the dio Product Section of Visual Educom . . .

Associations

Werner Engelmaier, of Bell Laboratories, and **Gus-ve Shapiro**, of the National Bureau of Standards, ere honored during the Electronic Components Con-rence in Washington. Engelmaier for his paper on hin Film Resistors; Shapiro for his contributions to e electronic components industry . . . **O. Leonard ress**, executive director of the Kentucky Educ. Net-ork, was elected chairman of the board of directors f Educational Television Stations, a division of the AEB . . . **Paul B. Comstock** has resigned as execu-ve vice president for government relations of the AB effective September 8, to accept another posi-on. Comstock will be succeed by **Grover C. Cobb** . . . **on Davis** and **Bart N. Locanthi** of the Altec Div. of ltec Corp. were given Fellow Awards at the recent 2nd Convention banquet held by the Audio Engineer-g Society. The award given Davis was "for his role promoting the fine art of sound reinforcement;" to ocanthi "for his contribution to the theory, practice nd standardization of loudspeaker design." . . . **harles T. Jones, Jr.**, vice president of the New Mexi-o Broadcasting Co., has been appointed director the AB's new Radio Information Office. . .

(Continued on page 49)

Building A Teletype Control That Thinks For Itself

Like so many other units, the teletype alarm to be described here was born out of the fiasco of February 20, 1971. We wanted our alarm to think a bit and to be unresponsive to all but the proper sequence of alarm impulses from the teletype machine.

The unit described here incorporates the following features:

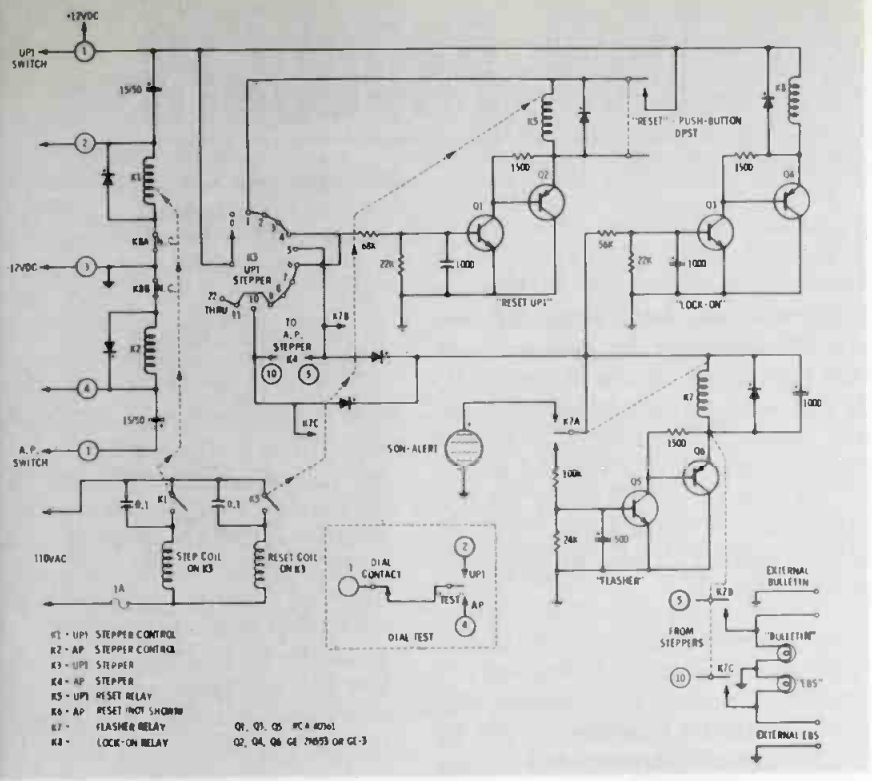
1) It will respond to the signalling from both UPI and AP Radio wires.
2) It will signal either a bulletin or an EBS alert/alarm from either or both machines.
3) It will not respond to any but the proper number of impulses within the proper amount of time.
4) Once "locked" into either bulletin or EBS alarm mode, our unit cannot move out of its alarm position until manually reset.
5) Provisions for easy testing are available as well as provisions for audible and visual local and remote alarms.

Considering Figure 2, you will note that we show just half of the system for simplicity. The "contact points" (A normally-open SPST switch) installed by a teletype maintenance man furnish a momentary switch pulse from either teletype machine. Let's consider just the UPI portion where the switch closes with the ringing of the teletype bell (of course five bells is a bulletin and ten bell signals an EBS alert).

The steppers used are guardia Mer-120AC with 120VAC coils, s K1 and K2 are employed to kee the voltage on the contact point a 12 VDC to Q1 which is functionin as a timer circuit. A group of fiv or a group of ten consecutive bell must ring within a certain perio (adjustable, but 4-6 seconds work well) to keep the stepper contac from the base of Q1 and full charging the condenser.

If the stepper stops on either th "five" or "ten" position, the vol age is removed. If it stops any where else, voltage applied cause the R-C network to time out, an relays K5 or K6 operate, resettin their respective steppers. (Thus for example, a group of three bell followed a few seconds later b two bells will not add up to a five by then the system has reset itself. We've found too, in practice, tha when the teletype is running wil and bells are ringing like mad, th reset circuit calmly goes about it business. In fact, in this "wild' condition the condenser at the bas of Q1 doesn't get a chance to com pletely discharge so the stepper i reset sooner and sooner. The resul is much less wear and tear on th stepper when the machine is goin wild.

"I'D LIKE TO EXCHANGE FOR A BROADCAST ENGINEER. ABOUT FORTY-SIX."



If the stepper stops at five or ten, voltage is applied to the base of Q3, starting another timing circuit. When relay K8 operates, K1 and K2 cannot function and further impulses from the teletype cannot move the steppers until the system is manually reset. Thus, once either a bulletin or EBS alert is signalled from either machine, no further bells or signalling can "unlock" the alarm. The time delay at Q3 is necessary for the EBS alert. . .without this delay the unit would lock on **five** immediately and never get to the top of the steps.

Q5 and Q6 form a flasher circuit with relay K7. This circuit could be all-solid-state but we wanted the flexibility of intermittent relay contacts to operate both the lights and the "son-alert." The flasher circuit begins to operate as soon as a five or ten is reached and will continue to go until the system is reset.

Construction

We used A BUD SC-2131 cowl-type minibox and an AC-407 chassis to accommodate the relays for two systems on one chassis. Transistors are of the garden variety and non-critical. PNP transistors were used for Q2, Q4, and Q6 since their collectors could then be tied directly to the chassis. Diodes are general purpose and 1 AMP, 1000 PIV. Resistor values are non-critical. . .the input resistors to Q1, Q3, and Q5 are adjustable to vary the timing of the three circuits. Plug-in relays are P&B KHU17D11 12 VDC.

We located the unit directly above the teletypes with the reset switches on the front panel, so the operator must come to the machines before he can reset the alarm. A dial with a two-way switch is provided to test the entire operation of the unit. Once a week a newsman will dial up a five or ten to verify proper operation. After installation we did a bit of juggling with the time constant on the reset circuit before we got the unit to "outthink" the teletype machines.

Mark Durenberger, CE
WLOL AM-FM
Minneapolis, Minn.

Keep Up With The News.
With Direct Current, page 4
Industry News, page 10

NEW PRODUCTS

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

As you may have expected, we are still covering the vast array of new equipment shown at the NAB. If you want further information on any item described here or in our advertisements, tear out the Reader Service card and circle up the numbers that correspond to those at the bottom of the product description or ad.

Voice Logging Recorder-Reproducer

The **Stancil-Hoffman Corporation** has announced a complete new line of voice logging recorder/reproducers to record communications from two-way radio, telephone lines or console microphones.

Designated as the CRM 7-14-28 Series, the recorder/reproducers have been developed for use in police, fire and public safety centers; public utilities; private security systems; and radio and television broadcast logging.

The basic system consists of a tape transport panel 8¾ inches x 19 inches and an electronics panel 7 x 19 inches. Either single or dual transport systems may be mounted in standard rack cabinets or in portable carrying cases.

The systems are designed for continuous duty and record for over 25 hours on a standard 7 inch reel of tape—up to 7 channels on ¼-inch tape, up to 14 channels on ½-inch tape, and up to 28 channels on 1-inch tape.

Standard features include Automatic Gain Control in each channel, continuously variable rewind speeds for fast message retrieval, failure detection of power supply, recording bias or tape breakage, single in-line record and playback heads, built-in metering for level setting or maintenance testing, and motion memory sensing to prevent tape breakage. Dual transport versions are furnished with automatic 24 hour time clock changeover as well as failsafe changeover.

Many plug-in accessories are available which may be added at any time without engineering: Digital time recording with high speed automatic search, voice operated control, remote control of all functions, instant recall, and time and message sharing on a single channel giving messages priority. Also available is the only true malfunction sensing system which continuously compares the input signal to the output signal and detects any

iterioration of quality or tape
ption.

Circle Number 60 on Reader Reply Card

M91-ED Cartridge

Shure Brothers Inc. has augment- its M91 Cartridge Series with a ajor new addition which offers creased trackability.

Called the M91ED, the new car- dge is said to deliver improved gh frequency trackability over e present M91E. This is made ssible by design advances in the ylus assembly. By mounting an ra-lightweight nude diamond tip rectly on the stylus bar and doing way with even the tiny metal shing used in the M91E, Shure duced the stylus tip mass. The sult is a smooth, peak-free fre- uency response and a level of verall performance not previously ailable in this price class.

The M91ED features the popular Biradial (elliptical) tip. For those who prefer a spherical tip, the M91GD is available. Owners of M91E Cartridges may upgrade their present system by purchasing an N91ED Stylus.

The performance characteristics of the M91ED Cartridge also make it a suitable choice for use in four-channel encoded (matrix) systems.

Circle Number 62 on Reader Reply Card

Multichannel Recorder

A new accessory for the Ampex MM-1000 multichannel recorder which results in better sound quality and flexibility in recording film sound tracks has been placed on the market by **Ampex Corporation.**

The new Ampex film lock system permits film makers to record up to 15 channels of sound, add special effects, dub down to one or two channels, and play back the final sound track in perfect synchronization with the pictures.

Circle Number 117 on Reader Reply Card

Custom Consoles, Cabinet, Racks

Amco Engineering Company, an old line company in the cabinet and console business, has decided to focus on the broadcast-communications industry. Many of their consoles are already in use in government communications complexes.

Because Amco uses a modular approach to cabinets and consoles, they can put together (RF-proof) layouts to meet almost any demand, and that includes a choice of 17 colors.

Available in this system are the low silhouette, an auxiliary desk console that is used with selections of 3 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 a variety of accessories including blowers, wire mold, hardware, casters and other associated supplies.

(Continued on page 46)

Circle Number 63 on Reader Reply Card

Need A Consultant? See Page 57

New Products

(Continued on page 45)

Low Cost Waveform Monitor

Ultra Audio Products has introduced a low cost TV waveform monitor primarily for closed-circuit applications but suitable for broadcast use.

The VW-O is available as a portable or will mount 2-across on a standard rack panel, or side by side with Ultra Audio's PC-95 pulse cross picture monitor.

The 2-input WFM features 7MHz. bandwidth at a price modest enough to permit budget-conscious installations to utilize VW-Os on each camera, program line and throughout the video system.

Circle Number 65 on Reader Reply Card

New Quartzline Scoop Lamp

A large, pear-shaped lamp with a 1,000-watt quartz-halogen inner filament tube will soon be available to light TV and movie productions.

The jumbo, frosted lamp measures six and a half by 13 inches and is the industry's first tungsten-halogen lamp of its size and configuration, according to **General Electric** stage and studio lighting engineers.

"Scoop Lamp" creates softer, more diffuse shadows than smaller lamps of equal light output, thus making it ideal for critical use in TV, movie and still studios.

Designated the Q1000/PS52/4, the new lamp fits in standard 16 or 18-inch scoop reflectors, and can be burned in any position for an

average life of 500 hours at 3 200°K. Its special design make "Scoop Lamp" noise-free eve when used on solid state dimmer GE engineers said.

Like all other GE Quartzlin lamps, the new lamp maintains sta ble color temperature and ligh output, and has more than twic the predicted life of other incandes cent or tungsten-halogen lamp presently available for similar ap plications.

Circle Number 66 on Reader Reply Card

5-Inch TV Monitors

Dage Television announces the roduction of a line of 5" moni- rs, ideally suited for educational, oadcast, CCTV and industrial or curity applications.

The monitors are available in an tractive single desktop unit or a iple-monitor, 19" rack mount con- guration. Entirely manufactured America, the new monitors pro- ide good picture quality and relia- ility. A single, plug-in printed cir- uit card simplifies maintenance. egulated power supply assures onstant picture size and bright- ess over a wide range of power ne variation.

Features include low power dissipation, fast horizontal flyback to assure no loss of picture information, 100% DC restoration, and an automatic frequency control specifically designed to give jitter-free performance, even when operating with helical video-tape recorders.

Front panel operating controls include Brightness, Contrast, Horizontal Hold, Vertical Hold and Power ON/OFF. A front panel screwdriver adjustable width control is also provided.

Circle Number 67 on Reader Reply Card

Equalized Phono Preamps

Russco Electronics introduced two new lines of RIAA equalized phono preamps designed for professional broadcast and recording studio applications.

Dubbed "Fidelity-Master" and "Fidelity-Pro" they are designed to complement the company's Cue-Master and Studio-Pro turntable lines. The Fidelity-Master models offer fixed equalization. The Fidelity-Pro models feature switchable rumble filter and high frequency boost and cut.

All models are available in mono or stereo versions with balanced or unbalanced output. Features include self-contained power supply, integrated circuit design, high output capability, low noise and low distortion. A special feature is a unique extruded aluminum case that allows quick and easy service access.

Circle Number 68 on Reader Reply Card

Digital Program Automation System

Gates Division, Harris-Intertype Corporation, introduced a new digital program automation system at the 1972 NAB Convention.

(Continued on page 50)

bookreview

The Work Of The Television Journalist has bee written by Robert W. Tyrrell. Television journalism never the work of one man and a typewriter. It d pends on a team of talents and skills. Each membe should know something about the others' problem and methods. This book describes every job and su plies the necessary knowledge for the members work as a successful unit.

The author is concerned with the day-to-day bus ness of putting a picture into a square and matching with the right words and sounds. He is uniquely qual fied to provide this specific and practical text as he ha done most of the jobs he describes, and develope many of the techniques which are commonplace British television today.

This book is available through Communication Ar Books, Hastings House, Publisher, Inc., New Yor N.Y.

Circle Number 91 on Reader Reply Card

Solid-State Electronics, written by George B. Ru kowski, will help the technician meet his challenge The author not only discusses the fundamentals, b also develops the student's ability to select proper d sign components for solid-state electronic circuits.

The book begins by explaining common semicor ductor materials. Other chapters discuss the zene diode, the junction transistor, the silicon-controlle rectifier, the field effect-transistor and integrated ci cuits.

A modified programmed style is used throughou the book. Each point discussed is followed by at lea one worked example.

This book is available through Howard W. Sams Co., Inc., Indianapolis, Ind.

Circle Number 92 on Reader Reply Card

Television Measurement Techniques, written by L.E Weaver, is a review of the techniques and equipmen used in the checking and standardization of the appa ratus in television signal chains, from source to trans mitter.

This monograph fills a gap in the literature on telev sion technology. It includes a great deal of materia previously accessible only with difficulty, and a cer tain amount of original work. Although a comparativ approach is made to available methods, with emphasi on local and national differences, the techniques advo cated are, wherever applicable, the ones recom mended by those international broadcasting bodie which for years have been working to achieve world wide agreement on standards of quality, equipmen and procedures.

The book is written from the point of view of the tel evision broadcast engineer, though much of the mate rial is directly applicable to related fields, such a closed-circuit television for educational and industria purposes. Like other books in the IEE Monograp Series, it is intended for the professional engineer an those in training.

This book is available through Peter Peregrinu Ltd., London, England.

Circle Number 93 on Reader Reply Card

Commission Turns Down Union Request

A petition by The American Federation of Televi-on and Radio Artists (AFTRA), requesting that the ommission's practice and procedure rules (Part 1, ubpart D), be amended to require that the Commis-on, in all instances of transfers or assignments of M, FM or TV licenses, give special notice of the oposed action to any unions connected with the ansferor or assignor, and that such unions be made rties in interest, has been denied by the Commission M-1848).

AFTRA, a branch of the Associated Actors and rtists of America, which is affiliated with the Ameri-n Federation of Labor—Congress of Industrial Or-nizations, requested the rule making to protect its embership from what it considers disadvantageous tions which may arise at the time of the transfer or signment of a broadcast station. It said it desired to articipate, as an automatic procedure, in all transfers nd assignments of stations where the buyer has not ssumed labor contract obligations of the transferor or ssignor.

The Commission said it could not agree that special otice from the Commission to unions is necessary or the public interest. The Commission said it provides mple notice of any transfer or assignment proceeding rough a variety of means to all interested parties.

The adoption of a rule whereby the AFTRA and all ther unions representing employees of a station about o be transferred or assigned would automatically be esignated to have standing and be a party in interest would give petitioner an unusually privileged posi-ion in that no other private party is designated, in any f our proceedings, as 'a party in interest' by rule," he Commission said. It pointed out that the unions vhich represent employees of a station about to be ransferred or assigned may file a petition to deny vhich, the Commission said, it would evaluate.

People In The News (Cont. from page 41)

Ronald N. Kahill has been appointed Sales Manager or Superior Continental Corp. Cable and Equipment Div. . . . And **Bill L. Miller** is now manager of wire and able manufacturing . . . **Clifton P. Grant** and **Law-ence R. Kem** were elected to positions of group vice resident, General Cable Corp. **William W. Garretson** vas elected a vice president and **Charles J. Bodenstab** amed a general manager . . . **Irving Kolodyn** has been appointed to the position of director of application en-gineering for General Cable's Communications Prod-ucts Operation . . . **Dr. John D. Stauffer** has been ap-pointed general manager of General Cable Corp. mag-net wire products . . . **Israel Switzer**, P. Eng., has been appointed to the position of Vice President-Engineer-ing, Maclean-Hunter Cable TV Limited . . . **Thomas J. Madden**, former writer for **Broadcasting Magazine**, has joined the public relations staff of the National Cable Television Association . . . **Theodore J. Swanson** has been named vice president-engineering of Cypress Communications Corp. . . .

(Continued from page 46)

Installed in the fully automated FM radio station at the Gates' exhibit, the new system is a custom installation, as are all Gates' program automation systems—although all have in common the fact that each is configured from standard components to a station's individual needs.

Gates' NAB system introduces 5 new digital components. These include the following:

- Gates' KSP-10 Digital System Programmer, which provides fully automatic control of the automated programming system. It can call on up to 10 audio sources such as cartridge, reel-to-reel, network, remote or audio console output.
- Gates' RA-10 Random Access Digital Programmer—capable of controlling up to 10 Gates' G-24M/S Multiple Cartridge Reproducers, or other program sources with 1 to 99 shelf addresses. Its MOS IC Read/Write Memory has a capacity of 1,000 events.
- Gates' TS-4 Time Selector—used as an exact time control device that performs a switching function on a time programmed basis.
- Gates' Digital Clock—used in the automation system as a centralized source of real time information.
- Gates' SSC Digital System Switching Center—the control point and switching center of the program automation system. Nearly all of the control commands, control responses, audio programming, auditioning, logging, etc., are routed through the SSC.

Although the Gates' NAB system uses only tape cartridges as program sources, many configurations are available, using both reel-to-reel and tape cartridge sources. In fact, each system is tailored to the broadcaster's particular requirements, so that no format changes are required to install Gates' automation.

Circle Number 69 on Reader Reply Card

Sweep-Focus Fresnel

Berkey Colortran, Inc., a div sion of Berkey Photo, Inc., a nounces the introduction of its ne **Sweep-Focus Baby.** The six inc 750 to 1000 watt Fresnel uses a ne lamp designed exclusively for th unit.

Rapid focus lever permits varia ble spot-focus settings in second Double wall construction keep unit cool and increases coolin effectiveness of its compact hou ing. The swing-away front doc with captive accessory latch pe mits easy relamping without affec ing accessory positions. The un weighs 10 lbs.

Circle Number 70 on Reader Reply Card

Film Chain Color Camera

A new color film chain camer for broadcast closed circuit an cable television applications offe ing a combination of automatic fe tures for ease of operation an maintenance has been introduce by **International Video Corpora**

in.
Michael A. Moscarello, IVC
sident, said the IVC-240 color
mera is engineered and styled for
egration with the IVC-4000 large
age multiplexer. Combined the
o produced provide the most
mpact broadcast film chain and
ltiplexer system available in the
oadcast industry and at extreme-
low cost.

Among the features that contrib-
e to its ease of operation and
aintenace are: a single neutral
nsity control disk built into the
mera enclosure that eliminates
parate disks for each projector;
tomatic white and automatic
ack controls compensate for vari-
ons in film density; all camera
t up controls and the multiplexer
cal controls are located on a slop-
g control panel at the camera;
ree separate mesh vidicon tubes
placeable in minutes without af-
cting optical alignment or remov-
g deflection yokes.

Circle Number 71 on Reader Reply Card

Telephone Multiplex

Scott-Buttner Corp. Coastcom cently introduced its Type 100 SBSC low-density telephone mul-plex system package. This pre-ngineered system is unique in its bility to provide both multiplexing nd all other functions required for complete end-to-end communica-ons system including VHF con-ol and rural subscriber line inter-ace for private or multi-frequency nging party line service from mi-rowave drops.

The Type 100 system is ideally uited for local government or utili-y 960 MHz microwave systems here VHF control or telephone xtensions are needed at remote ocations.

The Type 100 system is designed o provide up to twelve 4 KHz oice or data channels plus order ire in the 0 to 52 KHz spectrum nd conforms to CCITT Group A ecommendations. Groups of 12 hannels may be combined for igher density applications. Each Type 100 channel is crystal con-rolled and functionally independ-nt.

Circle Number 72 on Reader Reply Card

New products begin on page 44

amplifiers provide an output jack for the bus, so it is not difficult to tie them together.

The Annual Proof of Performance Measurements require that the AGC action be disabled or switched out of the circuit when making the Proof Measurements. This is understandable from a response point of view. Should the system audio response ahead of the AGC be poor, the AGC action would compensate for it and the output would appear as a false flat response.

The system distortion measurements are also made with the AGC disabled. The Proof may check out within specifications, but this do not guarantee there will be no di tortion during normal programin To discover how the syste checks out with AGC actio switch the AGC back into the ci cuit and run a series of distortio measurements at normal level Then run the levels at the highe excursion expected and check di tortion. Do the same with the e pander in operation while feedi low level tones through the systen

A well adjusted and properl operating AGC amplifier will n add too much distortion to the sy tem overall readings. A few tenth of a percent are normal. Howeve if the distortion increases marke ly, it may be that the AGC is mi adjusted or simply has problen that need correction. If the disto tion occurs only with higher leve of tone, this could indicate th something else in the system working too close to distortion. A amplifier may be near overloa with normal levels, but is overloac ing at higher levels.

Many AGC amplifiers use ba anced stages so that sudden lev changes will not produce "thump". This is canceled out i the pushpull stages. Such ampl fiers must keep the stages balance or this feature will be defeated. N only should the individual tubes c transistors match up in gain an performance, but also the suppl voltages and other circuit param eters should be balanced to them.

Strong RF fields can affect tran sistor stages if they are not we shielded. A solid state model use at the transmitter site can fall vic tim to RF. The amplifier can ac erratically, as well as pick up nois and hum while under the influenc of RF.

One possible trouble spot can b the remote antenna meter, if it i mounted in the same rack as th AGC amplifier. The leads from th rectifier in the tuning house mus be properly shielded and the lead filtered to prevent RF from bein carried back into the rack from th tuning unit. Although the origina installation may have been don properly, shields can break o

…unds come loose. If RF is sus-…ected, check out the AGC after …n-off when the transmitter is …t down. If RF is a problem, it …ld disappear with the transmitter …f

Summary

AGC amplifiers can do an excel-…t job of controlling average pro-…m levels, just so long as the amplifier is properly adjusted and input levels are kept within range of the AGC. You should be careful not to allow the AGC to become a crutch and thus ignore levels altogether. A certain amount of manual control is required to keep levels within range of the AGC. Once the levels are within range, the AGC should be allowed to handle the levels on its own.

(Cont. from page 8B)

Operator Requirements Change

one or more first class operators in full-time employment or under contract on a part-time basis. (A first class operator is presumed to have a thorough knowledge of electronic fundamentals and broadcast equipment. A third class operator need have only minimal technical competence.)

Under the present rules that require all transmitter duty operators at certain stations to hold first class licenses, these duty operators are also frequently responsible for programing assignments as announcers, disc jockeys, or for related studio production work. These programing assignments frequently conflict with the operator's ability to adequately respond to his obligations to properly maintain the transmitting system. The new rules permit the station's chief operator to serve as transmitter duty operator during routine operation only to the extent that the secondary assignments do not interfere with his primary responsibility for insuring that the station is operating within the required technical standards and the station authorization.

In a rulemaking notice adopted July 29, 1970 (FCC 70-825) the Commission observed that many stations were having serious problems obtaining properly qualified operators with first class radiotelephone licenses, and asked for comments on operator require-

(Continued on page 54)

(Continued from page 53)

ments, and methods for improving the competence of supervisory operators in order to offset any lessening of the technical competence of duty operators if the rules were to be relaxed. The Commission also asked for comments on a number of questions relating to operators and their grades, the effect of possible changes on technical operation, job security and minority group opportunity, possible different standards for small markets, and the possible automation of transmitters in the future.

More than two hundred comments from individual station licensees, national and state organizations of broadcasters, operators' unions, individual operators and radio license schools were received in response to the rulemaking notice.

Commission Explains Its "Off-Network" Restrictions

Section 73.658(k) of the Commission's Rules limits television stations in the top 50 markets to no more than three hours per evening of network programming during "prime time" (7 to 11 p.m. E.T. and P.T., 6 to 10 p.m. C.T., and 7 to 11 p.m. M.T. except that stations in that zone may elect to substitute 6 to 10).

Effective October 1, 1972, Section 73.658(k)(3) also provides that "the time from which network programming is excluded" may not "be filled with off-network programs; or feature films which within 2 years prior to the date of broadcast have been previously broadcast by a station in the market."

In response to a number of inquiries as to the interpretation of the "off-network" and previously shown movie restrictions, the Commission is issuing the interpretations to the following four questions:

uestion: Does the restriction on off network programs" apply to special" programs, which were esented on a national network ıt not on a regular basis?

nswer: Yes. The rule and its re-rictions apply to off-network pro-ams which were of a special or regular nature, as well as to regu-r program series.

uestion: Does the restriction on -showing of feature films in the arket within two years apply here the previous showing was on ne same station, i.e., if a network-ffiliated station ran a feature film uring 1971 (at any hour), is it pro-ibited from presenting the same novie during the "cleared" por-on of time in 1972?

nswer: Yes. The two-year restric-on on filling the cleared portion of rime time with movies previously hown in the market applies to a howing on the station which pre-iously showed it.

Question: Is material considered an "off network program" not eligible for presentation during the cleared portion of prime time, if it, itself, was not presented on a network but it is a further episode or continuation of a series which ran on the network?

Answer: No. As long as the particular program or episode itself did not run on the network, it is not considered an "off-network program".

Question: Do the "off-network" and "two-year feature film" restrictions of Section 73.658(k) apply to independent stations, not affiliated with a national network or networks and normally carrying little network prime time programming?

Answer: No. Since these stations do not carry substantial amounts of prime time network programming, as to them there is no particular "time from which network programming is excluded", and the off-network and feature film restrictions do not apply to them.

Send your Engineer's Exchange Ideas To:
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Kansas City, Mo. 64105

Commission Makes More Operator Changes

Amendment of Part 74 of the rules (operator quirements for experimental, auxiliary, and spe broadcast, and other program, distributional servic to delete the requirement for licensed operators wh ever a restricted radiotelephone operator is allowe perform the function, has been proposed in a rulem ing notice by the FCC.

The Commission said that it was considering th changes because restricted radiotelephone operat (RP's) perform duties not unlike those performed other services where there are no requirements fo licensed operator and the deletion of the license quirements would not be a detriment to broadcastin

Pointing out that these operator requirements w included in the rules as a matter of discretion rat than statutory mandate, the Commission noted t while Section 318 of the Communications Act p vides that a licensed operator shall actually operate transmitting apparatus in any radio station, it also p vides that this requirement may be waived except stations engaged in broadcasting (other than th engaged solely in the function of rebroadcasting t signals of television stations).

OTP Broadband Study Released For Sales

The Office of Telecommunications Policy has leased a study entitled "Pilot Projects for the Broa band Communications Distribution System." T study, conducted by the firm of Malarkey, Taylor, a Associates of Washington, D.C. for OTP, evaluat demonstration programs to test the uses and pub demand for cable TV and related services.

The report specifically proposes that governme and industry cooperate to establish a pilot cable sy tem using the latest practical technology serving a ba ic test group of 1,000 or more homes. The suggest pilot system would involve two-way cable transm sion facilities, terminals to control system services each home, central information files and simple da processing accessible to home users, and facilities f local program origination live or with film and vid tape.

No decision has yet been made concerning possib implementation of the MTA study recommendation Discussions are continuing among interested Feder agencies and industry and public interest groups, b no immediate decision is anticipated. The Cabin committee on cable television established last June develop Administration policy for the regulation a development of broadband cable communication considering this concept as part of its deliberations.

Copies of the Malarkey, Taylor report may be ob tained from the National Technical Information Se vice, 5285 Port Royal Road, Springfield, Virgin 22151. The price is $3.00 per copy.

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ber of tputs	3	6	6	12	3	6
ce sistance ildout, ch Output	75+75Ω	150Ω	300+300Ω	600Ω	150Ω	600Ω
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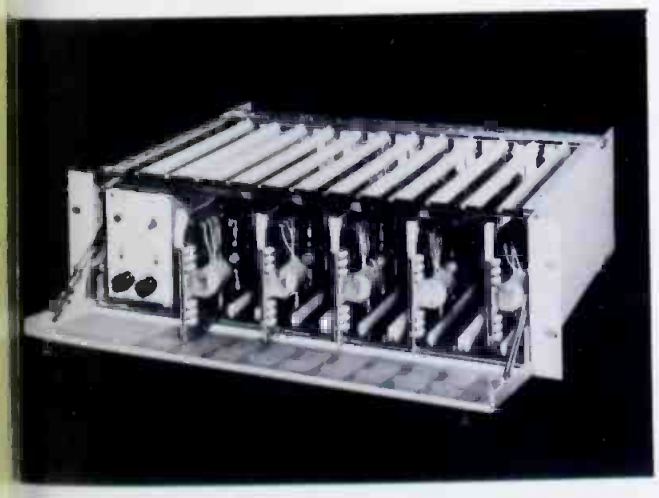

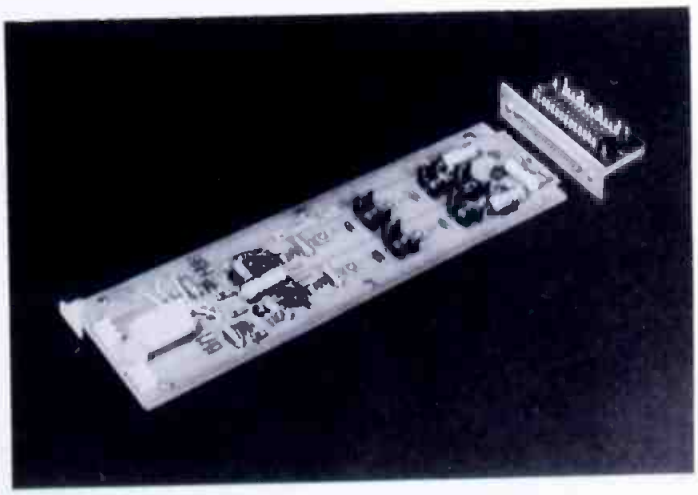

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