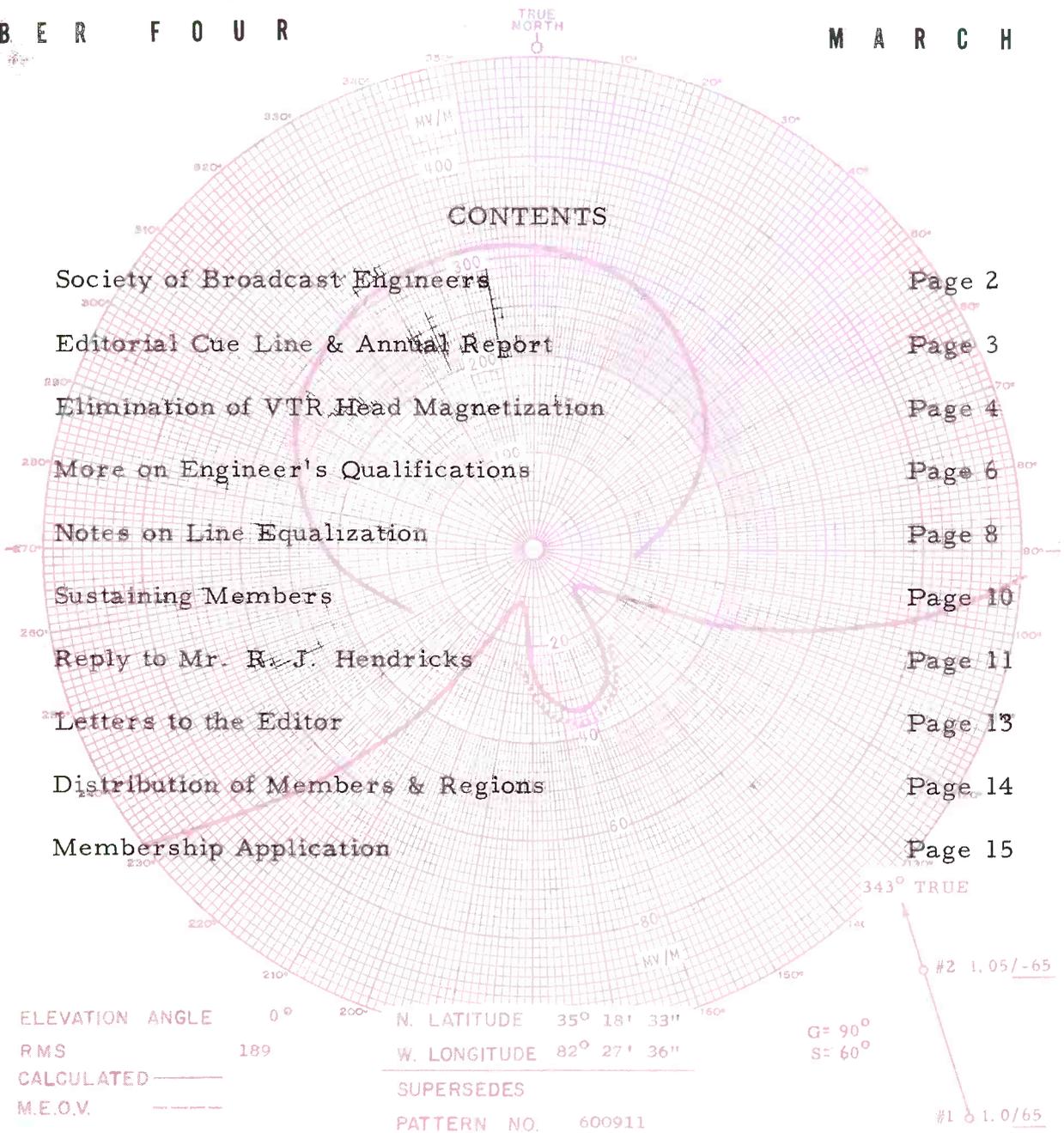


THE JOURNAL OF THE SOCIETY OF BROADCAST ENGINEERS

VOLUME ONE
NUMBER FOUR

MARCH 1965



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ELEVATION ANGLE 0°
RMS 189
CALCULATED _____
M.E.O.V. -----

N. LATITUDE 35° 18' 33"
W. LONGITUDE 82° 27' 36"
SUPERSEDES
PATTERN NO. 600911

G= 90°
S= 60°

343° TRUE
#2 1.05/-65
#1 1.0/65

THE SOCIETY OF BROADCAST ENGINEERS

THE SOCIETY OF BROADCAST ENGINEERS -

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EDITORIAL

CUE LINE

Instead of an editorial this month we are presenting the remarks of the Chairman of the Steering Committee, plus perhaps a few comments from the editor if space permits.

This time last year the Society of Broadcast Engineers was a dream called the Institute of Broadcast Engineers and we had about six members - all paid! A few letters to engineers who had expressed interest in the past, and some very welcome publicity from our friends at Broadcasting and Telecasting and TV Digest etc. gave us a fillip, support from NAB gave us a meeting place for the convention and the First Annual Meeting was held. During this meeting we enrolled nearly 100 new members and changed our name to the Society of Broadcast Engineers.

A steering committee and a constitution and by-laws committee were formed and plans made for a quarterly Journal. In June 1964 the first issue of the Journal of the SBE appeared. It, and we, were honored by a greeting from the Honorable E. William Henry, Chairman of the Federal Communication Commission.

We also received solid support from the industry and six of the major equipment suppliers have become sustaining members of the Society - to these welcome members we tender our very sincere thanks for their interest in the Society and vote of the science of broadcast engineering.

We now have approximately 300 members. We need more, many more, to liberate the force that is latent in our association, so we ask every member, "go out and get at least one new member."

We are frequently asked "What is the purpose of the SBE?" To this we reply, "The SBE has been conceived to provide a vehicle for the exchange and promulgation of technical data concerning the science of broadcasting, to act in the best interests of raising the engineering standard of the broadcast engineer, and to establish a professional engineering society with such prestige that membership in it will become an honor that will be recognized and sought by broadcast engineers."

This month, enclosed in each copy of the JOURNAL, is a postcard with the names of various members nominated by the steering committee to fill the positions described in the Constitution and by-laws that were presented to the membership in the December issue of the JOURNAL. We believe that these men if elected will do a good job of advancing the aims and objectives of the SBE and act in the best interests

of the members. Provision is made on the card for write-in votes in the event that other choices are desired. In any case these pre-stamped post cards must be mailed by 7 March 1965 so that they can be counted and the results announced at the March 21 meeting at the Shoreham.

We now have ten chapters and two of them have gotten off to wonderful starts. Chapter One in Binghamton, N.Y. has been holding regular meetings and has 12 members. Chapter Six in Butte, Montana has a monthly newsletter and is enrolling new members almost daily. Congratulations Charlie Halliman and Kenneth Benner!

Our financial statement as of the 31st January 1965 will be found elsewhere in this issue. Plans are being made to provide some financing to every chapter, based on the number of members that they have on their rolls - this should help to encourage chapter activities.

In closing we, who have had the pleasure, and labor, of helping to guide the SBE for the past year want to thank all members for their support, and look forward to a tremendous upsurge in the coming year. It is only with your support that the power for progress that is germinating in the Society of Broadcast Engineers can be realized so that the statement "I am a member of the SBE" is made with pride and received with respect!

John H. Battison
Chairman, Steering Committee

THE EDITOR'S POSTSCRIPT

Now, wearing our editorial hat lets look at what the JOURNAL has accomplished. This is our fourth issue, and we have succeeded in turning up some fine controversy. Mr. Hendricks' article on engineer's qualification in the December 1964 issue has brought forth the article from Lawrence Behr and the letters from members that appear in this issue. We feel that there is much merit in the ideas expressed, and we wonder whether the executive group will consider the possibility of the Society taking a position on this subject - at a later date and perhaps filing a proposal with the FCC. This of course would have to wait until the membership is far greater than it is today and becomes more representative of the whole body of broadcast engineers.

EMBLEM

The only comments we have had on the proposed lapel emblem were favorable so attempts will be made to obtain prices on these and membership certificates.

ELIMINATION OF VTR HEAD MAGNETIZATION

by Al Browdy
Director of Engineering-KCOP
Hollywood, Calif.

Simple modification includes diode switching in VR 1000A tape recorders.

For years we have been fighting head magnetization on our VR 1000A machines. Power supply regulation, relay adjustments, additional capacitors, diodes, etc., seemed to help somewhat but made the machine entirely too sensitive to adjustments.

Our Video Tape Supervisor researched this problem and came up with the answers.

A study of this problem reveals the following:

1. The tips were being magnetized by large transients which were occurring during the stop mode.
2. The transients during this mode were originating in the Record Driver and the Record Amplifiers due to the operation of the B+ switching relays K26001 and K30002.

These transients were 25 to 35 volts PP at the output of the Record Driver. As long as relay K30001 (the rotary solenoid) opened before the B+ switching relays, no transients could get through to the tips. However, as the rotary solenoids relays became older, they became more and more difficult to adjust to achieve this condition.

Rather than the continued effort necessary to maintain these critical adjustments, we decided it would be logical to eliminate the source of the problem, namely, the transients. This, we did very simply by adding a 100 ohm 10 watt resistor (in the Record Driver) in series with contacts 11, 12, 13, 14 of K26001 and the junction of R26015, C26009, etc. At this junction, we also add a 40uf 450 volt electrolytic ground. By preventing the sudden drop of B+ to zero, we eliminate the transients. True, this does drop the B+ voltage by 15 to 25 volts, however, we swept the entire circuit and found little effect on its response. Input controls made up for any loss of gain. This took care of the Record Driver.

B+ TRANSIENTS

We used the same procedure in the B+ switching circuit in Servo Reference unit. We added a 10 ohm 10 watt resistor in series with contacts 5,

7, 8, and 10 of K30002 and pin 6 of J30007P. We also added a 40uf 450 volt electrolytic from pin 6 of J30007P to ground. Again, no apparent loss of response was detected when this circuit was swept. This removed all transients from the Record Amplifiers and removes the major cause of head magnetizing.

It might be said at this time that the coils L30005 (2.5mh) and L30004 (15uh) in the plate circuit of the EL34 will cause the tips to magnetize if they are beginning to fail. The large transients that have been driving these coils will probably cause the insulation to break down and short out numerous turns if they have been in the circuit any length of time.

We continued further by installing head switching diodes which completely eliminates the rotary solenoid and its associated relays. We used the Fairchild diode assembly FA3110 (\$7.50). This assembly contains four encapsulated FD1104 (matched) diodes. This is the assembly Ampex uses in their Editec package.

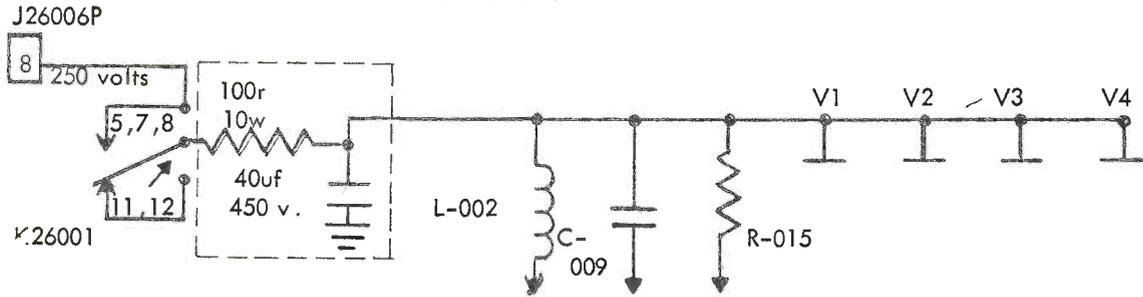
DIODE OPERATION

The characteristics of the diode are such that approximately three (3) volts are necessary to drive its forward resistance to zero. Since the voltage output of the record amplifiers is in the order of 40 volts PP when the system is in the record mode, the diodes will conduct. Where a tape is being played back, the voltage generated by the tips is in the order of 4 millivolts and, therefore, the diode will not conduct.

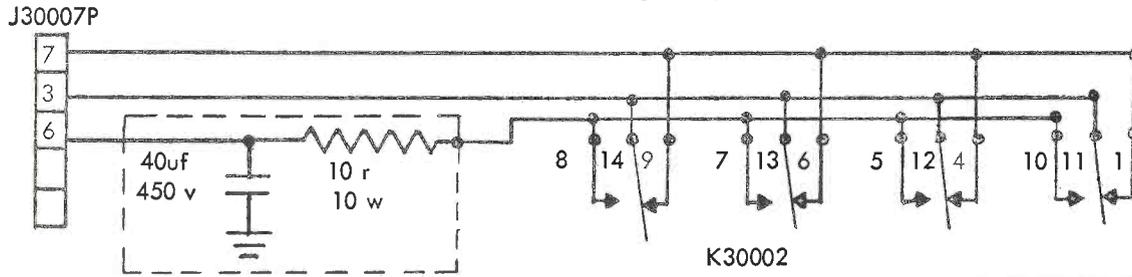
As the record AC voltage goes positive (+3 volts), the diodes (1 and 2) will conduct and continue to conduct until the negative going signal reaches +3 volts as the signal continues in a negative direction to -3 volts diodes (3 and 4) will conduct. Since the signal is a FM sinewave, the absence of conduction between +3 and -3 volts will not be noticeable since the PP voltage is approximately 40 volts and there is a considerable amount of flywheel effect.

The connection between the junction (1 and 2) and (3 and 4) serves to balance the diodes.

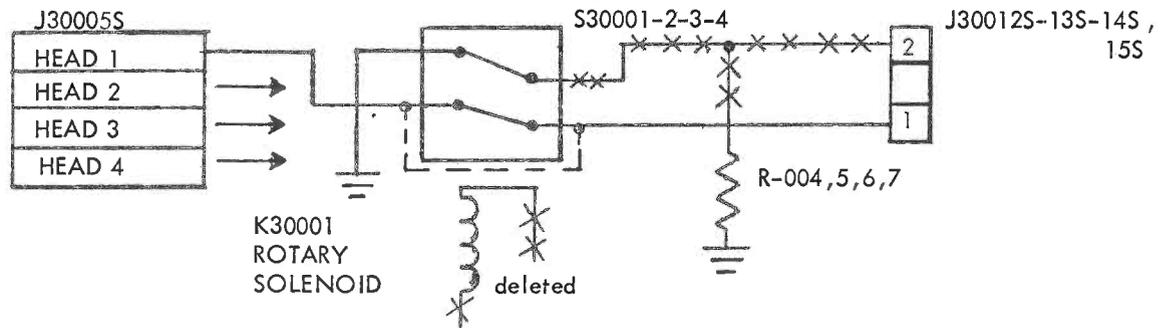
RECORD DRIVER



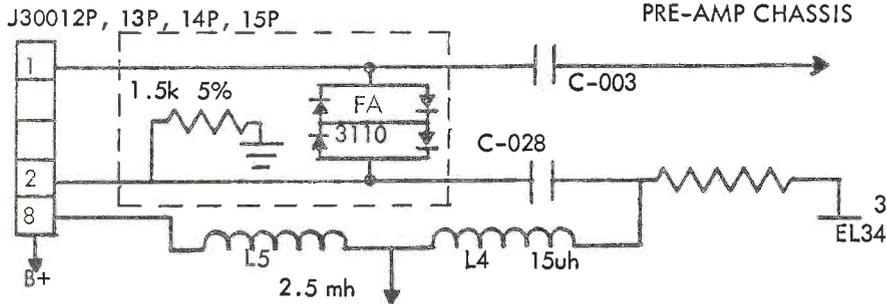
SERVO REFERENCE UNIT



PRE-AMP HOUSING



PRE-AMP CHASSIS



INSTALLATION

The installation is fairly simple. The Pre-Amp housing must be dropped and the relay contacts are by-passed between the head tip and pin 1 of J30012S, J30013S, J30014S, and J30015S. The blue lead on pin 2 of these blue ribbon connectors is removed. The 115 volt leads to the rotary solenoid are cut and taped. This completes the Pre-Amp housing. Next, a 1500 ohm 1/2 watt 5% resistor is installed from pin 2 of J30012P to ground in the Pre-Amp chassis. The diode assembly is installed between pin 2 and pin 1 of J30012P. This same procedure is fol-

lowed in the other Pre-Amp chassis.

At this point, you will know definitely whether or not the coils L30004 and L30005 in the pre-amps are good or bad. If they are bad, the tips will magnetize in channels which have the bad coils. Simple replacement of one or the other or both of these coils will eliminate this problem.

The advantage of using these diodes is the elimination of the rotary solenoid and the contacts which were formerly in series with the tips.

NEWS FROM CHAPTERS

Once again Chapter One in Binghamton, NY, has had a Chapter Meeting and sent us a report.

On February 3rd, last Chapter Ten met at the Colonial Motor, Inn, Vestal, N.Y. Nine members attended and saw an RCA film on mobile TV and tape recording (video) facilities. Later they participated in a discussion of technical standards of broadcasters, microwave operators, and CATV systems. All SBE members are invited to attend, and meeting notices will be mailed to anyone sending in his name and

address to Charles Hallinan, Chairman, WKOP, Binghamton N.Y.

*** **

NEW CHAPTERS: Chapter Ten at Portland, with Chairman Sidney H. Tompkins, Technical Director Portland State College, Ore.

Chapter Eleven: Boston, Mass.
Chairman Donald E. Lefebvre, Chief Engineer,
Boston University, Television

Good luck Gentlemen, and we welcome you to the ranks of the workers.

MORE ON ENGINEER'S QUALIFICATIONS

Editor's Note: The following extract is from a licensee's response to the FCC following questions at renewal time. It is printed with the licensee's consent, and provides another viewpoint.

PARAGRAPH SIX

Paragraph six, sections (1) and (2) point out discrepancies in the technical portion of the KOXR renewal application, and a request a full explanation of each discrepancy and a statement of corrective action taken. Paragraph six further calls attention to an attached skeleton proof of performance letter. This letter was not found in the mailing.

Paragraph six (1) states that the remote antenna base current ratio as logged deviates as much as 9.1% from the licensed ratio. Paragraph six (2) states that the base current ratio as logged deviates as much as 5.1% from the licensed ratio. The Commission points out that these deviations should not exceed 5% of the terms specified in the license.

Paragraph Six (1)

The deviation of 9.1% from the licensed ratio of remote antenna base current can be explained primarily as mal-functioning of calibration controls on the remote antenna base current circuitry. The calibration controls have been replaced and the remote antenna base current indicators function properly. The district engineer's inspection report should bear out the accuracy of the remote antenna base current indicators at the time of his recent inspection.

Paragraph Six (2)

The deviation of 5.1% from the licensed ratio of antenna base current ratio can only be attributed to an improper reading by the licensed man on duty. The maximum deviation recorded in the Chief Engineer's workbook for the monthly performance check is 4.6%. This high deviation was recorded in only one

reading in three years. All other readings were 3.6 or below. It is not uncommon for an operator with a First Class Radio-telephone license not to know how to read meters, especially thermocouple radio frequency ammeters under modulation. We have found in the past that some will read them on peak modulation, while others have read the average of the modulation swing. Many operators just write down what the previous operator recorded. The Chief Engineer of this radio station has many times in the past held school with the operators to teach them about matters which they are supposed to know as certified by their operator licenses. Only one out of ten operators holding First Class Telephone licenses have been found to be even closely qualified. Four holders of First Class Radio-telephone licenses were asked these three questions:

1. What is the maximum frequency deviation allowed for KOXR?
2. What is the FCC requirements regarding peaks of modulations?
3. How would you measure the power input to the final amplifier?

The only correct answer given to any of the above questions was that the modulation should not exceed 100%. One of the operators was asked "if he had a knowledge of Ohm's Law." He replied, "I know it has something to do with the FCC, but I just can't remember what it's all about." These operators questioned are typical of many holding First Class Radiotelephone Licenses.

The problem rests, not with the individuals or the schools they have attended, but with the

system of operator qualifications set up by the Federal Communications Commission. The system is antiquated, inadequate for present day requirements. The First Class Radiotelephone licensee, in the eyes of today's broadcaster, is a farce. The only significance it has is to signify that the holder is an American citizen. Broadcasting has expanded into three major fields: AM, FM, and TV, each field with separate operator requirements. If the FCC operator's license is to signify to the broadcaster that the holder is qualified to accept a position requiring a federal license, then changes are necessary in the present system of issuing operator licenses. We realize this discussion is not a direct approach to answering the Commission's letter; however, we feel that it is relevant to our explanation of the reported discrepancies.

The undersigned, a broadcaster of seven years' experience in the field of radio broadcasting, and twenty years' experience in qualifying and establishing requirements of Naval radio operators and technicians, would like to make the following recommendation in skeleton form regarding broadcasting licenses. It is recommended that there be issued three broadcasting licenses as follows:

- (1) Broadcast Operators License,
- (2) Broadcast Technician License,
- (3) Broadcast Engineer License,

and that each license carry one or more of the following qualifying endorsements:

- (1) AM Radio,
- (2) FM Radio,
- (3) Television.

The scope of the qualifications for each class license would be as follows:

Broadcast Operator

A broadcast operator shall be familiar with those rules and regulations of the FCC that are associated with external controls and instruments of a broadcasting transmitter and its auxiliary equipment. His technical knowledge shall include an understanding of the effects and operation of external controls and instruments of a broadcasting transmitter and its auxiliary equipment. His duties shall be limited to equipment operation only.

Broadcast Technician

A broadcast technician shall be qualified in the responsibilities of a broadcast operator and shall have had one year of satisfactory performance as a Broadcast Operator. In addition, he must be familiar with all rules and regulations of the FCC pertaining to broadcasting transmission. His technical

knowledge shall include a practical understanding of broadcasting transmitters and its auxiliary equipment. He shall be qualified to make minor adjustments and repairs to all broadcasting equipment. He shall be qualified to determine the proper operation of the equipment and to make such adjustments as to cause the equipment to operate in accordance with accepted technical practices, and the rules and regulations of the FCC. His duties shall be limited to testing, minor adjustments, and minor repairs of all broadcasting equipment.

Broadcast Engineer

The broadcast engineer shall be qualified as full-time, or on-call Chief Engineer. He shall be familiar with all rules and regulations affecting broadcasting, both technical and administrative. He shall have had at least two years of satisfactory performance as a Broadcast Technician, or a certification from an accredited school of broadcast Engineering. His technical knowledge shall include a theoretical as well as a practical knowledge of broadcasting transmitters and their auxiliary equipments. He shall be qualified to make all major adjustments and repairs to all broadcasting equipment. He shall be qualified in the use of all test equipment required to test and make major adjustments to broadcasting equipment to bring about the proper operation of the equipment in accordance with good engineering practices, and the rules and regulations of the FCC. His duties shall include installation, testing, and adjustment, major repairs, and modifications to all broadcasting equipment.

Each licensee shall demonstrate a proficiency in one or more of the qualifying endorsements. Examination and experience, where required, shall be limited to the field of AM radio, FM radio, or Television, for the endorsement the applicant seeks.

The foregoing is the thinking of the undersigned who has been in the operating field of the broadcasting industry. The above is not intended to be a complete analysis of the problem or its entire solution, but it is offered only as a contribution for thought.

CONCLUSION

It is hoped that this letter of reply has explained satisfactorily to the Commission the variances and discrepancies noted in our applications for renewal of licenses of Station KOXR and KAAR(FM), (File No. BR-3197 and BRH-893). If we have digressed into extraneous explanation, or have touched too critically on the Commission's procedures, we apologize. We assure the Commission that our criticism is purely conceived to be constructive. Our interest

in the broadcast industry and its administrative agency is a sincere and respectful one. We admire the great strides the Federal Communications Commission is making in its efforts to bring about a well regulated industry without blemish. We are pleased to have had the opportunity to respond to our shortcomings, as such measures of control will help to strengthen our broadcasting industry, provided that the same close supervision is leveled on all the

broadcasting service. Our industry's problem today can be summarized in one phrase; "The FCC's children were allowed to wander too many years without supervision, and now they must go to reform school."

Very respectfully,
OXNARD BROADCASTING CORPORATION
Paul R. Schneider,
President and General Manager

NOTES ON LINE EQUALIZATION

by R.S. Houston
Chief Engineer - WEAM
Arlington, Va.

For most voice-only applications, or for short lines, it is often possible to handle a telephone line to a remote location without the need for equalizers or booster amplifiers.

If equalization is indicated, it is general practice to have this done by the telephone company at the time the line is installed. When the installation is finished, the equalizer and coil become a permanent part of the line, and it is often difficult to use it for other things, such as cue feed, or talking.

By ordering a non-equalized line, the user has complete access to the line, since he is given the two ends of the circuit, and may use them as he desires. With no equalizer in the line, cue may be fed from the studio back over the same line, and it will be heard quite well since there is no insertion loss at the studio from the equalizer. Similarly for a telephone circuit, when making prebroadcast arrangements there is no equalizer to absorb most of the talking currents. Here, it would seem, are two contradictory situations. Several solutions present themselves.

The most obvious one is to have an equalizer as part of the station equipment which could be patched into the line when necessary. This is excellent when using the line for talking, since it is then a simple matter to change the patch to the broadcast circuit. But if cue is to be fed back on this line, the problem becomes complicated. Several solutions to this will be suggested later.

An arrangement used often by the telephone company and one which is available to the broadcaster is to terminate both ends of the line at 150 ohms, instead of the conventional 600 ohms. A large part of the high frequency loss on short lines is caused by the capacitance of the cable, therefore operating at a lower impedance reduces the loss from this source. Thus, while the transmission loss is greater, due to the higher resistive loss, it is more uniform and the high frequencies are less attenuated in proportion.

Another technique seldom used but nonetheless

effective is to introduce a deliberate mismatch in the line termination. As will be recalled, a mismatch from low to high impedance in any audio path will result in attenuation of the low frequencies, while the highs will be affected to a lesser degree. Applying this principle if the line is fed at 150 ohms, and terminated at 600, there will be a consequent loss at the low end of the spectrum. Now, depending on the physical structure and length of the line, this loss will approximately equal the capacitive loss of the high frequencies. In general the length of line that may be equalized under these conditions is from 3 to 5 miles actual cable length. When using this type of equalization, there is an insertion loss from the mismatch, which if used in the ratio of 150 to 600 will be 6 db, plus the loss from the line itself. But this loss is the same in both directions as is the loss from the above system using lower impedance but uniform termination. Thus it is possible to use the line for all manner of transmission without the need for switching, and without undue loss.

Returning to the problem of using equalizers to resonate a circuit for best response, we saw, supra, that if an equalizer is bridged across the line permanently, the loss in most cases will be too great to allow its use for a talking circuit, or for feeding cue back over the line. It is of course possible to put a switch in series with the equalizer to lift it off the line during cue feed. The drawback here is that it requires two actions when putting the program on the air. One, to switch the line from cue feed to broadcast, and the other to put the equalizer across the line. With most consoles in use today, the cue-program switch is permanently wired within the console, so that it would be difficult to place it ahead of the equalizer in order to effect the circuit shown in figure 1. As an alternate, the equalizer could be wired into the console at the point shown. When it is not needed, it can either be switched out with a separate switch, or left in

the "off" position.

Figure 2, shows a more flexible system in which the equalizer remains external to the console, available to patch to any line, and can be automatically switched in and out of the circuit. The only modification necessary in the console is to add an extra pole on the broadcast position of the cue-broadcast switch. In some consoles, it may be necessary to change the entire switch to accomplish this. When the line is in the "cue" mode, the equalizer is normally out of the circuit. Thus can can be fed back on the line without attenuation. When the line is switched to "broadcast", a relay connects the equalizer across the line, completing the requirements for broadcast. A relay is recommended in this service rather than running the switch directly to the console, unless the connection would be only a few feet. With a long lead in this position, it could unbalance the line sufficiently to introduce some hum. However, if the line first goes through a coupler, before reaching the equalizer, this precaution is unnecessary.

Figure 3 is an ultimate refinement in the system, one which will serve for even very long lines, provided there are no loading coils or amplifier in the circuit. The booster amplifier shown can be an unused microphone pre-amplifier, or any other similar type of flat response amplifier with about 40 db gain. The gain control can be either a variable pad ahead of the amplifier, or an interstage control within the amplifier. However, when there is little need for equalization the former method is preferred to prevent overloading the early stages. In effect, the total gain of the system is 40 db. If 25 db of equalization is necessary, the pad is stepped down an additional 15 db, and the output of the system is then equal to the level of the unequalized line. Depending on input requirements, and the level reaching the studio, this can be changed to suit any situation. Even if equalization is unnecessary, the amplifier may be used as a booster, should the received level be too low to be handled by the station equipment. Care should be taken not to raise the gain high enough to bring up the ambient cross talk. This sounds bad on the air, and is generally contrary to the regulations of the telephone company. Should this condition prevail, it is an indication of trouble somewhere in the external system; either the line or in the remote amplifier.

The system can be switched in and out of the line as needed, with the relay system connected as described above. A simple DPDT relay will suffice if the connections are made as shown. The switch in the relay circuit is to disable the system in the event straight through operation is desired on program feed. Hence it is easy to use the line for talking, and cue feeding, and then switch in the equalizer-booster for receiving the program.

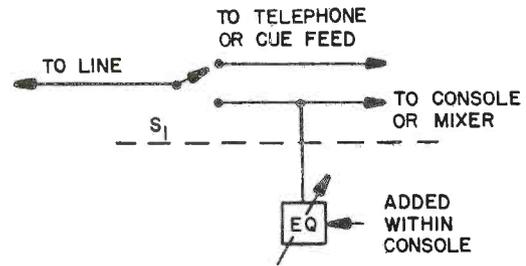


FIGURE 1: System for inserting equalizer in line. Switch S1 and equalizer can be either existing switch in console with equalizer added, or both may be external.

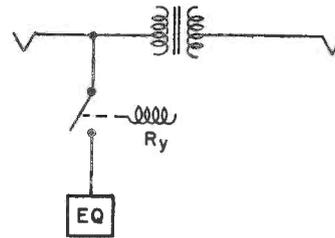


FIGURE 2: More flexible system providing equalizer bypassing for two way program feed.

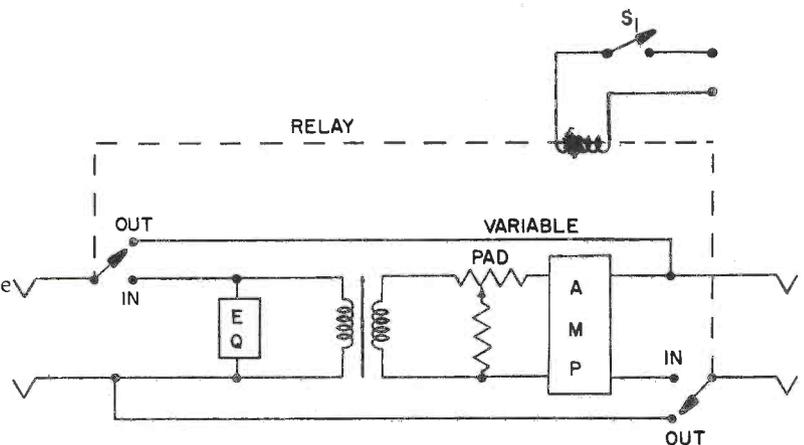


FIGURE 3: Ultimate equalizer-booster system. If input pad is "H" pad, input coil is not needed.

SUSTAINING MEMBERS

It is with the greatest appreciation that the Society of Broadcast Engineers lists the following organizations as Sustaining Members. It is their Support that has helped make these JOURNAL issues possible, and we hope that from time to time we shall have the pleasure of publishing articles from the pens of their engineers.

The Alford Manufacturing Company
299 Atlantic Avenue
Boston 10, Massachusetts
Manufacturers of Antenna Systems, transmission lines
and equipments, etc.

Burke and James, Inc.
321 S. Wabash Avenue
Chicago 4, Illinois
Suppliers of every conceivable form of photographic
equipment for TV.

Electro Voice Incorporated*
Buchanan, Michigan
Noted for top quality broadcast microphones and loudspeakers.

Andrew Corporation
Box 807
Chicago, 42, Illinois
Coaxial transmission line, switches, transmitting
antennas and masts, etc.

Auricon Division of Bach-Auricon Corporation
6968 Romaine Street
Hollywood, California
Everyone knows that this is the home of the "Pro" and
"Super Pro" 16 mm S-o-F Cameras for TV

Conrac Division (Giannini Controls Corporation)
Glendora, California
Top quality television monitors and video receivers for
rebroadcast purposes.

*Also an advertiser. SBE JOURNAL rates
available on request.

SOCIETY HEADQUARTERS AT NAB CONVENTION

During the NAB convention the SBE will have a suite at the Shoreham Hotel. This suite will be open from the evening of March 20th, through Tuesday night March 23rd. All members are invited to drop in to discuss ideas and get to know each other.

There will be a meeting of the two executive committees at 10 AM at the SBE Suite on March 21st. It is hoped that we can hold a meeting of the Chapter Chairmen on another day convenient to all Chairmen present during the Convention. This will depend on the availability of the Chairmen .

REPLY TO MR. R. J. HENDRICK
by Lawrence Behr
Consulting Engineer
Greenville, N. C.

This is a very interesting response to Mr. Hendricks' article in the last issue. Mr. Behr is well qualified to speak on this subject for as well as being a consulting engineer he is also directly connected with WFAG, Fayetteville, North Carolina.

I think that it is in order to thank Mr. Hendrick for his very provocative discussion of current engineering events and their effects. I don't have the pleasure of knowing this gentleman personally, but it's obvious that he knows whereof he speaks. Certainly, I have seen many of the troubles that beset the engineering side of the broadcast fraternity and sympathize with his concern. I think there is, however, a better way to cure the patient.

Taken in their proper perspective, automatic logging and relaxed operator requirements are to the benefit of broadcasting in general. As with anything, they may well be evil in the wrong hands. I personally consider automatic logging a valuable tool, and recommend it highly wherever it is practical to employ it. Falsified log entries are eliminated, a valuable accurate maintenance record is created, and the announcer, engineer, and manager are relieved of a very troublesome concern. I cannot share Mr. Hendricks' anxiety over the results of logging equipment failure. It has been my experience that the FCC is ready anxious to listen to any reasonable excuse for improper technical operation, so long as it is sincere and reflects real willingness to take every practical step to restore and maintain compliance with the rules. I would hardly consider that a station was using any equipment wisely, including automatic logging, if its announcers or other operating people could not detect the more obvious malfunctions without engineering help. This is basic orientation in most well run stations. There is certainly something to be said for any proposal for protection under the rules, but a proliferation of rules generally decreases their overall usefulness in direct ratio to their increase.

The qualifications of broadcast operators has rightly been a subject of considerable continuing controversy. It is both amazing and discouraging to consider the number of broadcasters and engineers who have no real concept of the tremendous responsibility that fall on an operator licensee. When an operator is in charge of transmitting equipment he is, literally, in charge of the receivers of thousands of listeners, and the bank book of the owners. Ignorance

and disregard of good engineering practice can, and has, caused revocation of broadcast licenses as well as the operator's. The question is raised: who is qualified, and for what?

It can quite correctly be hypothesized that the ultimate test of qualification is the ability to produce satisfaction in the user. This test works very nicely up to the point where the happiness of others, on the outside, is infringed, then some control or remedy must be applied. This, it is maintained, is the basis for all regulatory acts and police powers. In the case of broadcasting and the FCC, certain basic criteria have been formulated as guidelines to ensure equity to all involved. The FCC has established for the broadcaster's protection, and the protection of the public, a minimum amount of knowledge that is felt to be necessary for responsible performance of the duties imposed and permitted under the various classes of operator licenses. Also necessary to this assurance is the determination of basic moral and character qualifications. In this sense, the present FCC system is really quite thorough and effective. I am far from blind and can quickly point out many deficiencies in this and other systems, but again I must emphasize that over regulation is evil, and could cure the "six week wonder" and other problems, but only at great expense. The ultimate determination of qualification must lie with the broadcaster himself, although we must admit that there are some broadcasters who are not fit to judge—fortunately, very few.

It didn't take long to recognize an increased interest in engineering matters among broadcasters after recent FCC crackdowns and the implementation of the new operator rules, showing that very little management education has taken place in this area recently. Really not surprising in view of the complexion of broadcasting today.

In the old days the engineering department used to be the very backbone of a broadcast operation. Psychologically, the physical presence of the massive equipment of that day, the great cost of the complex needed for live programming, and the complexity and cost of maintenance of a

station's equipment put the engineering aspect among major management concerns. Three things have reversed all of this in today's station, especially where management never had contact with the broadcasting of 20, or even 10 years ago. The typical "news and music" operation today need be little more than a record player, transmitter, and antenna. In no way should this lack of equipment reflect poorly on a station-many communities receive excellent broadcast service from conscientious operators using little more; but the point is made that physical presence is gone. Today's equipment makes a control room look more like an office than the lab of yore.

One of the most sensitive parts of an owner's anatomy is his wallet, and unless some trifles with it, his broadcast quality problems are apt to be forgotten. Thus so with the engineer. In most small non-directional stations, the majority of our 4000 or so stations, maintenance costs will hardly average \$50.00 a month; probably less than a third of the phone bill. Under these circumstances, why not devote time to some more pressing problem?

My third point is one so obvious as to be given much less than its appropriate share of credit. This is an electronic world! Electronic devices are all around us. No longer does mystery preclude the air when you open the door of the equipment rack, frankly, the boss could care less - he probably has more tubes in his TV set than your transmitter does. Indeed, it is understandable that your request for funds for some obscure improvement was turned down; as long as you sound "all right" on the radio, your equipment is looked at, like the boss's TV, as something to turn on in the morning, turn off at night, and fix when it breaks down.

The upshot of this dissertation is simply that a whole new approach must be made to upgrade engineering operations in broadcasting. We cannot do away with the "six week wonders" because, under the present rules, they fill a gap and make compliance economically feasible in today's type of broadcasting. We cannot prepare voluminous new regulations to force changes in engineering operations, or we shall end up putting whatever we have accomplished on the same verbal junkpile that today makes it more economical to hire a lawyer to find a loop-hole than to pay one's proper taxes. We cannot blame whatever ills may exist on overpopulation, uncoordinated NAB's, or uncooperative FCC's. To accomplish the upgrading that you and I and Mr. Hendricks all desire, it will be necessary to sell and educate.

Here is where an organization like our Society and people like you members can really shine and do a real service!

When did your state broadcaster's association last include an engineering seminar or speaker

in its convention program? If its like mine, it's been years! There's no need for this with your SBE chapter available to arrange an engineering conference for station engineers, or a speaker for the management meetings, and this sort of thing can do wonders for management awareness and co-operation. If you are an experienced engineer: who was the last "six week wonder" who got your cold shoulder when he asked seemingly stupid question? (The answer to which might have made him more interested in the station operation.) Do you run such a clean operation yourself so that the boss gives you credit for what you know and will sit up and listen when you speak, and do you always make an effort to improve your own technical knowledge?

Considerable experience has convinced me that a great deal remains to be done on the part of everyone with engineering responsibility in broadcasting to clean up the "mess" in broadcast operations before others are blamed or asked to right the boat with force.

LETTERS TO THE EDITOR (continued from page 13)

in the contract requirement for this man to cover, and repair or maintain, studio equipment. As a result even though the transmitter, monitors are operating properly some studio equipment is maintained only by the studio personnel until a catastrophic failure occurs and then the contract man is called in. I realize I am in the contract class but I feel that I have a duty to the station not just at the transmitter so I make myself available at night to maintain the equipment at the studio and transmitter. By giving the studio personnel an "Emergency Operations Procedure" booklet I can keep the station on the air more easily, and also I can get some use out of the qualified persons (3rd class operators) at the studio. These operators, usually 2 on duty, can now keep the station on the air if it only requires "remote local" switching, or patching out of equipment not operating properly.

I like the design of the pin, and the proposed Constitution and by-laws, and I can't think of any changes.

Yours truly,
B. B. Landry
Chief Engineer, WESO

LETTERS TO THE EDITOR

Editor:

I have just finished reading Mr. Hendrick's excellent article in your December issue. It has been my feeling for quite some time that major revisions should be made concerning the broadcast engineer and the local radio station. I believe that this matter should be given serious thought by every conscientious broadcast engineer; however, as Mr. Hendrick pointed out, any revisions, no matter how slight, would be "...distasteful to a majority of the broadcast industry."

The FCC in an attempt to upgrade the engineering quality of local radio stations issued new regulations including the maintenance log. While I am sure that the ideas behind all of the new regulations are basically sound, the new regulations are idealistic, non-flexible, and probably too late in coming. Rather than upgrading the quality it will probably result in a greater degree of cheating than already exists. This may be more true for the station where the transmitter is remote controlled and not easily reached during bad weather.

I don't believe that a new examining element (element 10) is the answer to a better grade of broadcast engineer. A constant updating of FCC exams is perhaps another logical approach. The Commission has always been slow on updating the exams (i.e. transistor and television theory is only a relatively recent addition to the first phone exam). Mr. Hendrick proposes a new grade of engineer, the FCC Radiotelephone Engineer. Isn't this the grade that all registered consulting engineers hold?

I would like to conclude by reiterating that something should be done to upgrade the present engineering standards of the broadcast engineer and of the local radio stations. In regard to "combo" operators, they are merely a management's excuse to save money. You cannot be a good engineer and a good announcer, salesman, copywriter, and news man all at the same time. I don't go along with all of Mr. Hendrick's ideas, but I do commend him on his initiative to do something constructive about the problem, our problem.

Donald E. Lefebvre
Chief Engineer
Boston Univ. Television

Editor:

You seem to have done it again! Published another controversial article! This is the article on FCC standards and regulations.

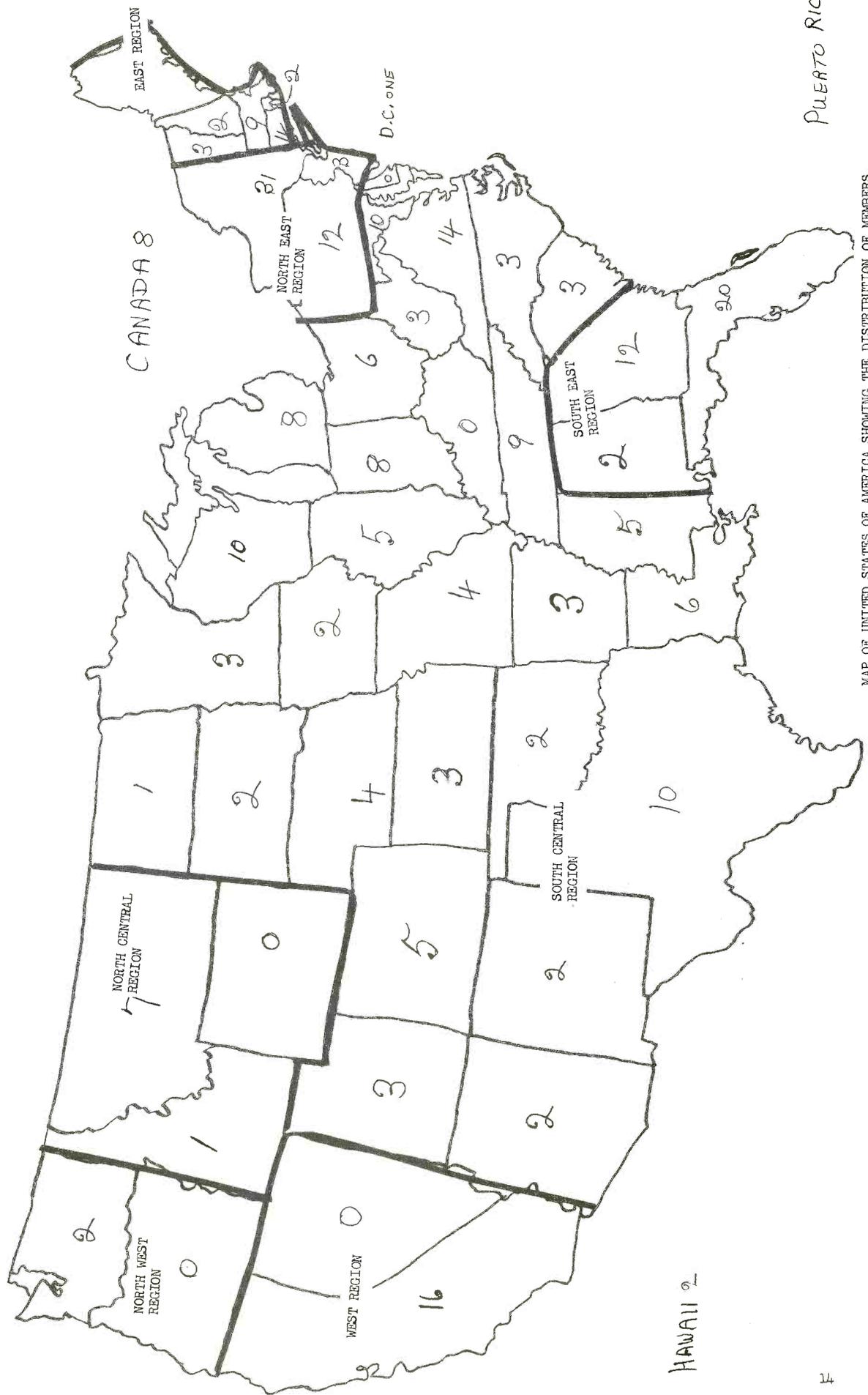
First off I am in favor of the recommended changes in Licencing requirements. But-the last section will let out many qualified personnel who work only on equipment at 5KW or 1KW stations but have the experience to qualify for the Radio Telephone Engineer license. I realize that there are many persons holding 1st class licenses who never exercise them, and who have them that use them only in 2-way radio work. I think that these ideas will not meet with approval from this group.

I am going to comment on this article from the standpoint of the "part timer." I have been in electronic maintenance (industrial) and military (Navy) since 1942 and have held a 1st class license for over 10 years. I used it first in 2-way work, and now in Broadcasting. Due to the fact that I am not available during the day, I have trained some of the station personnel in the maintenance allowed by FCC rules for third class personnel. Also I have set up more meter readings for remote operation so that station personnel can tell not only if the transmitter is on, but also if "just the plate start" failed to energize. This way I don't get called at 5:30 AM. They can put the transmitter on "local" and get on the air. I like the automatic logging feature, but still use the pen and sheet so can't comment on the section.

I realize that most station managers think that their engineers should be able to tell when a tube is going to fail and replace it before it does. It is hard to convince them of this, and all that happens is a little lost time for replacement. If more station managers, especially those directly associated with station operation, would study and get their 2nd class (new) license they would have a better insight concerning what the engineer runs into. Especially when one is told that a tape recorder is muffled (when he should be told that the "Highs" are gone). This, I think, would make for much better relations between the manager and the engineer.

The FCC changes on April 19, 1964 made it extremely easy for a station to hire a man for engineering and put him under contract, but the FCC never said what the man was to do--other than make a transmitter check 5 times a week and set the remote meters once a week (if on remote operation). There is nothing specified

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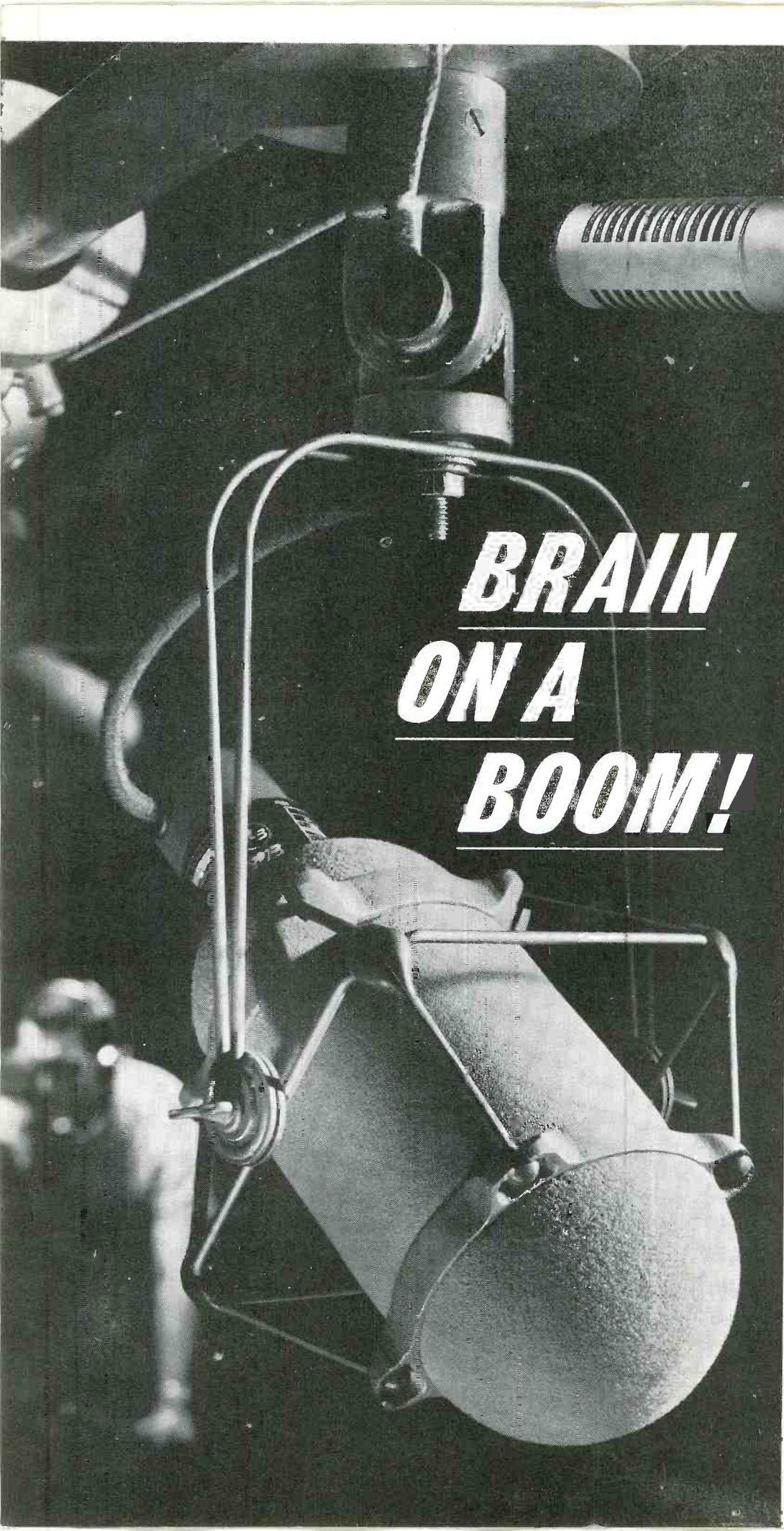
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