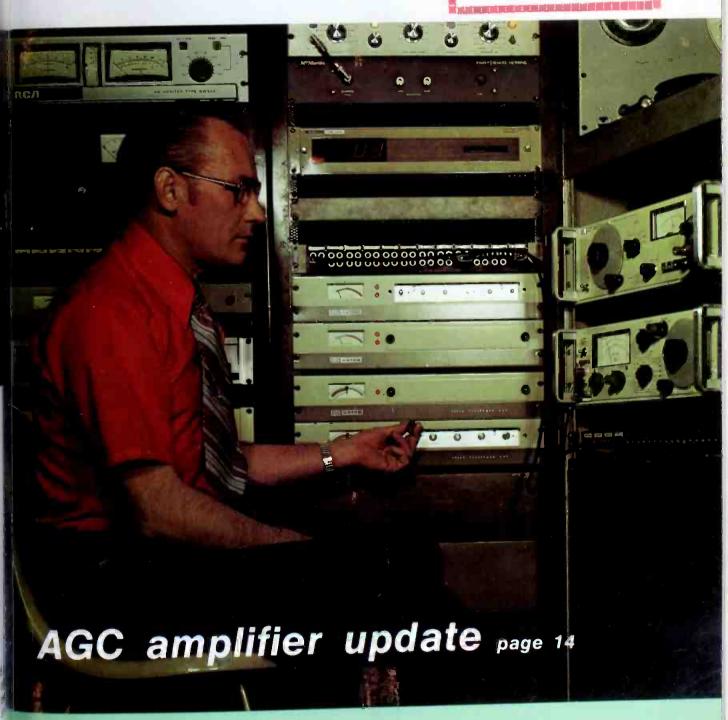
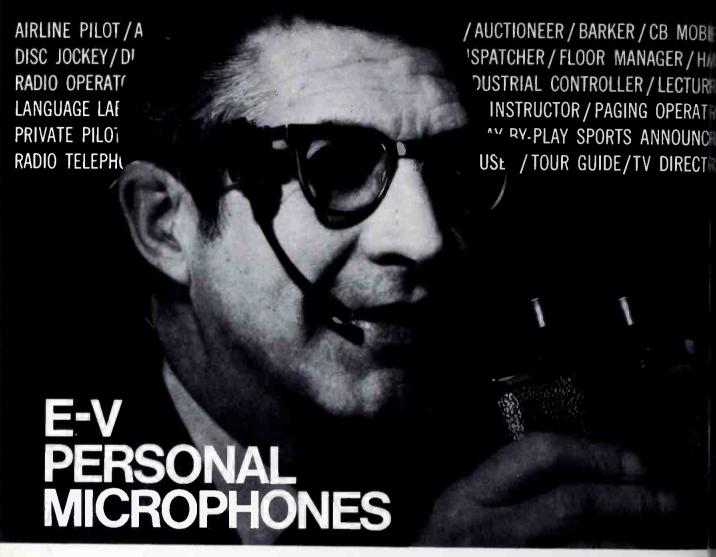
BROADCAST ENGINEERING

he technical journal of the broadcast-communications industry

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

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

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off facility to Models 967M/967ME. Has st for mounting on steering post for any craft/mobile installation. 3-pole moment switch energizes microphone and relay. \$25 list.

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BROADCAST ENGINEERII

The technical journal of the broadcast-communications industry

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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.

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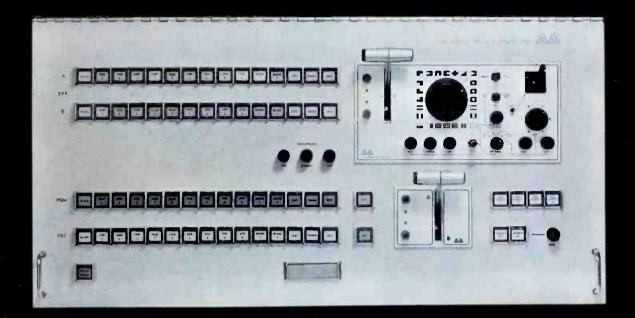
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DIRECT CURRENT FROM D. C.

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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.0000.

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 30, 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.

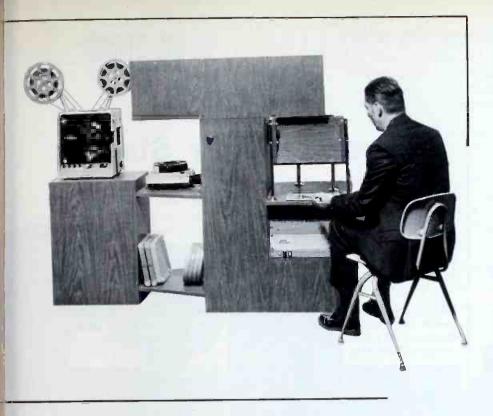
The system proposed for testing transmits the left channel information on the lower sideband and the right channel information on the upper sideband. Satisfactory results are claimed even with two inexpensive receivers, one tuned slightly below and the other slightly above the carrier, although properly-designed 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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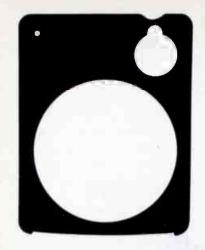
Containing its own built-in color sync generator and NTSC color encoder, this versatile color film chain system far surpasses other systems costing two to three times as much. In addition to a built-in capability to wipe between motion picture film and 35mm slides, the operator can also insert small opaque objects into the visual material, as well as point out

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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 offin 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)

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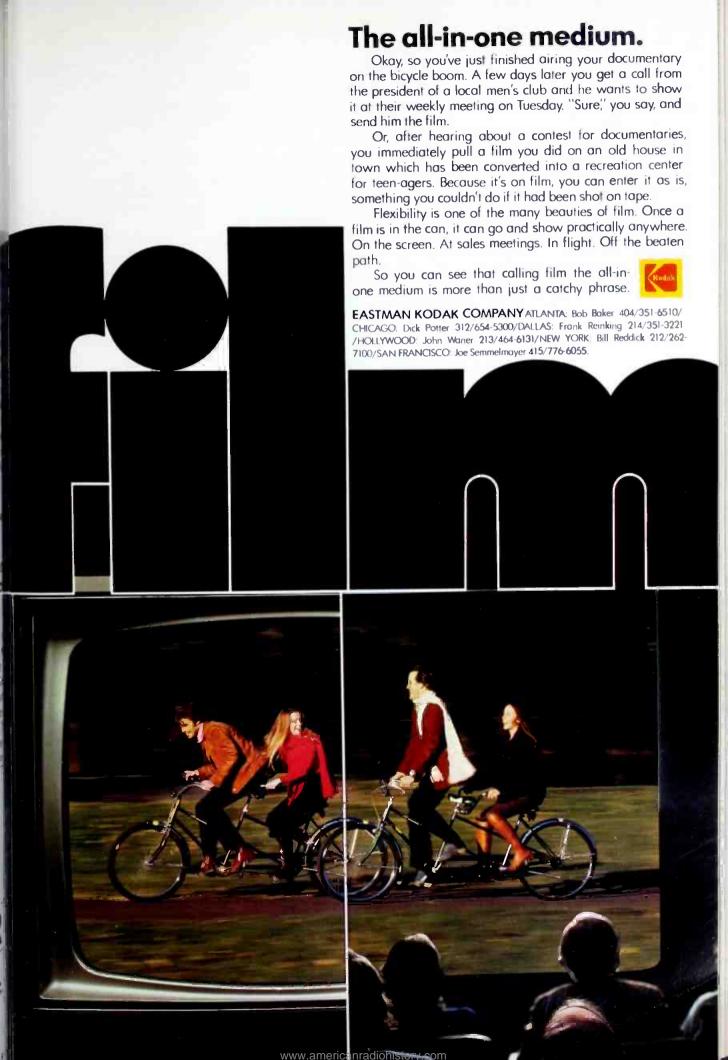


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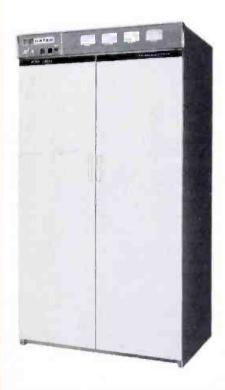
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Circle Number 48 on Reader Reply Card

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 fulltime 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 lesselicenses, 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 equipent maintenance.

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

heldon F. Storrier ice President WKTV Itica. N.Y.

Editor's Note: There probably is too nuch trust in the broadcast indusry. With concentration on good ound and sight, two things are ofen left to chance: burglar protecion and fire safety.

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

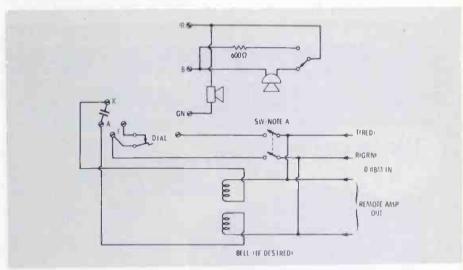
Unfortunately, total equipment ind facility protection seldom receive fair treatment. You can do something about it. Drop us a line and share your experiences, good or bad. Write to: The Editor, Broadcast Engineering, 1014 Wyandotte, Kansas City, Mo. 64105.

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



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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 Quadro-

phonic Radio Committee, their objective will be to evaluate the final and present technical conclusions to the FCC. The Commis sion already has named four of it staff to serve as observers to the committee.

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

Norman Parker, corporate stall scientist, Motorola, Inc., will serve as chairman of the quadrophonic committee panel on system specifi cations. Five other panels of the Committee will cover intercon necting facilities, broadcast trans mitters, broadcast receivers, field test, and subjective aspects.

An organizational meeting o Panel I 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 will 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 sterec phonic radio receivers and musisystems. The system transmit four discrete full-frequency 30 15000 Hertz audio channels b adding an ultrasonic sub-carrie above the present stereo sub-car rier used for FM-stereo broadcas ing. Both matrix and discrete four channel records and tapes may b broadcast using the GE system.





World's finest cartridge tape equipment

Here is the bold new standard in cartridge tape performance, versatility and ruggedness—the equipment that has everything! Five models of the magnificent Ten/70 are offered to meet every recording and playback application. All have identical dimensions. Any combination of two will fit in our sleek 19-inch roll-out rack panel, just 7 inches high.

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Inside is a massive U.S.-made hysteresis synchronous "Direct Drive" motor, solid state logic switching, modular construction and premium components throughout, separate heads for A-B monitoring, full bias cue recording, transformer input and output, flip-top access to heads and capstan.

THE CLASSIC 500 C SERIES. Long the industry standard, SPOTMASTER'S 500 C series is still offered. Performance and specifications are second only to the Ten/70.

For complete details about SPOTMASTER cartridge units (stereo, delayed programming and multiple cartridge models, too), write or call today. Remember, Broadcast Electronics is the No. 1 designer/producer of broadcast quality cartridge tape equipment . . . worldwide!

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FCC And FTC Make Formal Agreement

The Federal Trade Commission and the Federal Communications ommission have established liaion procedures under which both gencies will exchange information and maintain regular staff contacts 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 jurisiction over all matters regulating nfair or deceptive advertising in Il media, including the broadcast iedia." It specifies that the FCC will continue to take into account ertinent considerations in this rea (false and misleading advertisig) in determining whether broadast applications for license or reewal 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 responsiility of maintaining a flow of infornation on matters of concern to oth agencies. They will also deternine when formal meetings are eccessary.

The agreement establishes a ormal framework for cooperative ctivities between the two agenies, which have been carried on nformally over a period of years. Essentially the FTC is concerned ith advertising content, and it has

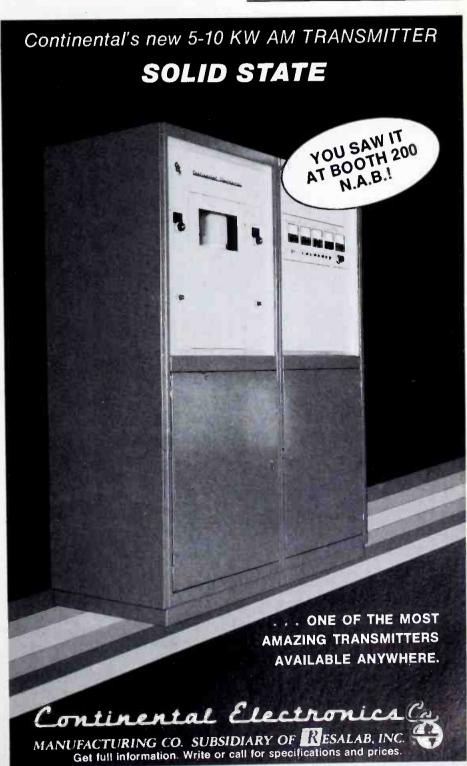
ECHO FOINT FEC.

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.

Don't Miss Our Direct Current

Page 4



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Circle Number 14 on Reader Reply Card

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 cathree and a half hours of Olympi 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 presente at any particular time. It pointe out that a maximum of prime time programing was permissible eve without the waiver. Assumin 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 befor the prime time rule was adopted (its contract with the Organizin Committee was announced April 1969; the rule was adopted in May 1970, and became effective October 1, 1971) and were based of three and a half hours of prime time coverage.

NAB Urges New Operator Rule

The National Association of Broadcasters urged the Federal Communications Commission to-day 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 com-

ments a 40-page-plus filing urginuthe Commission to grant operatorelief on such operations as Tyremote control, inter-city relays and aural station links.

Radio Appointment

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

Appointed by Vincent T. Was lewski, NAB president, are Arc 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 ar nual convention in Houston.

Rules Adopted For Multiplex Microwave

Amendments of Part 2 of the ules, concerning methods of deternining the necessary bandwidth and the occupied bandwidth for requency modulated microwave adio 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.

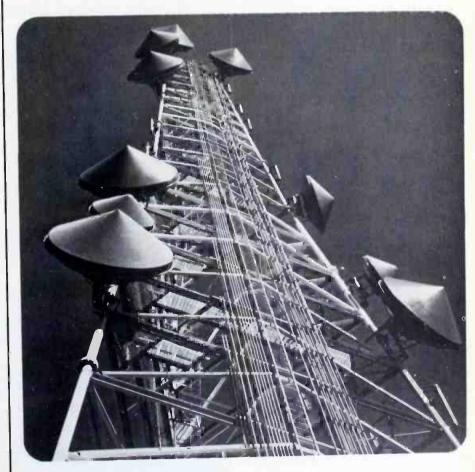
The Commission stated that it was concerned with the relationships, particularly in certain FDM/FM systems, between baseband loading, message channel arrangements and carrier frequency deviation, and how these factors affect the determination of necessary or occupied bandwidth. The changed rules will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



Send Your Industry News To Broadcast Engineering 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.

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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 ex-

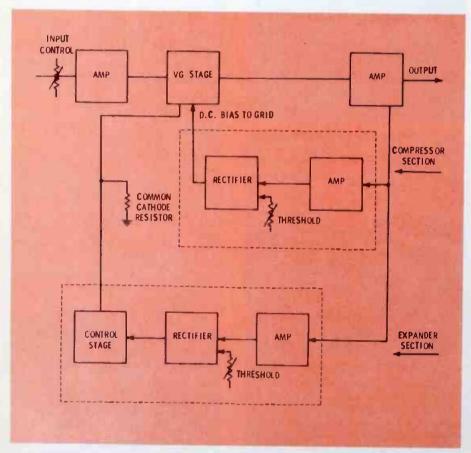


Fig. 4 A gated AGC amplifier. Compressor section works in normal fashion. Expander control stage shares common cathode resistor with variable gain stage. Control stage works during compression, adding 10 dB compression. When program level drops below expander threshold, blas rectifier shuts off control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

pander may control the variable 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 over come. The control amplifier share a common cathode resistor wit the variable gain stage which not mally holds the variable gain stag in 10 dB compression. The expan der control voltage when in opera tion, will cause this control tube to 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 inpulevel to the amplifier be cut off, the expander cannot operate until the signal comes within range so it threshold can open the gate. O course, without signal, the compressor is also inoperative, and the amplifier gain will drift back to normal. Many of the most modern AGC amplifiers use some form o gating, although it may be called by another term.

The Memory AGC

This type of AGC contains some other refinements over the Gated AGC and contains memory o storage circuits. Besides the normal AGC actions, these also offe advantages in programing that contains long pauses, such as in dramatic 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" is made to change the gain up of down. This feature is helpful ir bridging long pauses without leve variations occurring as would happen in a straight AGC. The 10 second 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

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BCD output
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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 cureall 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 short-comings. 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 inpulevels 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 newel models also provide an output control on the amplifier itself. Inpuland output levels should be adjusted so that the amplifier control 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 cases 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 manual.

If the amplifier has an adjustable utput control, it should be set at idrange for correct level. And if its 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 control, the output must use pads to educe the output. If the input level idropped, the amplifier will not be perating properly.

At this point, the amplifier is set p within specifications according o sine wave input. Since programng is a complex waveform, final idjustments to the AGC should be nade using selected program mateial. Select material that has a reaionably controlled program level, such as a good record and one that loes not have too great a dynamic ange. Feed this through the sysem, setting the console VU for proper 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)

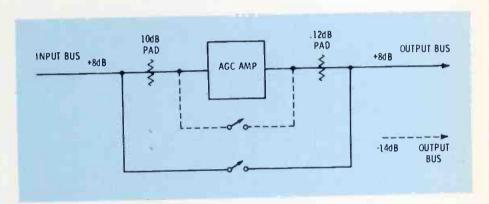


Fig. 5 By-pass switch should be wired as shown in solid line. Bypassing the AGC would cause no level changes on the output bus. Dotted line bypassing of AGC will insert both pads in output bus, dropping bus level by 22 dB.

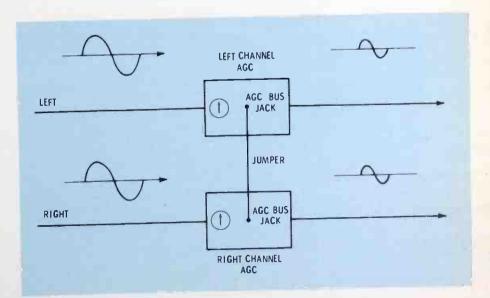
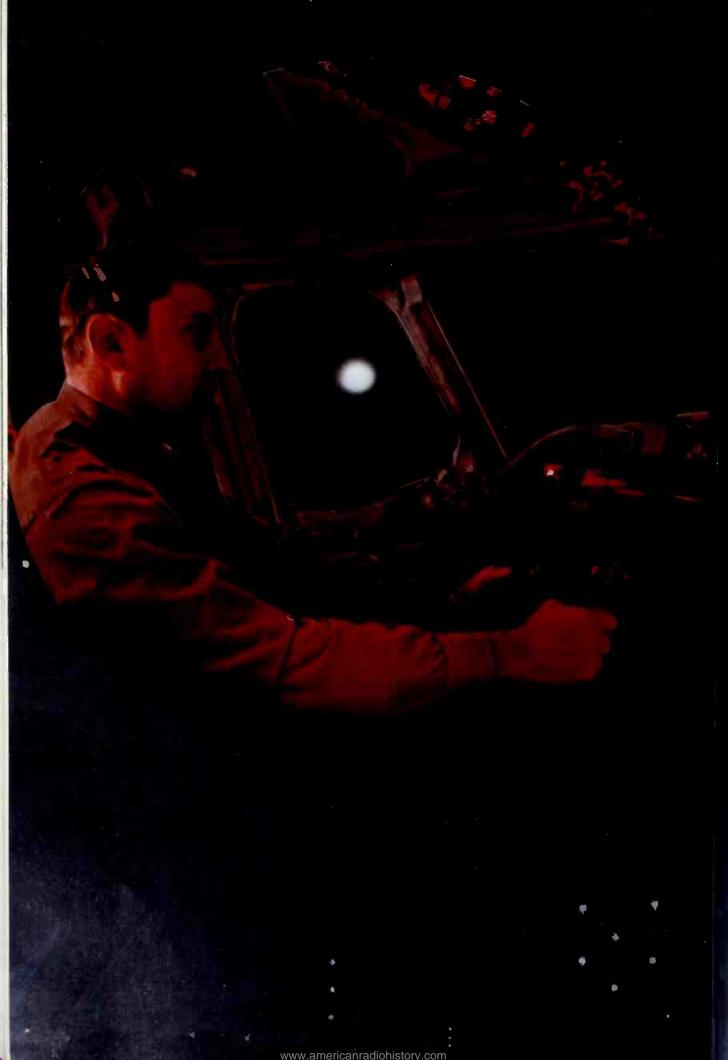


Fig. 6 Two AGC amplifiers used together for FM stereo. The AGC control bus of both are tied together. The channel with the highest input assumes control of both channels. Compression meters show identical compression.





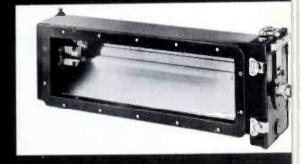
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simultaneous flash

simultaneous flash.

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Designed for use on cantenary supporting structures
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 show-case 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 with half-inch insulation board. Next half-inch wallboard was mounted by means of R-C channel, springy metal strip which preven sound conduction through the walls and also creates a small detair space.

Over the wallboard we install two-inch Tectum. This is a dense fibrous panel which was designed for sound control, and is vereffective in deadening the studio Painted an off-white, the Tectus forms the finished walls. Its appearance seems rather strange first, but actually the effect is rater pleasing. One word of caution when building soundproof wall Be sure all corners are given special attention. Earlier experience indicated that if there is going to a sound leak, it will probably be a corner.

The studio suspended ceiling are soundproofed with a thick lay of sound blanket. Windows b tween studios are double 1/4" pla

ors are carpeted, and the doors

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

Two conduit systems were inalled, one for audio and the other or control and miscellaneous cirnits. There is a junction box for ach conduit system in the control bom, news room, and production bom. The audio conduit contains of shielded pairs, while the control onduit contains 25 unshielded airs. Using this system, adding firing from one room to another is mply a matter of connecting to the barrier terminal strips in the inction 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-



ilg. 2 Wendell Philips at the controls in the howcase control room. See Figure 3 for com layout and dimensions.

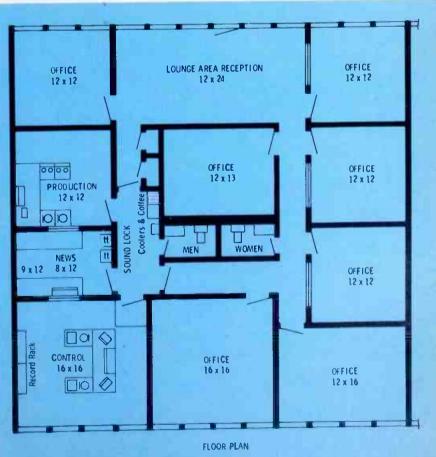


Fig. 3 The WSTM-FM facility layout.

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 mixe 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 multipin 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 solidstate stereo transmitter through FM stereo Volumax, eliminati most tube failure problems. Tremote control unit, monitor amp fier, and tower light control par complete the equipment comp ment. A dual-polarized anten system was recently installed, wigreat results.

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

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

If you have made major facili changes that were designed to propour station out of the dark ages broadcast layout designs, we'd litto hear about it. We do pay for arcles. Write to Broadcast Engineeing, 1014 Wyandotte, Kansas Cit. 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 roo program director Allen Brown and Sharon Hancock put togeth a spot in the production room.

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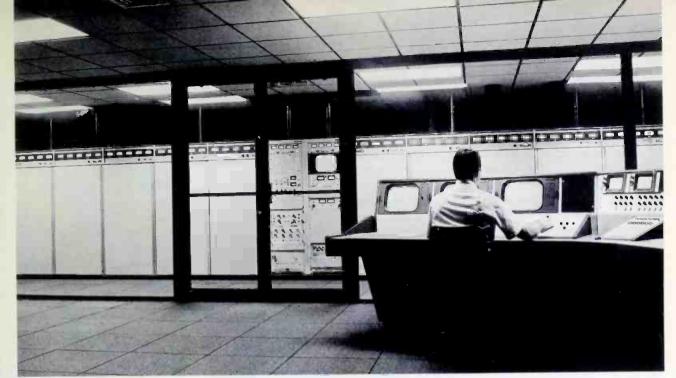
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PE 240	8572V Luminance 7038 Chroma Channels	8572V4 Luminance 7038V4 Red 7038V4 Green 7038V4 Blüe	4	Direct Replacements Each Vidicon Channel Matched
PE 24 TK 26	7038V All Channels	7038V4 Luminance 7038V4 Red 7038V4 Green 7038V4 Blue	4 (TK 26)	Direct Replacements Each Vidicon Channel Matched 7038V4 Luminance (PE 24 Only)
TK 26	8572 or 8572V All Channels	8572V4 Red 8572V4 Green 8572V4 Blue	3	Direct Replacements Each Vidicon Channel Matched

For pricing and availability information, contact your GE Distributor; for technical or application information, contact E. T. Chace, GE Imaging Devices Operation, General Electric Co., Syracuse, N.Y. 13201 Circle Number 1 on Reader Reply Card





(ETC takes inique facilities approach

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

sing film and video tape equipent at the transmitting site akes KETC a breed apart as to bw goes into a full color operaon.

With the recent completion of the KETC-TV Broadcast Center 1 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 commodate not just transmitting nd terminal equipment, but also ouses playback film and tape failities, automated video and audio witching and network line termials normally located at the studies

The inclusion of the film and ape equipment at the transmitting ite sets the KETC-TV Broadcast senter apart from normal transmiting facilities. Some 95 percent of the KETC-TV programming is ilm, tape and network origin which manate from the Broadcast Cen-

ter. 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 anti-

quated 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 the transmitters are housed in the low er level beneath the glassed-itransmitter room. The system unique in that it could be locate within the transmitter cubicle space were at a premium.

Also housed on the lower levare the electrical equipment roon the machine shop, maintenant room, telephone equipment roon full bathroom and carport.

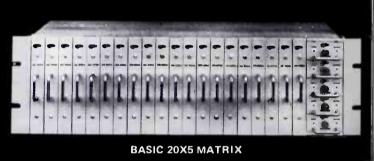
The upper level accommodate the storage area and a Gates mult ple transmitter RF switching sy tem, one of the first of its size an complexity, and the RF transmi sion line leading to the antenna a ray.

A permanent monorail from the tower to the switching room is incorporated for lifting large piece of equipment into the building of from the building to the tower elevator for transportation up the tower.



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

If you are contemplating a switching system, you should take a look at DYNAIR's Series-5100 equipment.



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ig. 3 Note the elevator waiting at the latform. Also, a permanent monorail Is hown coming toward the building from ist 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

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 offwhite, 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 travs 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

Off-the-air monitoring of AM freluency and modulation without an RF amplifier. Less interference from he intermodulation products of unvanted signals. Sensitivity of 2.5 Mv. requency stability better than ±2 Hz per year. Digitally settable peak flasher (to 129% positive modulation).

No other AM monitor gives you nore than the TFT 713. And, it's all in one, solid-state, 7½" unit that needs requency calibration only every five rears.

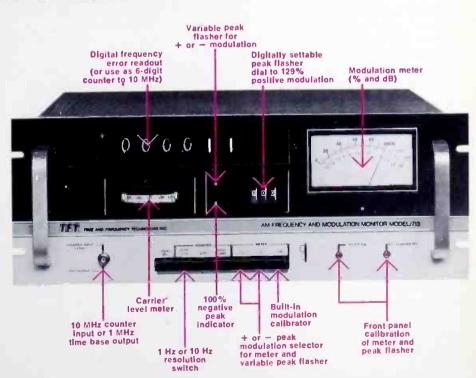
The TFT 713 uses the same adanced technology that has made FFT TV monitors a runaway success since their introduction a year ago: nore than 100 TV stations now use FFT instruments.

What's more, the TFT 713 can be converted, at the push of a button, to 3 general purpose 10 MHz 6-digit fre-

quency counter. The TFT 713 carries FCC Type Approval #3-195, and meets all appliable requirements for local or remote perations.

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I for AM A 3rd generation, off-the-air monitor.



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The tools of the trade:

Getting more out of your lighting equipment By Herb Greek

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 of your potentiometer. Dimming be low this point will cause, in the case of a 3,200°k lamp, a "blue lamp" to turn "red". This could result in considerable trouble for the video engineer in color balancing his cameras, especially involving flesh tones.

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

Here's a good rule of thumb fo locating the scoop light you're using as base illumination. Place the scoop 10 feet away from the person being lit and hang it approximately 10 feet high. This "isosceles triangle arrangement" can be used successfully in studios of limited height, say 7 feet high, where the base and the height of the isoscelectriangle would now be 7 feet.

In terms of angle, the simples technique is also the best: hang the scoop so it approximates the camera angle with which it is being used. The reason for this is to enable the subject's eyes to be seen without any ungainly shadows, and to de-accentuate lines and wrinkles. Steep angle lighting, except it the case of dramatic shows, is no advisable.

Fresnel Lens Spotlights For Concentrated Light

The fresnel (the "s" in the word is silent) lens spotlight is a highly



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.

But unlike the scoop, the Klieg light also has an internal shutte arrangement which allows you t frame the light. This framing cape bility has many applications in television studio. For example, th Johnny Carson "Tonight" Show 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 also avoided the boom shadow, wa used when Johnny stood up.

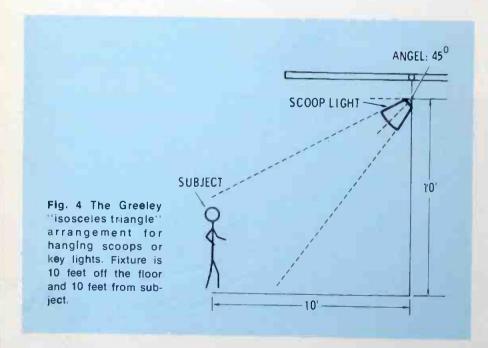
Klieglights are sold in man packages, but the 750 or 1,000 Watt instruments are the mos popular. Lens sizes are 6" or 8" and a good TV facility will need both.

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 interesting. 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. We 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 exactly 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, with the light framed so light and shad ow slash across the painting, help add dimension to the whole scene.

Editor's Note: For further lighting tips, we suggest you read the lighting article in the March, 1972 issue of BE. Extra copies are available on request.





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*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.

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

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

Simple signal sampling for FM stations

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 portage ble device that actually measure at the relative signal strength at an point. Fortunately a suitable device need not be as sophisticated and expensive as a broadcast fiel strength meter since we are intermediated 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.



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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 AMFM 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

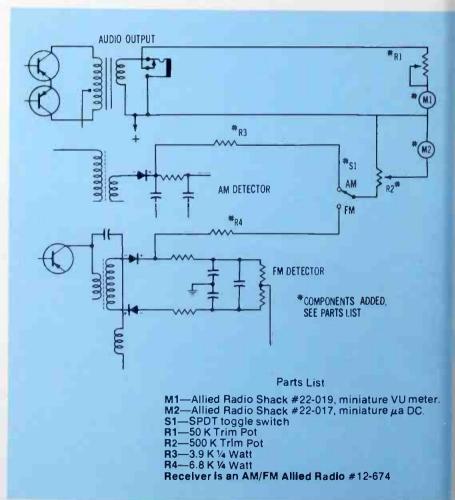
inexpensive units most stations at likely to have on hand or can easil obtain.

Using the AGC circuitry as meter voltage source has the ac vantage of providing a logarithmi readout. If a standard signs strength meter is available for comparative reading, the scale c the signal sampler may be calibrate ed in actual UV or MV by adjust ing the calibration trim-pot for th desired metering range. The value shown in the diagram with the re ceiver listed produce a readable 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 the signal sampler to pin down probler reception areas, but its simplicit and versatility made investigation

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



ground level signal pheonomena s easy, we soon found manyuneseen applications for the de-

WLIF-FM and WTOW-AM are ert of Sudbrink Broadcasting orp., a company with directives om the top to provide the best assible public service no matter bw inconsequential a listener's cestion or complaint might seem. s a result, we log all calls relative t reception problems. All callers tk directly to the engineering aff, and many reception problems æ handled personally using the gnal sampler.

Most people are unaware of how tsily VHF signals are reflected cause of their short wave-length. ne public relations value of actally checking signal level in ensely populated residential areas ia statement of the obvious. The blic, in general, rarely has any entact 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.

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MAGNETIC TAPE HEAD CLEANER

A new approach for

Spurious emission measurements

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 Re-*Chief Engineer, WRVR-FM, New York.

cording 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 spu-

rious emission, or intermodulation 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 conpared 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 spectrum was watched closely. Just as w had hoped, no spurs were presen The same procedure was then a plied to the area of the band be tween 75 and the lower edge of th FM broadcast band with the sarr results.

Inspecting The Band

The FM broadcast band wa then inspected. Each stations' cer ter frequency was set-up at scor 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 to the photograph made of the other ten stations made previously.

The area of the band between 110 and 150MHz, the area betwee w 150 and 200MHz, and 200 100 250MHz were then checked as 1 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 ! cense application as an engineerin exhibit and sent to the FCC. Temporary Program Test Author zation was issued by the FCC Sel tember 27, 1971, and WRVR bega program test with its changed faci ities at 5:30pm that same day. F the same time, WRVR changed it

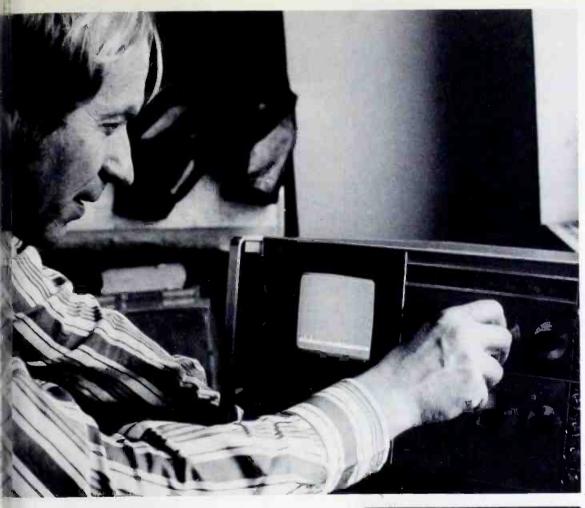


Fig. 1 Fred Lender adjusts the spectrum analyzer in preparation for the emissions testing.



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



Fidelity-Master Fidelity-Master

Russco's two new lines of top-quality phono pre-amps give you the power where you need it! (+18 DBM)
All models are self-powered, available in mono or stereo versions, and feature a unique aluminum case that allows quick and easy service access. Years ahead in engineering, the best news is the Low Prices starting at \$92.00!

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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.

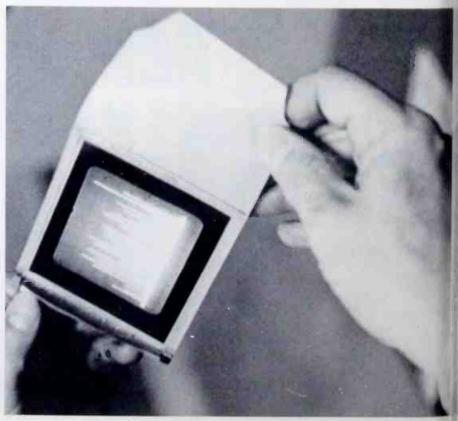
My first experience with Spectrum Analyzing equipment had been as an Avionics Technician with the United States Coast Guard, where they were used to set-up Single Side Band Transmitters. Later as Technical Supervisor at an ETV Station in West Virginia, I was exposed to the 8554L Hewlett/Packard equipment. 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 practice was to hire a consulting firm to rulthis test and it was expensive.

When I purchased new tes equipment for WRVR, we discussed the possibility of using the 8554L to do the spur test. It was agreed that the equipment was capable of the test and Hewlett/Packard agreed to provide the equipment and technical help 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 their 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 the 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. Noneo 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

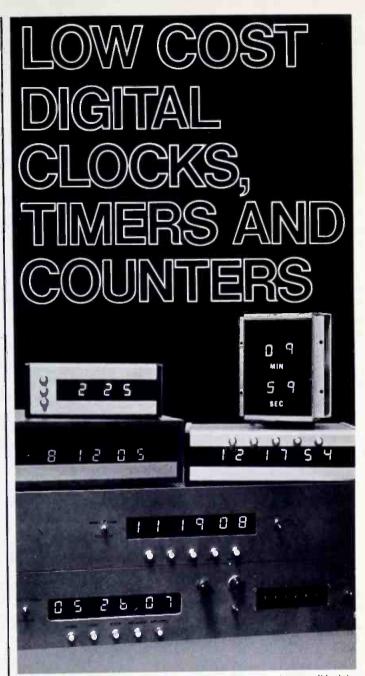
Thomas H. Winkofske has been named to the newlyated position of project manager at Koss Corp.... thur I. Bruns has been named to the new position of ses administrator for Broadcast & Industrial Prodats group of the Telex Comm. Div.... Tom Ferrara, be Green, Barry Wolfson and V. Frank Jones have been appointed Altec regional managers... Warren farles has been appointed Director of Sales for the fadio-Video Systems Div. of Philips Broadcast fuip. Corp. ... Robert L. Keith has been named tasurer-controller of Ampex Corp. In his new positn, Keith assumes the duties of controller in addition this former duties as treasurer...

Allan L. Merken has been appointed President of the inwly-formed North American Philips Electronic Component Corp. ... Norman A. Neumann has been appointed President of Amperex Electronic Corp. ... Portronics Co., Inc. has announced the appointment of three vice presidents, Mervin Kronfeld, Greg J. halt, and Alan C. Kronfeld ... Thomas R. Humphrey as been elected to Vice President of McMartin Instries, Inc., in charge of engineering, marketing and eles ... John L. Gafford has been appointed to the psition of Engineering Manager, LPB Inc. ... Valletupski has been appointed a Vice President of Vistal Educom. Nietupski will be responsible for the hadio Product Section of Visual Educom . . .

Associations

Werner Engelmaier, of Bell Laboratories, and Gusve Shapiro, of the National Bureau of Standards, ere honored during the Electronic Components Conrence in Washington. Engelmaier for his paper on hin Film Resistors; Shapiro for his contributions to le electronic components industry ... O. Leonard ress, executive director of the Kentucky Educ. Netork, was elected chairman of the board of directors f Educational Television Stations, a division of the AEB ... Paul B. Comstock has resigned as execuve vice president for government relations of the 1AB effective September 8, to accept another posion. Comstock will be succeed by Grover C. Cobb . . . on Davis and Bart N. Locanthi of the Altec Div. of iltec Corp. were given Fellow Awards at the recent 2nd Convention banquet held by the Audio Engineerig 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 Mexio Broadcasting Co., has been appointed director the AB's new Radio Information Office. . .

(Continued on page 49)



All ESE digitals are designed and constructed using the latest solid state electronic components and circuitry. This equipment is perhaps the most economical line of digital clocks, timers and counters available. Circuit efficiency and lasting quality are designed into every ESE digital product. Constructed with the built-in ruggedness necessary for studio use. No moving parts.

Special custom items, like the video tape/counter editor, a monitoring system with unique display configuration, 12 and 24 hour clocks or timers, 10 minute timers, 3 digit, 4 digit, 6 digit, record seconds in tenths, hundredths or thousandths... Even a station ID reminder, all available from ESE. Options include: Thumbwheel switch programming, BCD outputs, relay closure outputs, and solid state buffered outputs. Many products available in kit form.

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 ES-112/124, 12 hour or 24 hour clock.
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Circle Number 23 on Reader Reply Card

ENGINEER'S EXCHANG

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:

- It will respond to the signalling from both UPI and AP Radio wires.
- It will signal either a bulletin or an EBS alert/alarm from either or both machines.
- 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.
- 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).

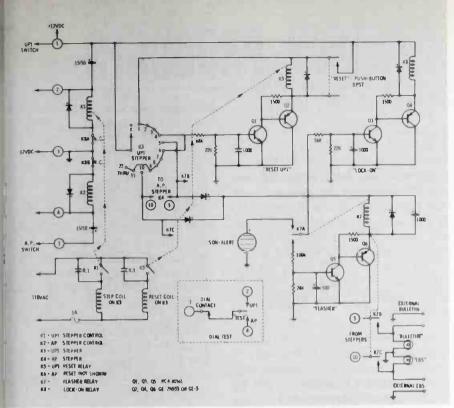
The steppers used are guardia Mer-120AC with 120VAC coils, s K1 and K2 are employed to kee the voltage on the contact point a 12 VDC to Q1 which is functionin as a timer circuit. A group of fivor a group of ten consecutive bell must ring within a certain perio (adjustable, but 4-6 seconds work well)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

If the stepper stops on either th "five" or "ten" position, the volt 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 will 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 going wild.





"I'D LIKE TO EXCHANCE FOR A BROAFCAST ENGINEER, ABOUT FORMISM.



If the stepper stops at five or ten. bltage is applied to the base of Q3, arting another timing circuit. then relay K8 operates, K1 and 2 cannot function and further npulses from the teletype cannot iove the steppers until the system manually reset. Thus, once eiier a bulletin or EBS alert is sigalled from either machine, no furier bells or signalling can "unick" the alarm. The time delay at 13 is necessary for the EBS lert. . . without this delay the unit ould lock on five immediately and ever get to the top of the steps.

Q5 and Q6 form a flasher circuit ith relay K7. This circuit could be ll-solid-state but we wanted the exibility of intermittent relay concests to operate both the lights and he "son-alert." The flasher circuit egins to operate as soon as a five r ten is reached and will continue go until the system is reset.

Construction

We used A BUD SC-2131 cowlype minibox and an AC-407 chasis to accommodate the relays for wo 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 I 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

reversible ratchet offset screwdriver set

3-3/4" heavy duty, stainless steel reversible 20-tooth ratchet with short turning radius for close work.

Unique 6" spniner/ extension has drive socket insert in handle for ratchet. Use also as regular screwdriver with bits.

1/4" hex to 1/4" square adapter bit permits use of ratchet or spinner/extension with Xcelite Series 1000 or other 1/4" sq. drive sockets.

16 precision made, alloy steel bits with knurled spinner tops . . . 12 Allen hex type, 2 slotted screw bits, 2 Phillips bits.

FREE STICK-ON INITIALS personalize the sturdy plastic case and help prevent loss or mix-up.



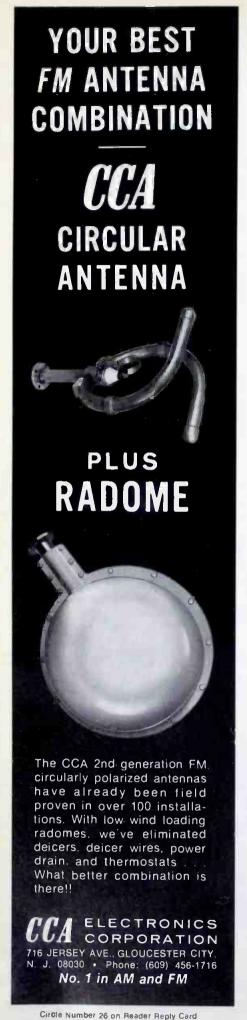
Also 5-Piece Kit (No. XL-75)
Reversible ratchet with 3/16" and
1/4" stotted screw bits, #1 and #2 Phillips
bits, all in a durable plastic, pocket
size, snap fastener case.

nationwide availability through local distributors
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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 834 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 1/4-inch tape, up to 14 channels on 1/2-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 a 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





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



BROADCAST ELECTRONICS. INC.

A Filmways Company -

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Circle Number 27 on Reader Reply Card

terioration of quality or tape intion.

Circle Number 60 on Reader Reply Card

M91-ED Cartridge

Shure Brothers Inc. has augmentits M91 Cartridge Series with a mior new addition which offers irreased trackability.

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

CPA-200 MINI-PROC



VIDEO AMPLIFIER WITH CLAMP, CHROMA CONTROL, AND SYNC-REFERENCED AGC

SPECIFICATIONS

OUTPUTS (DUAL)

DIFFERENTIAL PHASE:

DIFFERENTIAL GAIN CLAMP LIMITS

CHROMA CONTROL

MPUT POWER REQUIREMENTS, 115 VAC @ 2504 TEMPERATURE RANGE

IOUTPUT CONNECTORS

± 3 DB 0-50 DEGREES C

± 0.5 DB TO 8 MHZ

± 0.5 DEGREE

LESS THAN 1%

20 08

1% x 8 x 19 INCHES RACK MOUNTED

± 8 DB INPUT LEVEL CHANGE PRODUCES LESS THAN 0.5 DB OUTPUT LEVEL CHANGE

0.5V TO 2V COMPOSITE VIDEO (BRIDGING - VIDEO LOOP-THRU)

1 OV P-P COMPOSITE VIDEO INTO

PRICE \$460



ELECTRONICS DIVISION

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angenieux corporation of america O MERRICK RD., OCEANSIDE, H.Y 11572 . (516) 678-3520

Circle Number 28 on Reader Reply Card

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 fourchannel 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 complex-

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



NOW FROM CCA!!

Thanks to your support CCA is pleased to announce the purchase of the RF Department of Ampex. We trust you'll consider us for your UHF/VHF transmitters, antennas and line.

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SOLID STATE AM MONITORS ACCURATE @ 125%



- Positive and Negative Peaks Read Simultaneously
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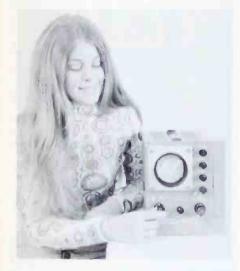
Circle Number 29 on Reader Reply Card

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 VWOs 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 tungstenhalogen 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 Quartzline lamps, the new lamp maintains stable color temperature and light output, and has more than twice the predicted life of other incandes cent or tungsten-halogen lamp presently available for similar applications.

Circle Number 66 on Reader Reply Card

TELAN

gas fueled thermoelectric generators

Nestled under the ice covered eaves of an equipment shed on a 11,000 foot mountain peak in Utah, this TELAN generator provides power for a TV translator. The propane tanks supplying fuel to TELAN require service only once a year. TELAN is available in from 10 to several hundred watts. 12-24-48 VDC standard.



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Circle Number 30 on Reader Reply Card



5-Inch TV Monitors

Dage Television announces the roduction of a line of 5" monirs, ideally suited for educational, loadcast, CCTV and industrial or scurity applications.



The monitors are available in an tractive single desktop unit or a iple-monitor, 19" rack mount conguration. Entirely manufactured America, the new monitors proide good picture quality and reliaility. A single, plug-in printed ciruit card simplifies maintenance, legulated power supply assures onstant picture size and brightess 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.



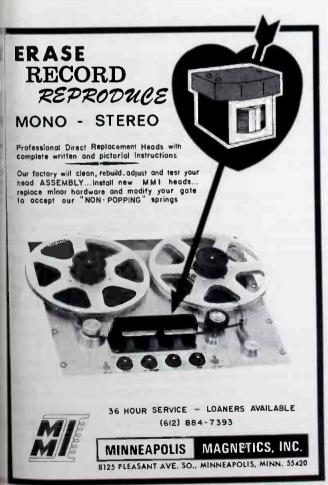
All models are available in mono or stereo versions with balanced or unbalanced output. Features include self-contained power supply, integrated circuit design, high output capability, low noise and low distortion. A special feature is a unique extruded aluminum case that allows quick and easy service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



Increase Head Life with ISOLAIR New Clean Air Unit by LIBERTY

This unit provides a laminar down flow of the cleanest possible air at the critical video head area. Excessive wear and damage by airborne contaminants are virtually eliminated, extending head life by 100% or more and insuring better overall VTR performance, as well as saving time and money. The unit is suspended from the ceiling thus requiring no additional floor space. It is easily installed and maintained and meets Federal Standard 209a, Class 100.

An additional positive effect is the cumulative result of the constant filtering of air from the entire room, so that during an extended period of use, the level of contaminants in the surrounding environment is progressively reduced



Liberty Industries has the capability for providing complete clean air environments for any size or type of operation. Our sales engineers are ready to help you.

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Now you have a third choice when you go from color tape to film.

The low-priced system.
You call it ''kinescope.''
You like the price.
Not the quality.



The high-priced system. You call it ''expensive.'' You like the quality. Not the price.



Our new Teledyne system. You'll call it perfect.

Teledyne at Mediatech is a brand new system that insures consistent broadcast quality transfers at the same cost as the low-priced system. Color or black/white.16 or 8 mm. From quad or helical tapes.

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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 depends on a team of talents and skills. Each members should know something about the others' problem and methods. This book describes every job and supplies the necessary knowledge for the members twork 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 had one most of the jobs he describes, and develope many of the techniques which are commonplace i British television today.

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

Circle Number 91 on Reader Reply Card

Solid-State Electronics, written by George B. Ru kowski, will help the technician meet his challenger. The author not only discusses the fundamentals, but also develops the student's ability to select proper disign 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 circuits.

A modified programmed style is used throughout the book. Each point discussed is followed by at leas 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 equipment used in the checking and standardization of the appratus in television signal chains, from source to transmitter.

This monograph fills a gap in the literature on television technology. It includes a great deal of materia previously accessible only with difficulty, and a certain amount of original work. Although a comparative approach is made to available methods, with emphasion local and national differences, the techniques advocated are, wherever applicable, the ones recommended by those international broadcasting bodie which for years have been working to achieve world wide agreement on standards of quality, equipment and procedures.

The book is written from the point of view of the tel evision broadcast engineer, though much of the material is directly applicable to related fields, such a closed-circuit television for educational and industria purposes. Like other books in the IEE Monograph Series, it is intended for the professional engineer and 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 Televion and Radio Artists (AFTRA), requesting that the immission's practice and procedure rules (Part 1, abpart D), be amended to require that the Commison, 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 arties in interest, has been denied by the Commission tM-1848).

AFTRA, a branch of the Associated Actors and rtists of America, which is affiliated with the American Federation of Labor—Congress of Industrial Ornizations, requested the rule making to protect its embership from what it considers disadvantageous ations 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 and assignments of stations where the buyer has not sumed labor contract obligations of the transferor or signor.

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 trough 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 5 be transferred or assigned would automatically be esignated to have standing and be a party in interest would give petitioner an unusually privileged position in that no other private party is designated, in any of our proceedings, as 'a party in interest' by rule,' he Commission said. It pointed out that the unions which represent employees of a station about to be ransferred or assigned may file a petition to deny which, 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 Lawrence R. Kem were elected to positions of group vice president, General Cable Corp. William W. Garretson was elected a vice president and Charles J. Bodenstab named a general manager . . . Irving Kolodyn has been appointed to the position of director of application en-Rineering for General Cable's Communications Products Operation ... Dr. John D. Stauffer has been appointed general manager of General Cable Corp. magnet wire products . . . Israel Switzer, P. Eng., has been appointed to the position of Vice President-Engineering, 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. . . .

NEW LIP-SYNC SECRET



Slant track and audio dubs are made from a quad master that needs audio sweetening.



The slant track dub provides accurate audio/visual timing reference as new audio is recorded on multi-track ATR.





The ATR delivers sweetened audio to quad master with lip-sync precision just as planned.





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The secret is the all new wide range electronic synchronizer. Within a 30 second capture range it automatically brings any two mag tapes—quad, slant track, sprocketed or unsprocketed audio—into exact sync.

The new BE450 compares identical SMPTE Edit Codes on the two tapes and adjusts the speed of one of the recorders until the tapes are in frame to frame lock. It keeps the tapes in sync, or in manually adjusted offset, regardless of normal tape stretch or slippage.

In the audio-sweetening example above, the SMPTE Edit Code on the quad master has been recorded both on the slant track dub and the multi-channel audio tape. The Synchronizer then keeps every production step in exact timing keyed to final audio recording on quad master.

The BE450 capabilities are too good to keep secret from anyone with audio sweetening problems or any other audio/video sync requirements. Send now for descriptive literature.



ELECTRONIC ENGINEERING COMPANY OF CALIFORNIA 1441 East Chestnut Avenue • Santa Ana, California 92701 Phone: (714) 547-5651 TWX: 910-595-1550 Telex: 67-8420 (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, reelto-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 division 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 thunit.

Rapid focus lever permits variable spot-focus settings in second Double wall construction keep unit cool and increases coolin effectiveness of its compact housing. The swing-away front doc with captive accessory latch permits easy relamping without affecting accessory positions. The univeighs 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 offer ing a combination of automatic fet tures for ease of operation an maintenance has been introduce by International Video Corpora



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A
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Michael A. Moscarello, IVC sident, said the IVC-240 color nera is engineered and styled for egration with the IVC-4000 large age multiplexer. Combined the o produced provide the most ampact broadcast film chain and altiplexer system available in the badcast industry and at extreme-

Among the features that contribe to its ease of operation and nintenace 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 varions in film density; all camera t up controls and the multiplexer bal controls are located on a slopg control panel at the camera; tree separate mesh vidicon tubes iplaceable in minutes without afcting optical alignment or removg deflection yokes.

Circle Number 71 on Reader Reply Card

Telephone Multiplex

Scott-Buttner Corp. Coastcom cently introduced its Type 100 SBSC low-density telephone mulplex system package. This prengineered system is unique in its polity to provide both multiplexing and all other functions required for complete end-to-end communications system including VHF control and rural subscriber line interacte for private or multi-frequency nging party line service from mirowave drops.

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

cations.

The Type 100 system is designed provide up to twelve 4 KHz oice or data channels plus order rire in the 0 to 52 KHz spectrum and conforms to CCITT Group A ecommendations. Groups of 12 hannels may be combined for ligher density applications. Each type 100 channel is crystal conrolled and functionally independent.

Circle Number 72 on Reader Reply Card

New products hegin on page 44

The Aristocart has just made other cartridges obsolete.

New basic design gives you

 Less wow and flutter— Almost reel to reel fidelity

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Longer head life—up to twice

Longer tape life

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Circle Number 35 on Reader Reply Card

AGC Amplifier Update

(Continued from page 19)

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 re-

sponse 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 cicuit and run a series of distortid measurements at normal level Then run the levels at the highe excursion expected and check di tortion. Do the same with the epander in operation while feedil low level tones through the system

A well adjusted and proper! operating AGC amplifier will no add too much distortion to the sy tem overall readings. A few tentl of a percent are normal. Howeve if the distortion increases market ly, it may be that the AGC is miadjusted or simply has problen that need correction. If the disto tion occurs only with higher level of tone, this could indicate the something else in the system working too close to distortion. A amplifier may be near overloa with normal levels, but is overload ing at higher levels.

Many AGC amplifiers use bat anced stages so that sudden lever changes will not produce "thump". This is canceled out it the pushpull stages. Such amplifiers must keep the stages balance or this feature will be defeated. No only should the individual tubes of transistors match up in gain an performance, but also the supply voltages and other circuit parameters should be balanced to them.

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

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

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prunds come loose. If RF is susleted, check out the AGC after in-off when the transmitter is let down. If RF is a problem, it disappear with the transmitter

Summary

AGC amplifiers can do an excellet job of controlling average progm levels, just so long as the

GET

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)

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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)

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Circle Number 12 on Reader Reply Card

(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:

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BROADCAST ENGINEERING

54

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

nswer: Yes. The rule and its rerictions apply to off-network proams which were of a special or regular nature, as well as to regur program series.

vuestion: Does the restriction on e-showing of feature films in the rarket within two years apply there the previous showing was on ne same station, i.e., if a networkffiliated station ran a feature film uring 1971 (at any hour), is it proibited from presenting the same novie during the "cleared" poron of time in 1972?

inswer: Yes. The two-year restricon on filling the cleared portion of rime time with movies previously hown in the market applies to a howing on the station which preiously 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".

Ouestion: 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.

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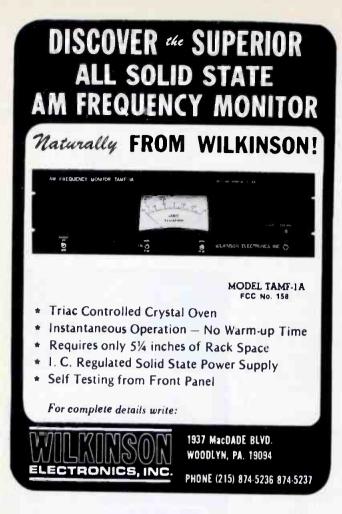
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Commission Makes More Operator Changes

Amendment of Part 74 of the rules (operator quirements for experimental, auxiliary, and special broadcast, and other program, distributional services to delete the requirement for licensed operators wherever a restricted radiotelephone operator is allowed perform the function, has been proposed in a rulement ing notice by the FCC.

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

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

OTP Broadband Study Released For Sales

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

The report specifically proposes that governme and industry cooperate to establish a pilot cable system using the latest practical technology serving a basic test group of 1,000 or more homes. The suggestipilot system would involve two-way cable transmission facilities, terminals to control system services each home, central information files and simple da processing accessible to home users, and facilities follocal program origination live or with film and vide 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 1 develop Administration policy for the regulation and development of broadband cable communication considering this concept as part of its deliberations.

Copies of the Malarkey, Taylor report may be ol 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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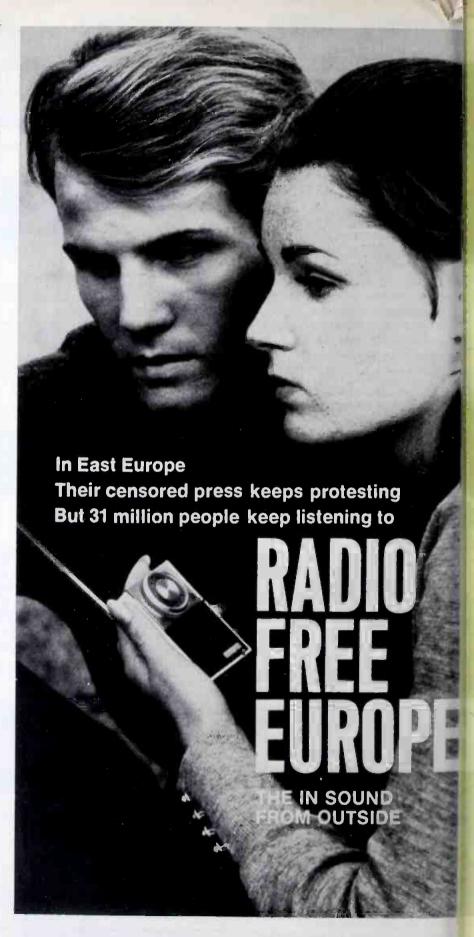
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1	per of tputs	3	6	6	12	3	6
1	ce Isistance Ildout, ch Output	75+75Ω	150Ω	300+300Ω	600Ω	150Ω	600Ω
	ition itween itputs 1-20,000 Hz ime channel)	46dB	46dB	60dB	60dB	46dB	60dB
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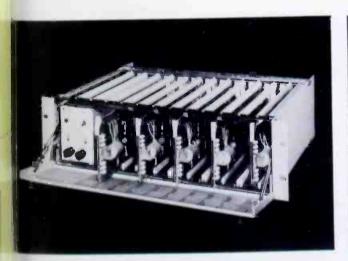
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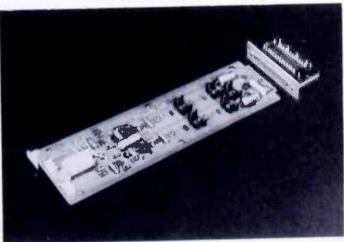
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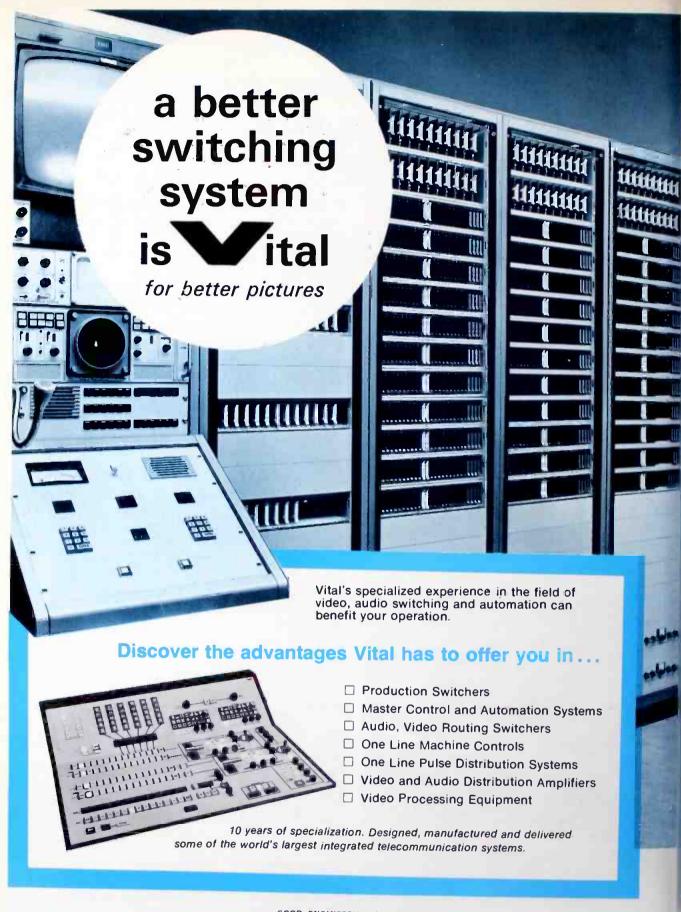


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