

THE BROADCAST ENGINEERS' JOURNAL
Ed. Stolzenberger, Editor
116-03 91st Avenue Richmond Hill 18, N. Y.

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New York, N. Y.
Permit No. 2961

OFFICIAL PUBLICATION OF THE NATIONAL ASSOCIATION OF BROADCAST ENGINEERS AND TECHNICIANS

SINCE 1934—OF, BY, AND FOR THE BROADCAST ENGINEER

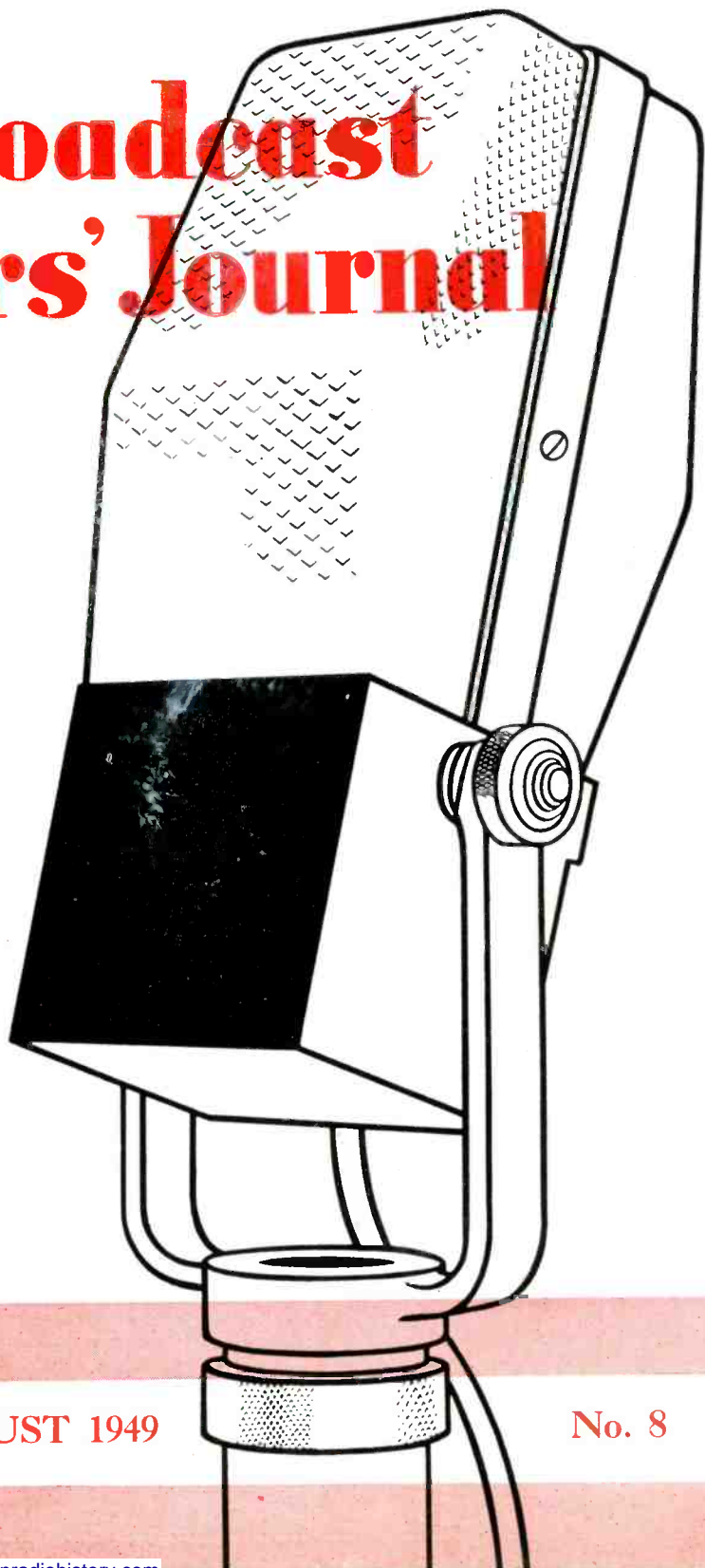
The Broadcast Engineers' Journal

Ed. Stolzenberger
Featuring ---

the facts about
electric shock

television
in Denver

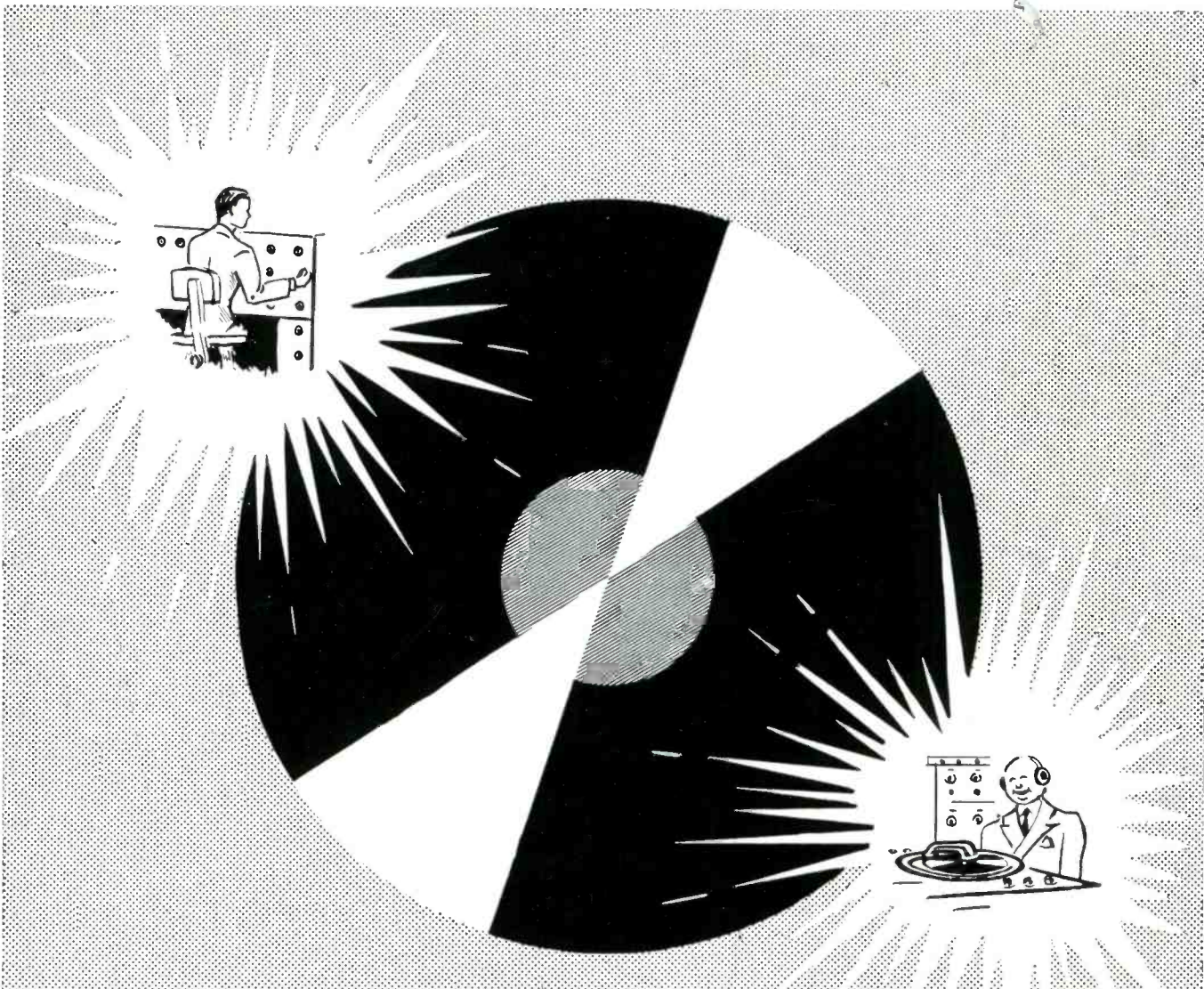
news of interest
to radiomen



VOL. 16

AUGUST 1949

No. 8



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THE BROADCAST ENGINEERS' JOURNAL

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Editorial, Advertising and Circulation Offices:
116-03 91st Avenue, Richmond Hill 18, N. Y.
Telephone: Virginia 9-5553

VOLUME 16, No. 8



AUGUST, 1949

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THE BROADCAST ENGINEERS' JOURNAL

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Advertising rates and information supplied on request. Subscription, \$2.50 per year; \$4.00 for two years. Single copies, except Christmas Yearbook, 35c; Christmas Yearbook, \$1.00. All remittances in advance. Foreign: add postage. Back copies 50c, back Yearbooks, \$2.00.

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National Association Broadcast Engineers and Technicians

OF, BY, and FOR
THE
BROADCAST
ENGINEER

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NABET rank-and-file members control
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Pertinent Topics from the National Office

from

C. WESTOVER
Exec. Secy., NABET

Quite frequently there comes to this office bulletins and magazines, published by other unions in, or trying to get into, the radio field. The newest one is put out by IBEW, called "Broadcast Bulletin." I have requested that we be put on their paid subscription list but no answer as yet.

Since this bulletin used so much space publicizing NABET, and saying that NABET's statements were mostly lies, the writer feels that his column is a good place to reply. Inasmuch as no by-line was given to the author in the bulletin, I will just guess who the author was.

The meeting referred to occurred at the Hotel Astor, October 22nd, 1948. Present for NABET were Hiller, Gorsuch, Westover, O'Donoghue and Dunn. For IBEW, Tracy and Wimberly. For IATSE, Walsh, Shea, Spivak and an attorney whose name escapes me.

The meeting resolved into Tracy and Walsh saying they had agreed to splitting jurisdiction in television and would put the split into effect when NABET gave up the ghost and entered the IBEW. Walsh stated that if NABET continued in the field, that the IA would start organizing AM as well as TV. Tracy said the IB would put its sharpshooters to work and run us out of the field.

NABET said it wanted to be in the AF of L but felt radiomen were entitled to their own charter. We further stated that threats would not scare us off. Both Tracy and Walsh made quite a point of their intention to work together to eliminate NABET and indicated they would not allow radiomen any autonomy.

It is true there was correspondence between NABET and IBEW, which degenerated into breast-beating. There was nothing offered by IBEW that would grant radiomen any degree of control over their own problems. Tracy's attitude was that the "benign" leadership of his office was all radiomen needed.

This article in the Broadcast Bulletin mentions NABET's predecessor, the ATE of NBC, completely ignoring IBEW's spawning from the ABTU of CBS and how that was accomplished—in Chicago—and by whom. Ignoring, also, the fact that as IBEW, CBS maintained complete domination over the so-called "Union."

A comparison of NABET and IBEW contracts will show the fallacy of the IBEW claim of contract superiority. Suffice it to say that NABET *turned down* the NBC-ABC offer of the CBS-IBEW contract—a bona fide offer. A good wager is that CBS wouldn't offer the NABET contract terms to IBEW. It would increase CBS's engineering costs too greatly.

The smug attitude of the IBEW author is revealed by his attack upon NABET's officers and their "big titles." Suffice



A Message to the Members of NABET

from

JOHN R. McDONNELL
President, NABET

Two months after this reaches print the Annual National Council Meeting of NABET will convene in New York (Oct. 9—1 P.M.).

Every NABET member who has an appreciation of the welfare of his union at heart will give some considerable thought to the problems that will face the Council. Your Chapter Chairman will be advised well in advance of the Council Meeting as to the nature of the major issues and the pertinent facts. Discuss them thoroughly so that he will come to the meeting prepared to represent you.

Speaking of issues—has management been knocking you around of late, using T.H. as a club? If they haven't, yours is the unusual case. By the way, have you sent a letter to your congressman? You know what to tell him. At this point he hasn't done much about taking T.H. off your neck.

Have you read the "Journal" lately? Is it saying the things you think it should? It's your magazine—you own it. If it doesn't reflect what you think the official NABET organ should—write a letter to the Editor—send me a copy—I'll be interested.

Sincerely,

JOHN R. McDONNELL,
President—NABET.

it to say that NABET officers cannot rely upon "appointments" that cannot be touched while "one man" remains in office. The remark "one organization, adequately equipped with facilities and with resources" omits one fundamental. That is an HONEST attempt to service RADIOMEN. Honesty is hard to cultivate in certain labor circles. Suffice it to say that ALL NABET officers have, each year, to answer to the members for their conduct in office. No "benign" Omnipotence can retain in a NABET office a person who doesn't produce.

The IBEW claim of "protecting" the interests of radiomen is well demonstrated in the Yankee network strike where, as reported in Variety, the final solution will be allowing announcers to operate turntables and ride gain. Shades of the Brown-Petrillo deal!

By the way—why did the IBEW revoke that Brown's membership? Or is the question embarrassing?

NABET

A RADIOMAN'S UNION

Electric Shock vs. the Broadcast Engineer

By FREDERICK W. SMITH*

ENGINEER AT WLW STATION KILLED

More Than 11,000 Volts Passed Through Body.

CORONER GIVES VERDICT

Victim Is Harold C. Stocker, Native of Iowa.

LEBANON, O., April 11—(Special)—Harold C. Stocker, 34, WLW transmitter engineer, was accidentally electrocuted in the world's largest transmitting plant at Mason at 1:30 a. m. Monday.

Warren County Coroner H. M. Williams said death was due to electrical shock from a high tension transformer, carrying between 11,000 and 12,000 volts.

After the WLW "sign off" Stocker and G. K. Snyder, both technical engineers, were preparing to move some transformers from a temporary set-aside position when the accident occurred. Under ordinary conditions the triple safety transformers

While most broadcast engineers enjoy being the object of a certain amount of public attention as a result of their professional work, few would appreciate receiving the type of publicity illustrated on this page. It is characteristic of the average engineer that whatever his occupational hazards, he earnestly believes that, "—it will always happen to the other fellow—never to me," and consequently, risks his life repeatedly by handling deadly electrical circuits with assumed impunity.

This review of the nature and the effects of electric shock has been compiled in order to correct some misbeliefs widely held by those working in the broadcast field and to underline and re-emphasize the extreme dangers to which the average broadcast engineer nonchalantly exposes himself each day.

HISTORY OF ELECTRIC SHOCK

The entertainment field, in which the

*Radio and Allocations Engineering NBC, New York.

radio and television engineer has of late assumed such an important role, has always been noted for its willingness to clutch innovation to its bosom. It is not surprising therefore, to learn that the use of lethal potentials for theatrical effects was instituted as early as the year 1849, in the first performance of Meyerbeer's "Il Prophete."

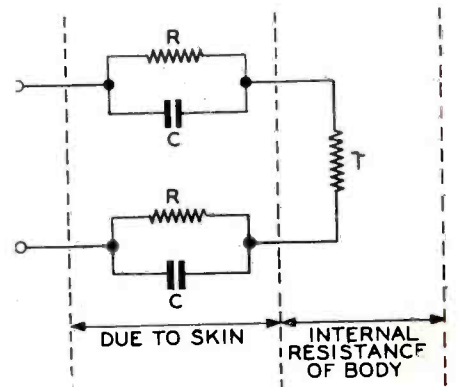
It was only a matter of time before someone on a set availed himself of this novel opportunity for self destruction. In 1879, a stage carpenter in Lyon, France, became simultaneously a man of distinction and extinction by completing a 250 volt circuit, the first reported death due to man made potentials. Shortly thereafter, in 1890, New York State adopted electrocution as its method of capital punishment, employing shocks of 1200 to 1700 volts at 8 amperes, lasting from 3 to 8 minutes. The present accident rate in the United States and Canada due to electric shock is approximately 7 per million, one-half of which are fatal. In the power utility field alone, there are 70 to 80 such accidents yearly.

FACTORS IN ELECTRIC SHOCK Waveform and frequency:—

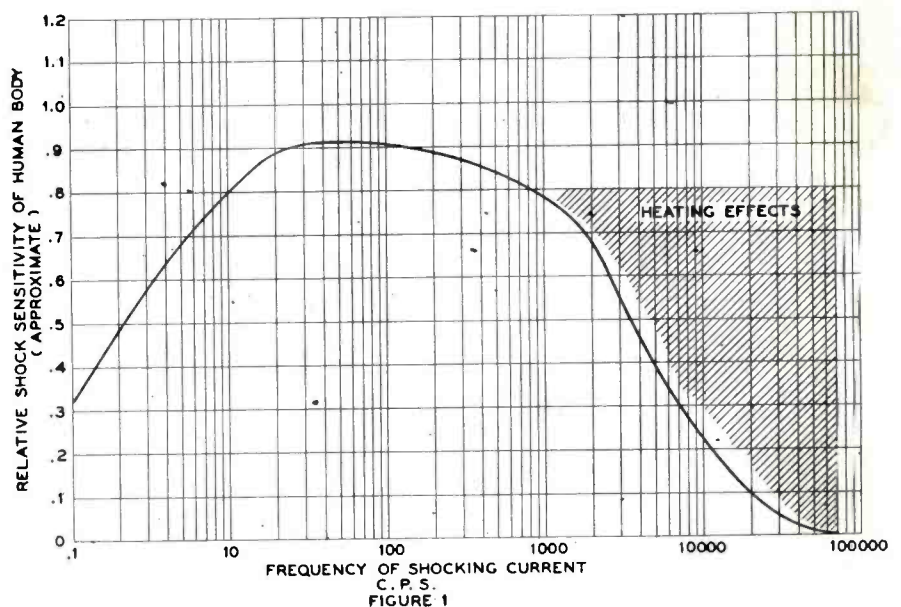
Figure 1 illustrates the relative shock sensitivity of the human body as a function of the frequency of the applied current. The most important feature of this curve is that body reaction is unfortunately

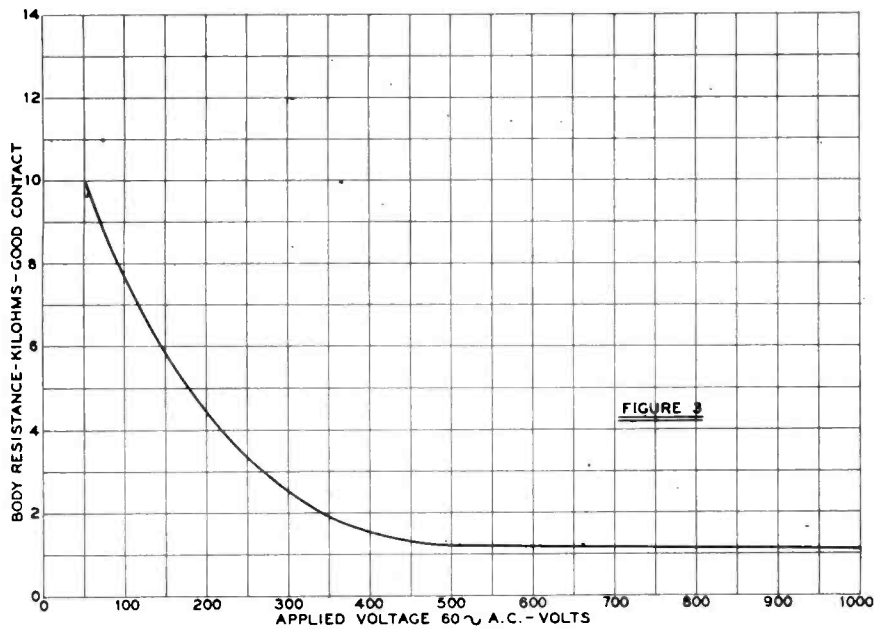
a maximum for the band of frequencies from 25 to 60 cps, the most common power frequencies. As can be seen, response drops off gradually with increasing frequency, until at 100,000 cps and above, muscular contraction and other symptoms normally associated with shock have virtually disappeared. This explains why exposure to radio frequency voltages does not produce the usual shock effects. The only apparent symptom beyond this point is body heating, which in itself can only be fatal if the internal temperature of the body is held high enough for a sufficient length of time. (Hyperpyrexia).

FIGURE 2
EQUIVALENT ELECTRICAL CIRCUIT
OF HUMAN BODY



Below 25 cps, body sensitivity again drops off, the bearable direct current be-





ing three times as great as that which can be tolerated at 60 cps. This fact is in direct opposition to the common erroneous belief that DC is "more powerful" than AC. Direct current does not produce the strong muscular contractions experienced with AC, and the reaction to a given amount of DC can only be heightened by interrupting it periodically.

It has been determined experimentally for medical purposes that an exponential waveform is the most efficient for the purposes of muscular stimulation, but square waves are generally used for muscular shock therapy because they are easier to generate.

Body Resistance:—

The equivalent electrical circuit of the body is shown in Figure 2. The total resistance of the body is made up of two components, R and r . R represents the resistance due to the skin itself which can be as high as .25 megohm for a light contact over a small area as a check with an ohmmeter will prove. r is the resistance of the body interior which is usually on the order of 1000 ohms. The body circulatory system and muscles make excellent conductors, and although the skeleton itself has a relatively high resistance, the shunting effect of the former keeps r low.

Thus, only the skin offers an appreciable impedance to the flow of current through the body and is the sole protection which the body has against shock. Therefore, any circumstance which tends to impair the skin resistivity, will increase body susceptibility to shock. For example,

wetting the skin by perspiration or immersion in water can lower skin resistance by a factor of 100 and should be avoided if possible when working on electric circuits. Under continuous contact with an electric circuit, skin resistance will decrease rapidly, due to blistering, thus reducing body protection. 50 volts AC applied to the skin, will cause blistering in 6 to 7 seconds, and the total resistance offered by the body will rapidly drop to that of the body interior. The data plotted in Figure 3 represents the results of measurements made on cadavers and illustrates the rapidity with which skin resistance decreases as the applied voltage increases.

Referring once more to Figure 2, the resistance of the skin is shunted by a capacitance which tends to lower the skin impedance at the higher frequencies. As a result, the average power factor of the human skin at 10,000 cps is 0.1.

Current:—

Contrary to widespread belief it is not voltage but current which kills. Furthermore, the probability of death does *not* increase as the shocking current grows larger but under certain circumstances may be *less*. For example, a shock current of 1 to 2 amperes is likely to be less fatal than one of an intermediate value, say, 100 milliamperes. Why this is so can be understood from Figure 4, which summarizes the body reactions which can be expected over a wide range of sixty cycle shocking currents from 100 microamperes to 10 amperes.

As is indicated, the smallest current which can be perceived under special con-

ditions is on the order of 100 microamperes, and for a normal contact is from 1 to 2 milliamperes. These figures are approximate since the location of the threshold is dependent on the physical state of the individual and, in general, women are found to be much more sensitive in this respect.

Continuing up the scale, at 9 milliamperes, the maximum let-go current for the average male is reached. This point represents the maximum current which 99.5% of the individuals tested could release voluntarily. The equivalent let-go current values for DC are from 61 to 83 milliamperes, illustrating once more the extraordinary sensitivity of the body to 60 cycle currents. As before, this let-go point can show considerable variability from one individual to the next, ranging in some men from 8 to 22 milliamperes.

As shown in Figure 4, all currents which exceed the let-go point will cause a muscular contraction so severe as to prevent the victim from freeing himself unless the contraction happens to throw him clear of the circuit. Currents in this "freezing" range are thus likely to be fatal since prolonged passage of current through the body will cause blistering with an accompanying decrease of body resistance which will further aggravate the situation. However, it is possible to endure freezing currents without much harm or even loss of consciousness provided they do not approach in magnitude the danger point at which heart failure (ventricular fibrillation) occurs (See Figure 4). A current of only 100 milliamperes passed from the hands to the feet will produce ventricular fibrillation which is a disturbance of the rhythm and muscular coordination of the heart. In this condition each heart muscle functions without regard to the others, circulation ceases, and the heart is no longer an effective pump. Susceptibility of the heart to this condition depends on which part of the heart cycle the shock is received, and is likely to be the greatest when the duration of the shock approaches that of the heart cycle. There is no practical remedy for this condition, and artificial respiration will probably fail to revive the patient.

Curiously enough, it has been observed that currents considerably *greater* than 100 milliamperes will hold the heart muscles sufficiently stretched under tension (diastole) so that when the circuit is broken the heart snaps back into "sync." Thus, currents immediately beyond the fibrillation point are *less* likely to be fatal. A theoretical treatment for this condition has been proposed in which

a counter-shock of 1 to 2 amperes of 60 cycles AC is applied directly to the heart. This current should arrest fibrillation when broken sharply and the heart should resume normal beating. However, no information on the position of the electrodes or the current needed external to the body is available, so that this treatment is as yet of little practical significance.

When the current passing thru the body is of the order of 2 to 5 amperes, as indicated in Figure 4, a new condition may develop rather than the fibrillation of the heart just described. A block or partial paralysis of the nerve center controlling the respiratory system may occur. When this happens, signals from the brain are prevented from reaching the lungs and natural breathing ceases. (Apnea.)

It is under such circumstances that artificial respiration can save a victim's life, and patients have been successfully revived after as much as 8 hours of sustained and apparently unrewarding treatment.

The brain and the heart must receive sufficient oxygen to function properly. If this supply fails, the victim will first lose consciousness. If the supply continues to be cut off for more than 5 to 8 minutes, permanent damage to certain cells in the cortex of the brain may ensue and the mental capacity of the individual will be impaired, possibly resulting in idiocy. A nerve block will gradually pass away in 6 to 8 hours *provided* that artificial respiration is maintained during this interval. Therefore, an important rule to remember is:

Always apply artificial respiration immediately and continuously until Rigor Mortis sets in.

At the very top of the table are situated the heavy currents employed for electrocution which are considerably greater than those just discussed. Most of the condemned probably die as a result of the combined effects of excessive internal heating and respiration failure. The electric chair has thus been aptly dubbed in the underworld parlance as the "hot seat."

Pathway thru the Body:—

Danger exists whenever a vital organ such as the brain, heart or lungs lies in the current path. When such is not the case, permanent injuries are held to a minimum and will usually consist of burns only. Thus shocks received between the two hands or from one hand to a foot are particularly dangerous. Once the current has entered the trunk of the body, it follows a fusiform pattern (spindle like,

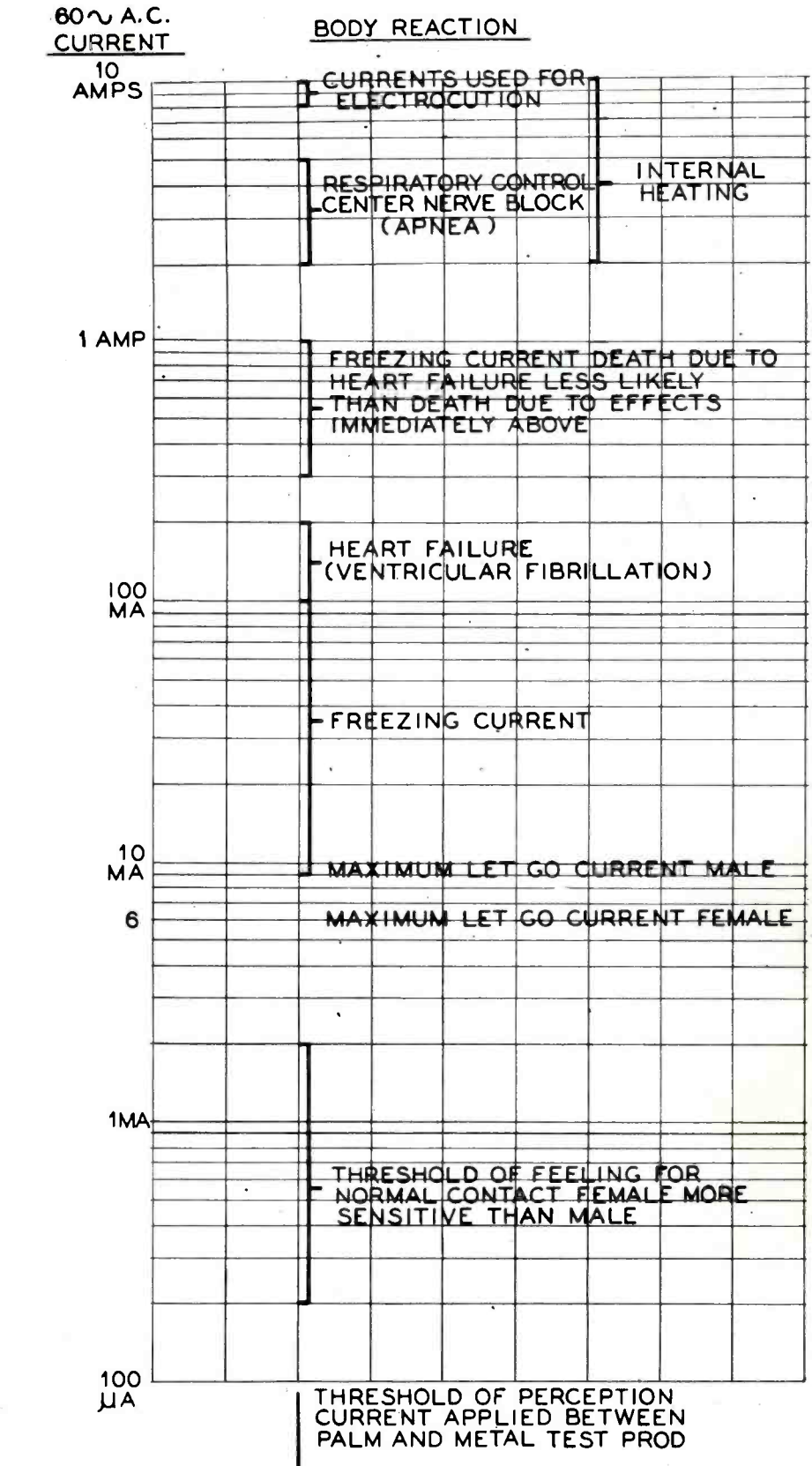
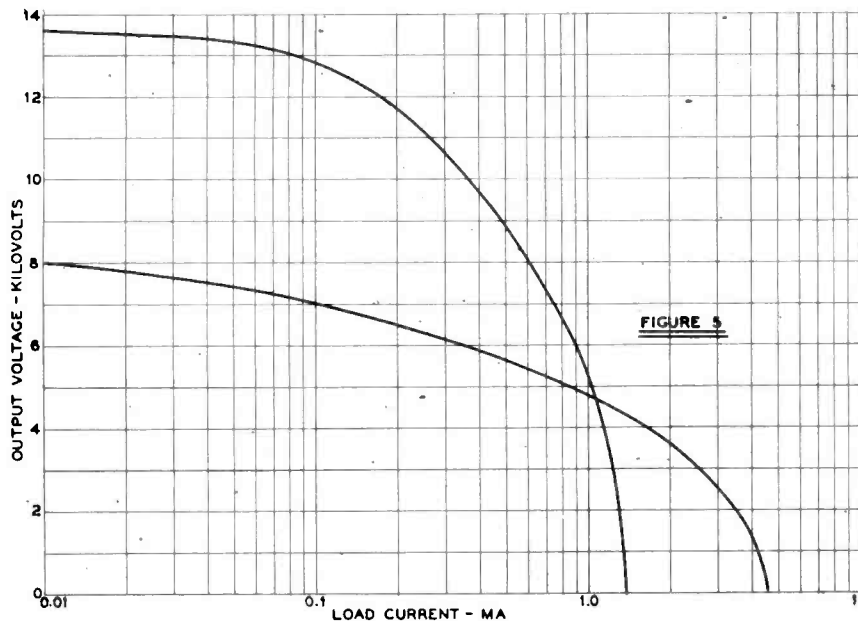


FIGURE 4

tapered at each end). Through-type current transformers inserted in the body in actual experiments showed that 10% of the total current passed through the heart when the current path was from one hand to the feet, so that it is not essential for the



current path to pass directly through the heart for that organ to be affected.

Voltage:—

From what has just been said concerning the factors of body resistance and current, some conclusions may be reached concerning the relative danger and the effects of high and low voltage shocks.

First of all, a DC voltage is not as dangerous as the corresponding AC voltage. Low voltage shocks, when fatal, kill thru the mechanism of ventricular fibrillation since a current of only 100 milliamperes is sufficient to produce this effect. Sixty cycle potentials as low as 60-65 volts can be fatal under the proper circumstances, and there is one case on record in which electrocution occurred at 46 volts. Voltages of 24 volts or less are considered by the Underwriter's Laboratories to be safe under all conditions.

On the other hand, high voltages usually kill through the destruction or inhibition of the respiratory nerve centers, asphyxia being the immediate cause. In these cases, artificial respiration can save the victim if promptly applied.

To dispel a popular notion, a statistical analysis of reported shock cases shows that there is comparatively little difference (7%) in the mortality rate for those who fall or are thrown clear of the voltage source during a shock since only a fraction of a minute is required for fibrillation and/or a respiratory block to occur.

The results of shocks at various levels may be summarized as follows, (assuming that the initial high resistance of the skin has been overcome and that the sole

remaining resistance is that of the body interior):

VOLTAGE EFFECTS

100 Volts	Certain death due to fibrillation of the heart, slight burns.
1000 Volts	Probable death due to fibrillation, marked burns.
10000 Volts	Survival, respiratory block only, death can be averted thru artificial respiration, burns very severe.

Power Supply Regulation:—

For those engineers who work with radio and television gear from day to day some information concerning power supply regulation is pertinent here. Obviously, shockwise it would be best to work exclusively with power supplies which have a high internal impedance. Unfortunately, most of those encountered do not fall in this category. Typical regulation curves for the high voltage supplies used to furnish kinescope anode potentials are shown in Figure 5. There is generally incorporated in these supplies a series resistance of one megohm or so which acts to limit the short circuit current of the supply. For the characteristics illustrated in Figure 5, a current drain of approximately 1.5 milliamperes on the 14 kv supply, and 4.5 milliamperes on the 8 kv. supply will cause the output voltage to drop to practically zero, limiting the death dealing potentialities of this type of supply.

On the other hand, the regulated S.P.U.'s which appear in most television plants such as the RCA Type 580-C or WP-33A have internal impedances of 0.1 ohm or less and will hold their rated output voltages (250-300 V.) constant for current drains up to almost a half ampere.

These supplies will thus deliver 300 ma. with ease into the 1000 ohms of body resistance presented by an unwary engineer.

Those men who normally work with transmitters are generally familiar with the excellent regulation properties of the high voltage supplies contained in their equipment, and all transmitters are equipped with interlocks and grounding sticks to insure that all circuits are dead and filter capacitors discharged before servicing begins.

UNDERWRITERS LABORATORIES' EQUIPMENT SPECIFICATIONS:

The Underwriters Laboratories have established the following specifications on Electric Shock Hazard in radio equipment:

(a) Shock Hazard:

Shock hazard shall be considered to exist at a live part in a circuit involving 125 volts or less:

1. At an exposed live part, if the open circuit voltage is more than 25 volts and the current with a 1500 ohm load is more than 5 ma. (1500 ohms has been selected by the Laboratories as the test body resistance.)

2. At a partially protected part, if the voltage is more than 35 volts and if the current with a 1500 ohm load is more than 15 ma., with a maximum allowable AC component of 10 milliamperes.

A part is considered to be exposed if it is subject to handling in normal use (not servicing) e.g. phonograph pickup arms and turntable terminals, antenna leads, or metal overall cabinets. A part is considered partially protected if it is located within the overall enclosure or beneath the appliance so that contact by persons is unlikely, except during servicing—e.g. a metal chassis located within a cabinet.

(b) Leakage Current:

Leakage current shall be measured with the appliance operated on a supply circuit of maximum rated voltage and rated frequency, except that if the marked voltage is 105-120 v. the potential of the supply circuit is to be 120 v. The leakage current limit shall be 5 ma. r.m.s. This current is well above the threshold of perception but is below the maximum let-go current. Since the body resistance of most individuals is well over 1500 ohms, persons using the equipment will not normally receive a full 5 ma. shock.

In AC equipment which has a power transformer input, .01 mfd. capacitors are generally placed from line to chassis on

the primary side of the transformer in order to reduce line interference. The leakage current for a .01 mfd. capacitor across a 120 v., 60 cps circuit is .45 ma., which is barely noticeable. In AC-DC sets where the negative side of the power supply is insulated within the chassis and is bypassed to the chassis through a 0.1 to 0.25 mfd. capacitor, the leaking currents will run much higher (4.5 to 11.4 ma.). The standard maximum capacity allowed for AC-DC sets is 0.2 mfd. which gives a maximum of 0.24 mfd. for a plus tolerance of 20%.

Transmitting equipment safety standards have been established by the F.C.C. and are outlined in section 3.46 of the FCC Standards of Good Engineering Practice. Additional standards on transmitter safety provisions are contained in the National Electric Safety Code. DO'S AND DON'TS

In closing, it may be well to reiterate some precautions on shock which follow logically from what has just been said:

1. Do not labor under delusions of false security. Resuscitation can only save a certain percentage of shock victims. Death in the case of fibrillation of the heart is instantaneous for all practical purposes.

2. Know in advance how to remove a victim from a live circuit and how to apply artificial respiration.

3. Always apply artificial respiration immediately and continuously to any shock victim who fails to breathe, until rigor mortis makes further efforts useless.

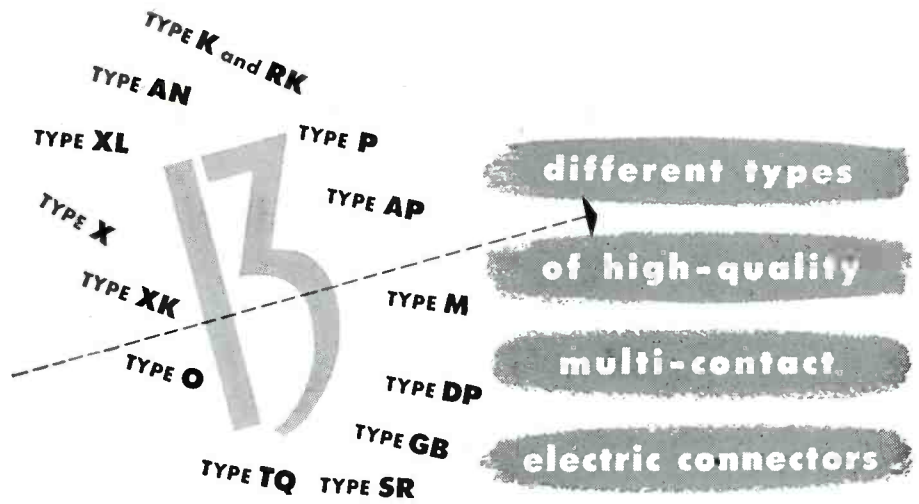
4. Never handle electric circuits with wet hands or feet, and never work on them while standing on concrete, even if it is "only" 110 v. AC.

5. When working on electrical gear of any type that is alive, keep your left hand in your pocket. Do not work in a position where your head can become a conductor.

6. Tag every interlock that is taped closed, and ground *all* circuits with the grounding stick before working on transmitters and similar equipment.

7. If you are a television lighting man, be careful when "hotting up" lighting equipment. Both sides of the line are exposed on the usual Kliegl lighting plug just as it is plugged into a pocket, and if the plug is grasped too far forward, a severe shock may result. Never hold on to a metal catwalk or pipe rigging when completing lighting circuits.

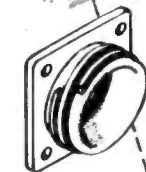
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INSERTS

INSERTS are of good dielectric material to meet the needs of the application; and may be of melamine, Durez, Bakelite, Alkyd, etc. As new and better insulating materials are developed, Cannon Electric will have them.



CONTACTS

CONTACTS are generally brass, silver-plated, or copper, and milled. Gold-plated contacts are available for certain Type DP Connectors.



COUPLING

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ROCHESTER

By "BUM" HOLLY

Most of the news, at this time, seems to be that of new faces, here and there, and vacations, also here and there.

The gang at WRNY seem to have things pretty well skedded for the summer—Ken Henderson leading off with his bottle—(oops, podden me—) *Battle* of the St. Lawrence, and its fish—any of the piscatorial *survivors* to be picked up by Doug Carveth, on his way to Canada, when Ken comes home. Doug is heading for "Muskie" heaven, in the Kawartha chain of lakes. Following in order will be the laughing (silly boy—shouldn't asking questions!!) departure of Leo Halpin and Ed Menzner. Carl Cleveland will wind up the list with a trip thru the Chi radio stations, bars and hot spots.

Couple of new faces at WRNY—Pete Tellex moves in for the summer before entering Cornell in the fall, to specialize in Physics and Math—and Norman Briggs takes over the spot vacated by Dick Dunn at the RNY xmtr.

WVET reports that Ed Cole is, at the moment, out vacationing—with Joe Mazzasero counting the minutes until Ed returns, so that he (Joe, that is) can take off for New York and the bright lights (sez he's gonna take the "cure").

Dick Dunn, previously mentioned, is a newcomer to VET, switching from RNY, as stated—and pat Amico and John Micsak complete the "new face" roster.

Irv Hoffman at VET's xmtr reports that things are *now* running smoothly, since Cole has gone on his vacation.

Al Kline insists that he's gonna spend his vacation digging up material for this column (careful with that spade!—that's fertilizer, son)—and Bob Treacy (believe it or not) rates *another* vacation, after his previously reported two weeks Naval Reserve cruise—some guys have *all* the luck.

WHEC reports, via Howie Mouatt, that their summer sked listed George Wilson as first away—spending his vacation at his camp on Honeoye Lake, with some character named Ed Lynch as next to leave (probably just a joyful round of contracts and negotiations, no doubt). Dick Sanderl heads for the Thousand Islands at the same date that Ed leaves. I understand that "new man" George Norton was really needed, following a WHEC Staff Picnic at Powder Mill Park, to convey the—shall we say—"unconscious" revelers home—(for shame, men—soch a beesness). There seems to be an undercurrent of *resentment* that Fran Sherwood was able to complete the construction of a TV receiver, and also to paint his car and retaliatory measures are apparently in order.

At WHAM the news is, of course, TV with "D" (or "TV" day, as you will) day come and gone, (*thank Gawd*) on June 11th. Everyone concerned, however, is justly proud of the fact that the "deadline" was met, and the skedded special opening day's festivities were run off with—whadda'-ya-know—*no* flubs. In fact, it was *all* hits, *no* errors and *RUNS*—Hell, the TV crew was *RUN* ragged. By this time, tho', it's an old story—daily Routine and Bull. (Work, that is.)

We have some more new faces here at WHAM—Bob Tryon, formerly of WSAY, (in the *early* days, boys, *please*) WGR, WKBW, WMGM, and points east and west, is taking over Bill Grant's spot. Sorry to report that Bill, whose stay with us was all too short, has been forced to return to New York, for medical treatment—Phil Bullock of Holcomb, New York, joins our Brookdale AM xmtr staff and Stan Kenyon of Ithaca, New York, joins our AM studio staff—both men pre-

viously pastimed in the New York State Rural Radio FM loop. R. Leurgens is taking a summer hiatus from his labors of love at the U. of R, and has joined the FM xmtr staff on Pinnacle Hill—and Vic Bochenko, of Johnson City, left Stromberg Carlson's Erie Plant and WCSI at Columbus, Indiana, to join us, and is working at the Brookdale AM xmtr. Clyde Parker, of Jamestown, also joins the Brookdale staff after a sojourn in Idaho (Sun Valley, no doubt)—and Ted Gullian transfers his affiliations from WVET (here in town) to complete the AM xmtr crew.

THE WHAM-TV staff has been augmented by the addition of Bob Rimelman, formerly of the Yankee net and Boston's WNAC—and Bob Zagoren of New York and Olean's WHDL.

Two new cameramen in the persons of Don Poole of Buffalo and, more recently, Chicago—and Ben Franklin, from Brooklyn, Long Island, join the gang.

By the way, the total NABET staff at WHAM is now 37 men, (we're growin', fellas).

After its initial struggles (and I *mean* struggles) the TV crew finds it much easier to move in on a job, now that we *have* (and *use*) our new TV mobile unit.

It takes a hell of a lot of the "Pack Horse" activity out of location work (for which praise be, etc.) only will some kind soul please advise us as to how to cool the damn thing down???

FM activities have been transferred to Pinnacle Hill, following the complete and total exodus from our downtown location—the new 20 KW is going strong, and the older, spare, 1 KW xmtr will be ready to go within a month. That means, of course, that the FM crew will now join in with the TV xmtr crew in their famous "Cabin Fever Blues."

The latest reports from the jungles, at Brookdale, are that arrangements are being completed, to hire Frank Buck—purpose, to conduct semi-weekly safaris through the wild flowers and weeds, that the boys claim are 15 feet high in the Brookdale "Matto Grosso," around the xmtr building. The ops are busy collecting various types of bugs (and not the Morse variety) that abound in the area, and warring against the "out-size" mosquitos, that rule the country side. It seems that these particular pests have taken a leaf from Jap aviation, and have organized *suicide* squadrons. In retaliation, the Brookdale ops are forcing the *captive* mosquitos to drink the *TAP* water, as furnished in the xmtr building—positively lethal stuff.

Vacations are in order, of course, and we are currently missing the smiling faces (well—they are now) of Bullis and Ambrose, from TV—Bill Reynolds from AM Studio, and Earl Zimmer from the AM xmtr staffs—with eager applicants ready to leave when they return.

Awaiting still *another* event, is Cameraman Ben Franklin who leaves his lucky state, of *single* blessedness, on July 3rd, when he takes to his manly bosom a wife (female type) Ann Downing by name—who has been gladdening the eyes, and acting as secretary, for some of the NBC audio and video "Brass" in New York City.

Oh, yes—this wedding stuff reminds me that friend wife of Charlie Laniak, has presented him with a brand new daughter—said daughter hasn't told her parents what to call her, yet, but at least (from our point of view) she'll *HAVE* to turn out *better* than the cigars her old man passed out. I reiterate, fellas—get into TV and you'll be too busy, and too *TIRED* to have things like that happen to you.

More news when and *if* I get it.

73's—"BUM" HOLLY.



ABC—New York News

By
GEORGE
HALVONIK

The weather in New York was stifling during the latter part of June, and the Council meeting at the Hotel Plymouth wasn't too comfortable; Stolzy presided, with minutes by Jack Paine; others present were: Kelly, (ABC Communications); Branagan, ((NBC Communications); Windham (NBC Maintenance); Byers (WJZ Transmitter); Cusamano (ABC Traffic); Chambers (NBC Day Studio); Paine (NBC Nite Studio); Conway (Muzak); Halvonik (ABC Day Studio); Connor (NBC Traffic); Kinsel (ABC-TV Field); Lynch (RCA-Victor Engineering); McDonald (ABC-TV Studio; and Treasurer Youngster. The meeting got under way at 8 p.m. and was adjourned at 11:40 p.m.—and the minutes were mimeoed and distributed in less than 24 hours!

Of interest at the meeting was a discussion by Stolzenberger of necessary reorganization within the New York Chapter, which might become a working pattern for the "one New York NABET Chapter"—now spiritually accomplished, but mechanically in first gear. An assistant Chairman is required, but constitutionally his title must be Secretary-Treasurer, but there was no intention or desire to separate our good treasurer Neal Youngster from the necessary bookkeeping function. Also recognized by Stolzy was the need for an ABC engineer up at the executive level in the chapter organization. Within a week it was all over—and functioning smoothly! The re-elected Chairman appointed Youngster as *Treasurer*, Paine as *Secretary*, Chambers as *Assistant Secretary*, and the very well-known and highly respected in all quarters, among the older and newer members alike—ABC Studio Engineer Rudy Bauer as the Constitutional second officer of the Chapter, with the title of *Secretary-Treasurer*, Bauer relieves Youngster of all chores unrelated to the bookkeeping.

R. W. Bauer is very well known in this area; he is a Penn State graduate, EE; he served as one of the NBC audio facilities design engineers in the construction of NBC's Radio City, New York; he has a very well rounded background and appreciation of the various work assignments—he served a term in maintenance and studio for NBC, and switched over to ABC when that company was formed, and he is the Senior ABC Engineer in terms of seniority, and is a Charter Member of NABET and its predecessor, ATE.

The Chairman and the Treasurer are now huddling on ways and means of reorganizing the relationship between the local and national treasurers, paying of local and national dues, membership cards, etc., Treasurer Youngster was last seen smiling approval.

Ed Stolzenberger's popularity as Chapter Chairman was demonstrated at the recent nominations for Chapter Chairman. He was renominated by such an overwhelming majority that

To page 11

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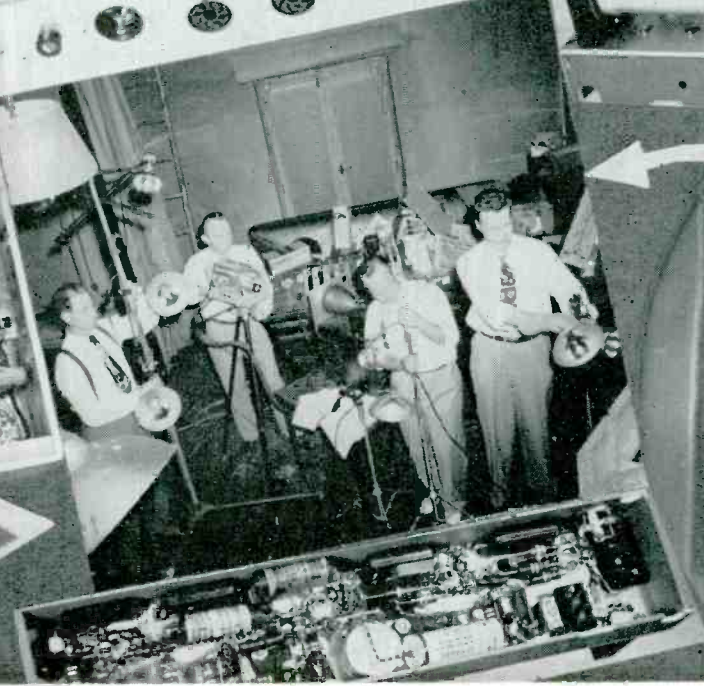
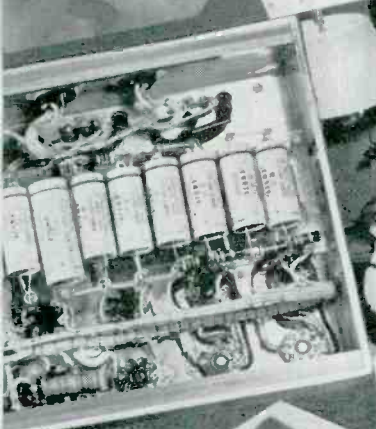
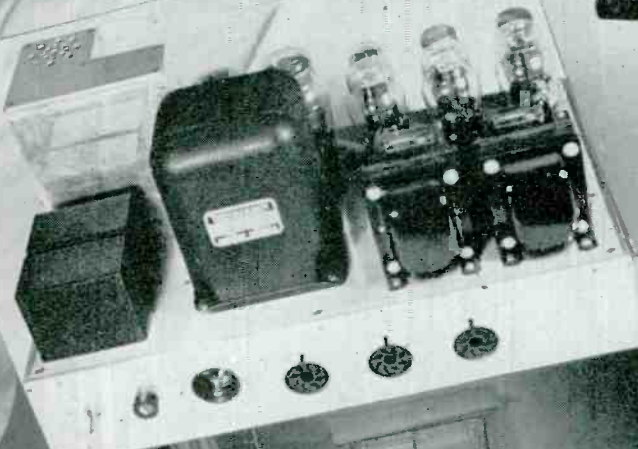
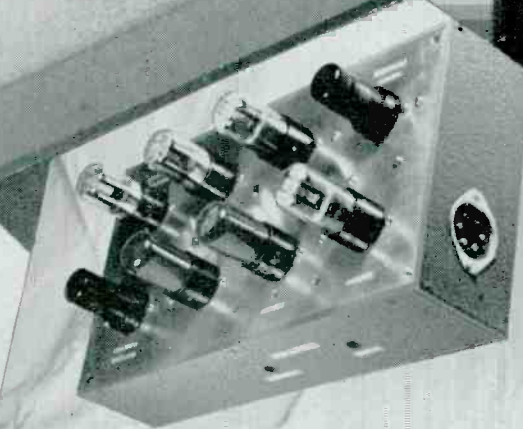
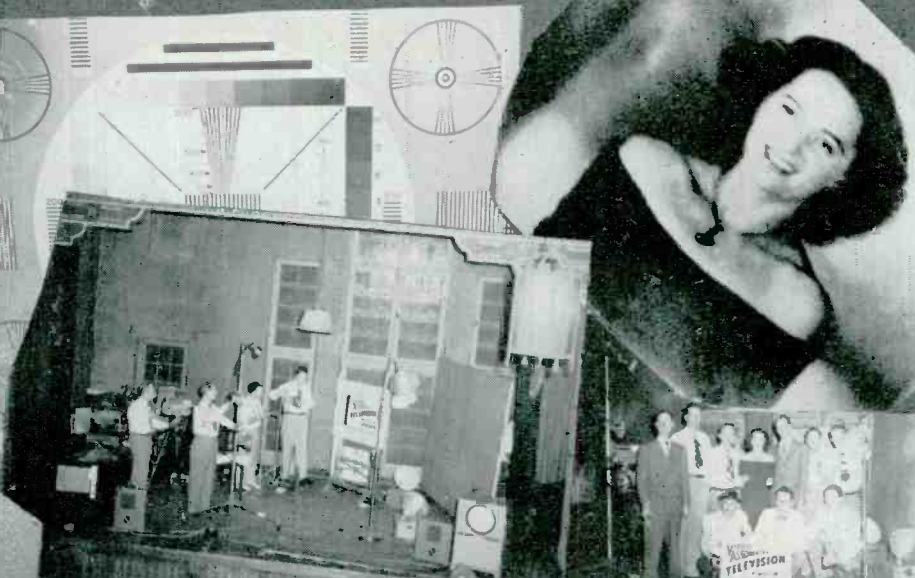
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C.M. Eining K.N. Raymond

KOA

ROCKY MOUNTAIN NEWS By G. A. SOLLENBERGER

Fellow engineers, view with awe the pictures on the opposite page showing what can be done and has been done by the VIDEO ASSOCIATES here at KOA. Certainly no TV course can offer the training facilities of the "roll your own" variety. The pictures show some of the equipment and set-ups of the pulse-happy video quad.

To this date three public demonstrations have been given and most have been flawless. This you might try to duplicate but did you ever use one camera on a dolly to cover the entire group of settings? It is possible when you only have one set of equipment. Continuity, therefore, must follow a different pattern from the standard studio practices. One of KOA's best producers, Bill Walker has cooperated admirably and also has probably gained some valuable experience.

One after another the bugs have been ironed out until the picture now has good resolution as shown by the shots of the monitor picture tube. A couple of Denver's retailers in TV receivers have cooperated by lending receivers with large viewing screens for the demonstrations. Connection was made by means of coax to the receivers. No projection type receivers have been seen in this area by this writer.

Stan Neal, VIDEO ASSOCIATES, is vacationing now and trying to forget TV, BC, AM, VU, OA AND ALL other things suggestive of routine. No trips are planned but he may see a little of the surrounding territory.

Kenny Raymond, VA, just returned from his respite (redness showing thru the suntanned skin. Too bad the ham bands weren't better for his score for the DX century club hasn't been growing quite so fast since the bands are also vacationing. Kenny is the new studio Councilman at KOA.

Charlie Eining is now an old married man and has rebuilt the monitor unit but still has some time for the conferences and demonstrations. His vacation is past but was spent well. Didn't send a picture of Charlie's unit this month but will next month, probably.

Al McClellan has been batching it of late and has burned the midnight oil often in the development of the pulse and new power supply units. The pulse unit shown in the upper left has been doubled in size as the performance showed that it was necessary to produce the proper wave forms. His bachelor existence has also proved his aversion for any domestic tasks. Disposition of the daily papers has been the principle task of his barren existence. The TV project has slowed down since the vacation schedule is in effect.

Carl Drebing and yours truly are back on the vacation relief again and enjoying working in those "air conditioned" control rooms. Carl is having quite a time keeping all the work caught up on his new home, garden, and small dog. The duck over the speaker didn't improve the sound of his recently added ceiling radiator. (Duck cloth that is.)

Aubrey Blake is assembling a TV kit among other duties and will probably be ready to view the next TV demonstration. Some of the new 16 inch tubes are also showing their faces and will soon be in operation in some other installations. Aub took some of the better prints on the opposite page. His ability as a photog is only exceeded by his poisonality and understanding of Onan emergency plants.

George Pogue seems to be enjoying his vacation but can't seem to get started on his proposed trip. Now that he has retired from the position as Chapter Chairman he doesn't know what to do with all of his idle time. So much the bet-

ter for incumbent Aubrey Blake to have all good ground work as laid by Genial George.

The transmitter crew hasn't been doing much out of the ordinary and has little to report. Joe Turre did have an enjoyable trip and saw L. A.'s TV and thought it was very good. The Chev held up well under the strain of California's climate. Speaking of cars, another guy upped and purchased a new Mercury, namely Connelly Holcomb. That just about fixes all of the crew of the 60 odd kw's automobile hankerings, for a year or so anyway. Barney Nesbitt will pilot his Hudson down thru the southwestern states to see more of the great wonders of these vacationland states.

It seems that this is about all that is new out here where the Indians still run wild and everybody packs six shooters. Our wooden sidewalks are starting to look a little antiquated but the wood fronts are solid and horses are fast disappearing. KOA's hitching post isn't doing badly either as this writer sees it (still single.) Best 73's.

On the opposite page are views taken during the growing-up of VIDEO ASSOCIATES. Starting at the top left and going clockwise are three views taken from the kine. Beneath the young lady is a group picture of the entire cast, staff, and props. Equipment views were photographed by Stan Neal and the kinescope views were taken by Aubrey Blake. Pictured at the left, just below center are Mrs. Blake and son. Comments are invited on this page of glossys.—G.S.

ABC-NY—from Page 9

an election wasn't necessary. We hope that when the merging of the Chapters is completed, Stolzy will continue as the head man.

Councilmen elections are in progress, and Dick Berrien, incumbent councilman for the day group in ABC Studio Engineering, does not choose to run. Hate to see Dick give it up, but a lot of other duties keep him pretty busy.

WJZ has gone to all night operations. Bebop music, with NABET's Raymond Durkin spinning the platters. Durk seems to like the graveyard shift; he did a similar shift during the war. Sam Walters helps out by doing the operations on the sixth day, which gives Durkin a rest and saves the company some overtime.

Durkin has been in radio a long time. It has been rumored that he "rode gain" on Marconi! He straps a VI meter to his chest when he goes to bed; to register his snores—if it hits into the red his wife awakens him and cautions him to keep it down. Even during dry weather he keeps his windshield wiper running because it simulates the swing of a needle on a VI meter.

I wonder if all those letters in feminine handwriting, and smelling so nice, and addressed to Joe Lewis are really from his cousins. I saw him over at the Playhouse one night with a couple of attractive "cousins." How's about an introduction, Joe?

They should have issued reading glasses with the new contracts. I've heard of clauses being in small print, but this is the first time I've seen a whole contract that way. And on the entertainment side, Bradley has everybody buffaloed since Bisson taught him how to play "dirty eights." Sit down and play, friend.

See you in August.



WASHINGTON

By J. K. WILLIAMS

First let me introduce three new NABET members who have been voted into the Union recently. All of these men are with NBC as group 2 engineers. First of the three to come to work was *Arthur H. Redfield, Jr.* Art is a native Washingtonian and attended McKinley high school. He is single, good natured and has a very nice smile. He is a graduate of a local radio engineering school and got his initial radio experience and training in the Navy. Art has been with the WNBW studio crew since April 1st. His hobby is photography.

On March 14th *Albert F. Kuschner* came to work for NBC. Bert comes from Haines City, Fla. He served with the Army Security Agency in Europe for a year and a half. Bert is an ardent "ham," call letters W3NTE and he first came in contact with radio in the army as a technician. He is now operating a camera at WNBW.

Last, but not least to come to work for NBC this summer is *Donald E. (Smokey) Stover*. Smokey was born in Mohnton, Pa. He spent 25 months with the 78th fighter squadron in the Pacific Theatre during the recent war and he saw action on Iwo Jima and Saipan. Smokey was discharged as a Sergeant and completed his radio education in a civilian radio engineering school in Kansas City, Mo. His first radio job after graduating from school was a television servicing job here in D. C. Recently he came into NABET and to work for NBC on April 15th.

For those interested, here are the local softball standings up to July 1st:

Team	Games Won	Lost	Pct.
NAB	7	6	.857
WOIC	7	6	.857
WTOP	7	6	.857
WMAL	7	4	.571
FCC-WWDC Broadcast	7	4	.571
WRC-NBC	7	3	.428
U. S. Record	7	2	.285
WTTG	7	2	.285
WOL-WQQW	7	0	.000

Thanks to *R. L. Fuller* and *Elmer Hall, E.E.*, both of WMAL-TV for the following interesting article on Long Distance Microwave Relaying.

On April 29, 1949, WMAL-TV utilized one of the longest independent microwave relays to bring a telecast of the Shenandoah Valley Apple Blossom Festival Feature Parade and band concert to viewers in the Washington area. The parade, led by the Grand Marshal, Bob Hope, marched through Winchester, Virginia, which lies seventy miles west of Washington. The Blue Ridge Mountains lie between the two cities, but contrary to the accepted laws of propagation of television frequencies, residents of Winchester view the Washington stations with as much ease and clarity as the local residents. These mountains were less obliging with respect to microwave techniques however. The relay had to be broken into two parts to clear them. A survey trip along the "Blue Ridge" led to the discovery of a forest ranger's fire lookout tower about 6.5 miles from Paris, Virginia, on the Appalachian (hikers') Trail. This trail is just wide enough for a truck and becomes a sea of mud after a rain. From the 75 foot high tower, a line of sight path is available to both Winchester (17 miles airline) and to Washington (55 miles airline). Permission having been obtained to use the tower, *Earl Hilburn* and *Elmer Hall*, assisted later by *Jim Field*, hauled the necessary relay equipment, portable Onan power plant and lumber to the site of the tower. A platform was constructed at the 60-foot level on which was mounted the receiving and transmitting antennae for this mid-point position. The receiving and transmitting equipment was housed in the enclosure atop the tower.

From the fire tower to Washington, a Raytheon 2,000 megacycle relay system was used. WMAL-TV has an eightfoot paraboloid receiving antenna for the 2,000 megacycle system permanently mounted on a remotely-controlled rotating pedestal located at the 225-foot level of the television transmitting tower. Gratifying results were obtained over this fifty-five mile leg using a four foot paraboloid re-

flector on the link transmitter antenna.

From Winchester to the fire tower an RCA TTRIA 7,000 megacycle relay system was used. A six foot paraboloid reflector was used at the receiving end and a four foot diameter dish was employed down at the pick-up point in Winchester. Two days were required to set up and test the two relay legs.

Early in the day of the telecast the WMAL field crew set out for Winchester in their new mobile unit, arriving at the pick-up point by 10:30 A.M. At 1:30 P.M. the cameras were in place, one on top of the mobile unit, and one across the street and satisfactory test pictures were being received in Washington via the two-section relay system. The actual telecast began at 1:45 P.M. and many Winchester residents televised the three hour parade in their own homes. They expressed pleasure with the fine picture quality of the telecast. Participating in the remote pick-up were *Jim Field* and *Gil Ennes*, cameramen; *Lloyd Smith*, technical director; *Elmer Hall*, video control operator, and *Earl Hilburn*, over-all director of engineering on the project.

At the June 10th meeting of NABET the local chapter was honored with the presence of *Cliff Gorsuch* from the National Offices in New York and *Tom Dunn*, lawyer for NABET. In their talks, they stressed the need for strengthening of the Union and stated that it was the concern of each and every member to keep it strong and growing by taking active part at all meetings and also on each individual job. *Tom Dunn* told of some of the problems that came up during the recent negotiations for NBC and MBS new contracts and how each problem was handled.

The engineers at WOIC want NABET to represent them and recently proved how much in their election held by the National Labor Relations Board. Of the 15 engineers at WOIC 13 were present and voted at the meeting and the count was 100% strong for NABET. They also called for a Union Shop and selected *Paul J. Malik* as their councilman. Their contract expired on April 31st. Several improvements in working conditions were made in the new contract. WOIC now has local bargaining since WOR, NY, withdrew from the Union.

WOIC's plan of interchangeability of engineers seems to be working out quite well. Each man is expected to know how to handle every job in the crew, specializing in his own particular job of course. This system seems to work well for a station with a limited number of men

To Page 13

WEATHER (OR NOT)

Ees one long rain
All tru the spreeng
Weeth Farmair Try
For plant somting

When May pokes the nose
Tru calendar sheet
Is rain cloud go
An com the heat

For forty day
Is no more wet
Wit berry spoil
While hotter get

Cloud sometam com
An thundair roar
But rainbarl dry
Get dryer more

Groun now ees dry
Lak one white bone
Crop sure is spoil
The farmair groan

Then more cloud com
Wit lightneeng play
But Radio yell
Not rain today

Sky now ees black
Lak eenside of whale
Wit thundair roar
An win blow gale

Gale now is howl
Lak Loup Garou
Mak fall the tree
Bust cabin tru

Win now is hush
Grow cool the air
Then com the rain
Wit roar lak Bear

Soon look the groun
As Lak Saint Claire
For rain so fas
Not can see air

The watair fall
An fall som more
Grow beeg the lak
More smaller shore

Bimeby she stop
Thees dam beeg storm
For cloud is dry
Washed out the corn

An now Im theenk
Ees drouth much rough
But too much um rain
Ees sure enough.
—Bateese

Deer Haydee: Bateese is back from one dam long trip. Feesh no is bite. Win bust cabin. Rain spoil the flour an Bear steal the bacon. Bateese now tak canoe but is lose paddle. Canoe she leak so mak largair hole for let water out. Isno good for dam teeng now seenk. Im now swim with pack on back. Get one bad cold. Hopping you the same I am remain.
—Bateese.

WASHINGTON— from Page 12

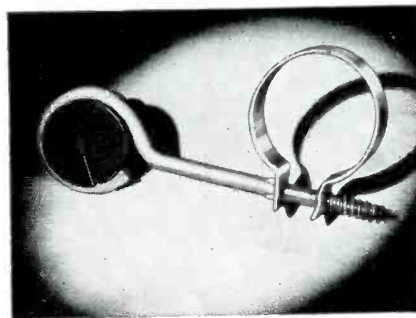
especially. WNBW, WMAL, and WOL have a "work-up" system in which the men advance as openings occur and longevity as well as ability counts.

The Local Chapter of NABET welcomes heartily its new Chairman, *Mr. Paul E. Anderson* and is happy to retain as Secy.-Treas. *Mr. Walter Godwin*.

73's—Warren D. Deem.

TRADE NEWS

Television Equipment Corp. announces its apartment house Telecoupler, under \$100, will serve up to 8 telesets. Three units may be used in cascade to serve 24 telesets.

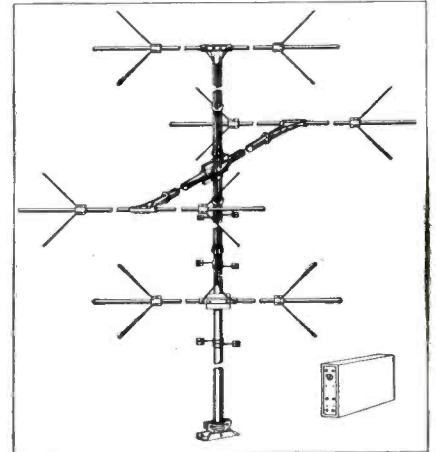


New TACO jiffy-clamp serves as wall stand-off or mast clamp, will grip any mast or pipe from 1" to 1 5/16". Makes for faster installation of TV sets, looks more business-like. *See photo.*

Cannon Electric Development Co. has announced its 1949 edition chart of insert arrangements of the Type "K" Series of electric connectors. The desk chart measures 19 by 24 inches, shows 211 layouts, with wire, contact, and clearance data; used in radar, television, radio, etc. equipment. Copies of the chart are avail-

able by writing Cannon Electric.

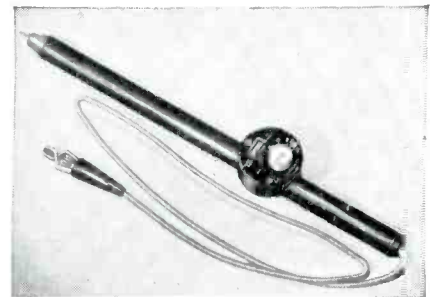
TACO advises a new TV reception DX record, obtained on one of the TACO TV antennas at Phoenix, Arizona. Received were WNBQ, Chicago, 1450 miles, and WMCT, Memphis, about 1200 miles. Remember the radio "silent nights" for DX-hunting???



TACO announces a new antenna designed to minimize TV co-channel interference. It features four driven elements, two vertical and the other two horizontal, thus giving greater control to the field pattern, and permitting lobe-switching. *See photo.*

G. E. Co. announces three types of TV microwave systems. All operate in the 1990-2110 mc band, and include transmitters, receivers, and antennas.

The NAM, in a release dated June 24, 1949, emphasizes the need for development of better employee communications with management for better understanding, as a counter-measure against the attacks which are being made to undermine our American individual enterprise system.



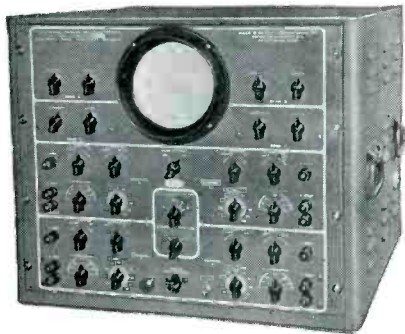
Industrial Devices, Inc., announces an inexpensive high-voltage voltmeter for checking voltages up to 30 KV. Two models are available, one for checking ignition transformers such as used for oil burners, the other model is

To Page 14

for electronic applications in TV, etc. Both models utilize a neon-lamp indicator; the knob is turned until the lamp extinguishes, and voltage is read from calibrated scale. Test prod is 7" long for safety. *See photo.*

Mech Industries announces a line of 12½" TV receivers retailing at advertised price of \$249.

International TV Corp announces a 16" TV set to retail at \$349. Uses a 630TS chassis, with covered controls.



Du Mont announces a special four-beam cathode ray oscilloscope. This scope is capable of displaying simultaneously four related or unrelated independent phenomena on a single cathode-ray-tube screen. Utilizes the Du Mont Type K1027-P11 cathode ray tube, which contains four independent electron guns. Additional data may be obtained from Du Mont. *See photo.*

Aerovox Corp. announces a catalogue supplement, Form SC-549, with additional listings and data on its Type AF twist-lug-base electrolytic condensers. Single element units now number 37; dual element, 27; and triple-element units, 69. Supplement available at your jobber or from Aerovox.

Sylvania Research suggests a new approach to the design of TV picture tubes to reduce the tube length, now required to hold down spot distortion. Sylvania suggests controlled pre-distortion of the spot shape and size.

G. E. Co. announces a new Marker Generator for TV maintenance and development. A separate crystal for each TV channel is selectable by a rotary switch, with no tuning required. Picture and audio carrier markers are available simultaneously, plus free positioning of the markers within the range from 20 to 50 mc.

RCA announces a remote control attachment, permitting the viewer to control the brightness and contrast of a television receiver from his armchair, incorporated in its newest projection TV receiver

with a 15"x20" screen, and 12" loudspeaker. Model 9PC41, at \$795 plus tax.

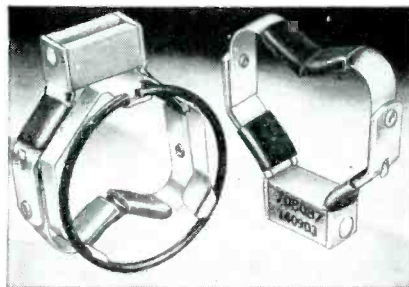
RCA has announced a complete line of highly specialized TV antennas to meet the peculiar receiving conditions in fringe areas, and those cases where the receiver location is midway between two TV transmitters. Local RCA distributors have the complete information.

The widely acclaimed success of the synchronization of the TV carriers of WNBT and WNBW, New York and Washington, has recently been applied to WNBK and WWJ-TV, Cleveland and Detroit, respectively. Interference has been favorably reduced, to the benefit of the fringe viewers. Result: increased audiences for TV.

A life-size TV projection system has been announced by RCA, projecting a picture up to 6 by 8 feet, the optical barrel is intended to be suspended from the ceiling.

The G. E. Co. announces a radio frequency ohmmeter, type YKS-1, intended for use by component manufacturers, etc., and has a wide range of from 50 kc to 80 mc. By means of a calibrated precision condenser, the device provides a measurement of the series reactance of the component under test.

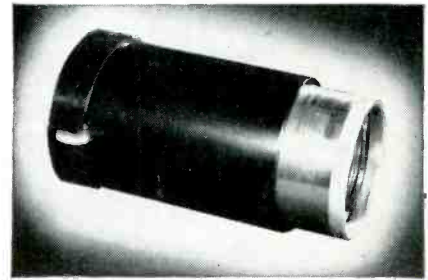
The 1949 Rochester Fall Meeting of the IRE will be held October 31st, Nov. 1st and 2nd at the Hotel Syracuse, Syracuse, N. Y. The meeting is jointly sponsored by the Engineering Department of the RMA and the IRE.



Clarostat Mfg. Co. announces a new type TV beam-bender at lower cost. It slips over the neck of the TV picture tube. Several types are available for specific applications. Details available from Clarostat jobbers. *See photo.*

Eimac announces its plans to manufacture 16" TV picture tubes at the new Salt Lake plant of Eitel-McCullough, which will help fill the demand for this size picture tube.

Du Mont announces a new oscillographic projection lens, Type 2542. It is a two-element lens, f/3.3, and focal length



of 7.7 inches. The light transmission is 85%. Projects a pattern up to 3 inches square, to distances from 8 feet to 30 feet. *See photo.*

TACO announces an indoor TV antenna, number 975, features both horizontal and vertical orientation, telescopic



dipoles, all channel coverage, and 300 ohm leadin attached. *See photo.*

WJZ-TV set its evening hour rate at \$1,500 effective June 1, 1949, the first increase since WJZ-TV went on the air August 10, 1948. Former rate was \$1000 per evening hour. Announcement rate is \$200.

According to the FM association AM is doomed to a slow but certain death. FM Ass'n also says TV is mired down by channel problems, and "FM is the only expandable product remaining on the radio market for the next year or so."

G. E. Co. announces general price reductions on its TV picture tubes.

Cannon Electric announces a new desk size Army-Navy Connector Spec (AN-C-591) Chart with the latest insert arrangements shown in detail at half scale for use by radio, aircraft, TV, etc. Full scale chart also available; write Cannon Electric for either chart.

Sylvania announces a comprehensive television receiver tube complement chart. It lists total tube complement, viewing tube type and number of tubes by type in 110 TV receiver models. Copies may be obtained from Sylvania.

COLOR TELEVISION

The RMA Engineering Department is forming a Committee on Color Television to make a study of present systems of color television in various stages of technical development and report to the RMA Television Committee which is headed by past President Max F. Balcom, the Radio Manufacturers Association said today.

An early meeting of the RMA Television Committee is being arranged by President R. C. Cosgrove and Chairman Balcom to formulate the industry's recommendations with regard to the TV allocation proposals issued earlier this week by the Federal Communications Commission in preparation for the hearing scheduled to open on Aug. 29.

A group of outstanding industry engineers has been invited by Dr. W. R. G. Baker, director of the RMA Engineering Department, to serve on the Color Television Committee. It includes the following:

- F. J. Bingley—Station WOR, New York City.
- Lewis Clement—Crosley Division of Avco Mfg. Corp., Cincinnati, Ohio.
- R. B. Dome—General Electric Co., Syracuse, N. Y.
- E. W. Engstrom—Radio Corporation of America, Princeton, N. J.
- D. G. Fink—Chairman of Joint Technical Advisory Committee, New York, N. Y.
- T. T. Goldsmith, DuMont Laboratories, Passaic, N. J.
- Peter Goldmark—Columbia Broadcasting System, New York, N. Y.
- G. E. Gustafson—Zenith Radio Corp., Chicago, Ill.
- R. F. Guy—Television Broadcasters Association, New York, N. Y.
- D. B. Smith—Philco Corporation, Philadelphia, Pa.

RMA recently expressed its official attitude on color television as follows:

"There has been much discussion of color television. The industry has been and still is engaged in research on the various proposed systems of color television which are still in the laboratory stage. When and if one of these systems is accepted by the FCC and the industry as standard, it must be thoroughly field tested and proven under practical broadcasting conditions. The industry is in accord with the policy expressed by the Federal Communications Commission that any future color system must be capable of being received on present sets with only minor modifications."

RMA NEWS

Cathode ray tube sales in 1948 exceeded by more than 300%, the number of units and the dollar value of the 1947 sales of CR tubes.

RMA has announced safety rules for servicemen and TV set owners, with the theme, "The picture tube is not dangerous if properly handled." The RMA safety committee also noted that "wild rumors are circulated occasionally as to harmful effects of ultra-violet rays reputedly emitted by cathode ray tubes. The committee stated that careful investigations by competent radio engineers have shown such emissions are practically non-existent."

In connection with the issue of possible TV obsolescence, the RMA has stated to the public to the effect that the 12 per cent TV channels will remain intact; that TV sets in existence will continue to serve their owners; that expansion will occur in the higher frequency region and that simple and inexpensive converters will adopt present TV sets to include the present and future TV channels; that practical color TV, when approved standards are arrived at by the industry and the FCC, will of necessity undergo long-term field tests, and is many years away, with the further proviso that color TV standards must permit color to be received on present sets with minor modifications (ie—sit back and enjoy your TV!)—Ed. S.

RMA also predicts six million TV sets by 1951. RMA Pres. Balcom notes, that even with this anticipated TV expansion, that "radio" is positively here to stay sees no need to plan for AM's wake, that AM set production, while off from prior production figures, is and will continue to be a sizeable figure, both in units and dollars.

An RMA TV Public Relations Committee will provide authentic and comprehensive information relative to TV, to the public, and government agencies, and will put an end to the stream of dire predictions relative to TV and AM, which

have been less than 83% accurate, to say the least!

Present receiver production shows more than one-half the dollar sales are in TV. 1949 TV receiver production is expected to reach two million units, with 1950 production reaching three million units.

RMA has done a fine job in sponsoring its servicemen's Town Meetings in various cities, discussing the problems introduced by TV, and the advantages that can accrue to the serviceman.

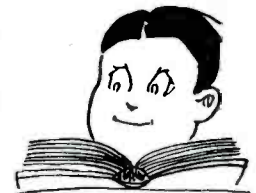
RMA's first five month report for 1949 follows: *Washington, June 24*—Television receiver production by RMA member-companies in May maintained almost the same high level reached in April but total output was slightly under that of the previous month. May's production of TV sets was 163,262 for the four-week period May 2-27 as compared with 166,536 in April.

The average weekly production of 40-816 television receivers in May was two per cent under the April weekly average but about 26 per cent above the weekly average for the first quarter of 1949.

AM home radio receivers showed a further drop during May, but production of portables and auto sets was higher than in April. Auto receivers produced by RMA member-companies numbered 181,803 and portables totalled 132,091.

Production of FM-AM radio receivers declined to 28,388, but May's production included 38,154 television sets with FM reception facilities.

If It Concerns
The Broadcast
Engineer



—he will read it in the
**BROADCAST
ENGINEERS'
JOURNAL**

FOLLOWING IS THE BREAKDOWN IN RADIO AND TELEVISION SET PRODUCTION FOR THE FIVE MONTHS OF 1949

	TV	FM-AM and FM	AM Only	All Sets
January	121,238	147,733	561,900	830,871
February	118,938	98,969	498,631	716,538
March (five weeks)	182,361	71,216	607,570	861,147
April	166,536	37,563	468,906	673,005
May	163,262	28,388	449,128	640,778
TOTAL	752,335	383,869	2,586,135	3,722,339

LABOR HISTORY — Conclusion

From the Labor Information Bulletin

Unions are frequently classified as "craft" or "industrial," but very few now fall clearly within either of these two types. Many unions are better described as "amalgamated" or "multicraft," because they include two or more skilled or semi-skilled groups. Others are better described as "semi-industrial," because, though they may include all production workers, they frequently exclude certain maintenance, technical, or clerical groups.

Generally speaking, most AFL unions tend toward the craft or multicraft type, while most CIO unions are more readily classified as industrial or semi-industrial. In addition to the locals which are chartered by their respective national or international unions, both the AFL and CIO have some locals which are directly affiliated. These are known as Federal labor unions (AFL) and local industrial unions (CIO).

The international unions and their subordinate organizations, such as local unions, joint boards, and district councils, are primarily concerned with protecting and improving the working conditions of members within their particular trades or industries. City and State groups, such as city federated trades or industrial union councils and State federations of labor or industrial union councils, devote themselves chiefly to legislative, political, and educational matters.

"Departments" composed of those international unions having jurisdiction over many craft in a broad industry may be set up under the AFL constitution to provide organization machinery for coordinating common interests. Those in existence are the Building and Construction Trades Department, with 19 affiliated international unions; Metal Trades Department, 14 affiliated unions; Railway Employees' Department, 6 affiliated unions; and the Maritime Trades Department, established last year, with 5 affiliated unions.

Each of these departments holds conventions and functions through local, district, State, and, in the case of the railway shopcrafts, "system" organizations.

The AFL Union Label Trades Department is made up of affiliates having labels or insignia and is designed to promote union organization and standards of workmanship through appeals to consumers to buy union-made goods or services.

Collective bargaining is now widely accepted and practiced as the basis for sound industrial relations. The number of collective bargaining agreements currently in effect greatly exceeds 50,000.

In manufacturing industries more than 69 percent of the production wage earners work under the terms of union agreements. Of 31.2 million workers in 1946 engaged in employment where unions are organized and active, 14.8 million or 48 percent were covered by collective bargaining agreements.

Union functions* and activities cover a wide field. After contracts are negotiated, the unions have the problem of making them work smoothly. This problem is normally handled through informal as well as formal union-employer conferences. Conferences are held to clarify the meaning of contract clauses and to deal with other current problems of mutual interest, such as operation of seniority provisions, supervision of grievance procedures, participation in joint labor-management committees as well as joint time, rate, and workload studies.

International unions frequently provide locals with necessary

technical assistance through legal, research, statistics, and engineering staffs.

Educational facilities are provided by many unions for officers, shop stewards, and rank and file members.

Most unions publish newspapers or journals. Unions also publish a wide variety of pamphlets and special reports in connection with their educational, political, and organizational programs. They conduct radio programs and operate radio stations.

Other union enterprises include life insurance and health benefits and pension plans, recreational activities, cooperatives, banks, credit unions, and even housing projects.

Critic's Time at Theater Is "Work," Appeals Court Rules

The First Circuit United States Court of Appeals, in Boston, has held that time spent in theaters by a theater editor of a newspaper to see plays for review is compensable time under the Fair Labor Standards Act, notwithstanding any custom or understanding to the contrary.

The ruling was made in a case which originated on one of the four newspapers—since reduced to two—published by the Republican Co., of Springfield, Mass. Annette Doyle, who reported labor and industrial affairs for the newspaper and reviewed plays at night, was the employee in whose behalf the American Newspaper Guild entered the litigation.

The newspaper-employer introduced evidence to show that it had never previously paid any compensation for time spent by theater editors watching plays, that the position of theater editor was much sought after, although employees knew that time spent in the theater was uncompensated, and that the employee in question received the assignment with this understanding.

Affirming the decision of the district court, the court of appeals held that liability under the act did not hinge on whether the work was voluntary or agreeable to the employee, but rather on whether the worker was performing services for the benefit of the employer with his knowledge and approval. The act defines "employ" as to "suffer or permit to work." The employee was required to spend time at the theater to be able to review plays. Therefore the hours spent there were required to be included in computing overtime compensation due under the act.

Secretary of Labor Tobin Says:

In the five years between 1933 and 1938, the enactment of social and labor and humanitarian legislation helped to change the history of the world. These laws helped make the United States the mightiest country on earth during the fateful years which have come since 1939.

Because these laws give us today moral leadership of the democratic forces in the world, they are helping to win the peace.

They are a demonstration to workers all over the world that economic security can be achieved without surrendering individual freedom.

But our job is not done. It is never done. We must continually improve our social and labor legislation to keep it from falling behind the times.

Franklin Roosevelt recognized this need 20 years ago. As Governor of New York he said:

"Labor legislation must be kept in step with changing de-

velopments in individual life and forward steps in social welfare."

There is no marking time in this field. What we have gained will be lost if we do not make improvements as they become necessary to meet today's problems.

The continued full economy of our country is dependent upon the cooperation of all if we are to maintain a high standard of living based on the adequate purchasing power of all the wage earners.

Need For Active and Effective Local Organizations

— OR —

T-H CAN Be Beaten

With the Taft-Hartley Act scheduled to remain "as is" until we have a new Congress, eyes are turning toward the next election of Representatives and Senators.

Labor has learned a great lesson in practical politics. The lesson is that precinct organization is what counts.

That's where labor has strength. It covers the country, especially in points where there is concentration of population.

Labor has the organization that can get right down to the precincts where the voting booths are to be found.

No matter what else they may have had, whether of vision or corruption, every city machine that has ever won and lasted has had its roots in precinct organization. Leaders knew voters by their first names and they could see that they got to the polls.

* * * *

Henry Wallace couldn't get to first base for many reasons, but one of them was that he could not possibly achieve the precinct organization necessary to the winning of an election.

There are times when, in a red hot battle, voters will follow the banner of a leader and go to the polls.

These times are rare and after a time the enthusiasm dies away and the one who was a victor becomes a loser, unless there is precinct organization.

Practical politicians are not especially afraid of crusades and of crusaders, because almost always they are not backed by the kind of organized followings that will do the steady, year after year job of building organizations in the precincts. Once in a great while they are fooled, but not often.

* * * *

When prohibition was defeated it was pretty largely because labor got into the fight in a big way, mapped the Congressional districts, figured out the districts in which the fewest votes were needed to turn the tide, built organizations in those districts and delivered the votes to knock out famous "noble experiment."

No time or effort or money were wasted on districts in which the margin needed was too great.

In practical politics you count the chickens you need, find out where they are and then go and hatch them.

Of course the most practical of practical politics will, in the long run, be licked, unless it is based upon sound principles. Tammany was licked after years of supremacy, because Tammany principles were more than the electorate could stand forever. But it took genuine organization, down into the precinct to do the job. Just wishing never could have been enough.

But, given honest principles, a real humanitarian goal, and you can win and stay there if you have organization.

Labor has a cause. At the moment that cause is symbolized by the Taft-Hartley Act. That law must go.

There is the rallying point. But if that rallying point should be used merely as something to talk about there would be no change. Used as a rallying point to organize voters right down to the precinct level, labor can and of course will so change the complexion of Congress as to bring about the repeal of that hated law.

Membership, as well as leaders, must understand the need for this kind of organization. The whole job is an organizing job, at which none can do better than labor.

That's the battle plan that will make it possible for planned action, to the end that the Taft-Hartley Act shall join its ancient fellows in limbo.—CMW.

STATE DISABILITY

The first official explanation of the provisions of the New York State Disability Law, recently signed by Governor Dewey, is contained in the May issue of the Industrial Bulletin, monthly news magazine of the State Department of Labor.

Couched in non-technical language the article on the law, which has been hailed by experts as "the finest for sickness and disability yet adopted by any unit of government," tersely explains what kinds of workers are covered, what the benefits are, how the program is financed, eligibility details, etc. This information should prove valuable to every worker and employer in the State.

When Governor Dewey signed the bill last month he said: "This bill brings to the working men and women of the State of New York the benefits of social insurance against the hazards of sickness and disability not incurred in their employment. That advance alone makes it a most important achievement; but the manner in which this program of social insurance has been attained is as significant as its principal purpose.

"This new program will be administered without the creation of a new agency of government. It permits the continuation of existing voluntary plans. It encourages the establishment of new voluntary plans. It places the emphasis upon the use of existing private enterprise to support the benefits and to supply the insurance required under the bill. Consequently, the bill, in contrast to similar plans in other states, provides the very minimum of government intervention in the field of social insurance."

In brief, the law establishes a system of cash benefits payable to employees disabled as a result of injury or sickness not arising out of employment. Cash benefits—not medical care—are provided and begin on July 1, 1950. They range from \$10 to \$26 a week. In order to accumulate a reserve fund, a temporary assessment on employers and employees will be made beginning January 1, 1950. The Workmen's Compensation Board of the Labor Department will administer the law which will cover an estimated six million workers.

New York is one of four states with a disability benefits program. In Rhode Island and California the insurance fund is financed solely by workers. In New Jersey both workers and employers contribute.

DEADLINE is 2nd OF EVERY MONTH. EXAMPLE: COPY RECEIVED MARCH 2nd APPEARS IN THE APRIL ISSUE, IN THE MAIL APRIL 1st.

Official I.R.E. Summaries of Technical Papers

Presented at the 1949 IRE Convention—continued from last month

PASSIVE NETWORKS II— ANALYSIS

Chairman, JOHN B. COLEMAN
(RCA Victor Division, Radio Corporation of
America, Camden, N. J.)

47. Impedance Curves for Two-Terminal Networks.

E. L. MICHAELS, *Northwestern University,
Evanston, Ill.*

This paper presents a thorough and systematic investigation of the characteristic curves of the complex impedance of all possible combinations of one-, two-, and three-element linear networks at all frequencies from zero to infinity. Use of the properties of inverse, reciprocal, and equivalent networks is made, so that a single set of curves applies to from two to six different networks.

The curves of complex impedance, plotted in the complex plane, are of particular interest because they give the resistive and reactive components of the complex impedance, as well as the impedance magnitude and phase shift, at all frequencies on just one sheet of graph paper.

Of the large number of special applications possible, the most interesting are those concerning the design of low- and high-frequency-compensation networks for wide-band amplifiers.

The information presented by these curves is extremely useful in determining the frequency ranges over which certain elements may be neglected in the final calculations.

48. An Analysis of Triple-Tuned Coupled Circuits.

N. W. MATHER, *Princeton University,
Princeton, N. J.*

An analysis is given of triple-tuned coupled circuits for high- Q cases in which the couplings between circuits are kept small in both the synchronously tuned and asynchronously tuned cases, which are investigated in detail. Contour plots of gain versus bandwidth product are given.

The results for the transitional and triple-peak response cases are compared with the double-tuned coupled circuit. The advantages of the triple-tuned circuit are shown to be its more uniform frequency and phase characteristics in the pass band and its 50 per cent better side-band selectivity.

49. The Bridged Parallel-Tee Network for Suppressed-Carrier Servo Systems.

C. F. WHITE, *Naval Research Laboratory,
Washington, D. C.*

The bridged parallel-tee network is the ac servo system analogue of the shunted

high-pass network in the dc servo system. In suppressed-carrier servo systems a symmetrical upper- and lower-sideband transmission characteristic is highly desirable. The parallel-tee resistance-capacitance null-type network with a bridging and a returning resistance exhibits the desired characteristic when operated between suitably selected generator and load resistances. The network output is resolved into a main component and a minimized quadrature component, and is shown by families of curves displaying amplitude and phase versus frequency. Carrier-frequency shifts are found to have only small effect. All network parameter data required by the servo system designer are summarized on a single curve.

50. Transient Response of Linear Networks with Amplitude Distortion.

M. J. DI TORO, *Federal Telecommunication
Laboratories, Inc., Nutley, N. J.*

The transient response of linear networks having phase distortion is characterized by an excessive amount of "ringing" effects. When this is corrected so that a phase response linear with frequency prevails, ringing effects may still persist and give interference between messages adjacent in time. An example is the so-called "ideal" (and unrealizable) low-pass filter having linear phase and flat amplitude response up to the cutoff frequency and no response beyond. The impulse transient response of this circuit decays at a rate not larger than inversely with time. The resulting interference due to overlapping messages decreases the transmitting capacity of the channel. The extent of ringing is determined by the shape of the amplitude-response characteristics. A number of cases of this effect are presented. A convenient way to analyze this problem is to introduce the use of self-reciprocal transforms, such as the parabolic cylinder functions.

51. Spectrum Analysis of Transient-Response Curves.

H. A. SAMULON, *Electronics Laboratory,
General Electric Company, Syracuse,
N. Y.*

A new method of spectrum analysis of measured transient-response curves is proposed, based on the work of W. R. Bennett, C. E. Shannon, and others who have studied the synthesis of curves with limited frequency spectra and known cutoff frequency. Under these restrictions, which are fulfilled in many technical applications, this method yields higher accuracy; at the same time, it gives a criterion for the necessary number of sam-

ple points of the curve. Comparison is made with a method previously proposed by A. V. Bedford and G. L. Fredendall.

COMPONENTS AND MATERIALS

Chairman, W. B. ANSPACHER
(Naval Ordnance Laboratory, Silver Spring, Md.)

52. Subminiaturization of IF Amplifiers.

GUSTAVE SHAPIRO AND ROBERT L. HENRY,
*National Bureau of Standards, Wash-
ington, D. C.*

A new approach to the miniaturization of electronic equipment is described wherein some concepts and techniques new to the equipment design engineer are used. Circuitry construction where tubes occupy a large percentage of the total volume involves problems of cooling which must be met by special high-temperature materials in the components. Technical information and techniques required to use these materials is discussed along with the necessity of and methods for controlling the size and shape of the components and assemblies. These techniques are illustrated in the design of typical IF amplifiers. The models described have bandwidths of 10 Mc, centered at 60 Mc, with gains of 95 db. Liberal use is made of miniature components in one assembly and printed-circuit techniques in another. A high degree of stability is achieved with physical volumes per stage approaching $\frac{1}{2}$ cubic inch. They may be readily mass-produced despite their small size.

53. New Applications of a Four-Terminal Titanate Capacitor.

ADRIANO A. PASCUCCI, *Radio Hispano
Suize, S. A., Barcelona, Spain.*

Results are given for an investigation of the properties of a Ba-SrTiO₃ four-terminal capacitor. The capacitance and power factor observed between two terminals of the capacitor are shown to be dependent upon a perpendicular electric field applied by means of the other pair of terminals. Some results are presented for the use of these titanate capacitors as variable reactances in FM modulators, and particularly as nonlinear elements in a new type of aperiodic frequency doubler and amplifier.

54. A Frequency-Control Unit.

AUGUST E. MILLER, *August E. Miller Com-
pany, North Bergen, N. J.*

The frequency-control unit discussed in this paper comprises an oscillator and quartz crystal contained within an oven.

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NEW YORK—By Bob Zweck

To you who think it is warm and uncomfortable these sunny summer days, pause and think of the columnist. 'Tis he who really finds things HOT and still more UNcomfortable. Just one wrong word, one careless thought, and the heat is really turned on. BUT, to those of you who may have noticed that our column was missing from the July issue, and also may have known that we were out of town, we want to state that we (it's safer to use the journalistic "we") did not leave town because of things being "hot" here! No sir! If it was heat we were after escaping, do you think we would have headed towards New Orleans (especially the French Quarter). Aside from aforementioned Quarter, New Orleans is the home of WSMB, NBC Affiliate, and WNOE, a Mutual affiliate.

One may very easily walk thru the French Quarter, take one or two wrong turns and wind up at the entrance to WSMB. This was particularly true in my case. However, I had been meaning to visit our southern affiliate and so I pressed the elevator button; was taken atop the Maison Blanche Dept. store, and there found the studios and offices of WSMB. It was about 11.30 p.m., CST, and the station was empty except for a Mr. Pierce. Mr. Pierce was closing the station in the capacity of, I presume, combination engineer/announcer, and assured me that as soon as he gave the station "break" and segued to Pt. 3 of the NBC Symphony ET, he would be more than happy to show me about. My visit was brief, partly because of the late hour and partly because my host knew the appeal the French Quarter must hold for youths. Right here and now, may I suggest that the next nat'l. convention of NABET be held in New Orleans.

The NBC-Army reserve unit here now has on its roster the following NABET men: 1st Lts., Bob Barnaby, Pete Boucheron and Ralph Lovell from the engineering offices; Carl Lindemann and Bob Potter from TV; 2nd Lts., Jack Paine (SE), Nevin Price (WNBC xmtr), and L. S. MacGregory (formerly of sound effects). These plus two attached officers, Capts. Bob Hanna and Tony Romeo of TV. Others who have made application for the unit are Ken Arber of studio and Ray Glendon, also of the studio group. The enlisted and officer strength of the unit is growing, but there are still vacancies for both officers and EM with engineering background. If interested, contact me care of the Journal.

Say Flavin—Yeah, you. . . The guy (FE) who does the Hormel show for ABC. You might be interested to know that when your show was in town, a couple of members of the Girls Corps were taken to Rockaway's Playland by a couple of NBC studio engineers. A fine chaperone you are!

Heading Cuts for Chapter news columns. Chapters without regular heading cuts and desiring same, should send in photo, cartoon, or drawing of subject matter that they wish used to identify and distinguish their column.

I. B. E. W.

The ELECTRICAL *brotherhood* continues relentlessly in its give-away of radiomen's jurisdiction. We're not referring to the movie-industry blood-bath in Hollywood between the *electrical* brotherhood and the IATSE for movie jurisdiction—we're talking about radio broadcasting—that's AM, FM, TV, FAX, etc.—and the time is right now!

1944—IBEW gave away the turntable jurisdiction; NABET beat Petrillo in the courts, and nullified this electrical brotherhood give-away.

1948—The presidents of IBEW and IATSE with their lawyers, met with NABET representatives and their attorneys. Purpose of meeting was to *discuss* TV jurisdiction. Instead of a reasonable discussion that NABET expected would lead to legal, permanent, and bonded contract relating to TV jurisdiction, NABET was quickly told that the electrical brotherhood and the IATSE had *already agreed* on work division, that IATSE was getting—that IBEW was giving away—as usual, and that only NABET's existence held up the further give-away of radiomen's jurisdiction. NABET refused to be party to such a degrading betrayal of radiomen.

1949—June issue of New York *Variety* has leaked the information that the ELECTRICAL *brotherhood* in its strike settlement with the Yankee Network, has given-away the studio engineer's gain-control function to the announcers!

The IBEW Give-Away

electrical union

is daily being abandoned by

RADIOMEN

NABET

is a

RADIOMAN'S UNION

NABET guarantees Autonomy

IRE—from Page 18

The unit is factory-adjusted to supply a specific output and frequency, accurate and stable to within 0.0001 per cent over an ambient temperature range of -55° to $+80^{\circ}\text{C}$. These units become especially advantageous in the ultra- and super-high frequencies. Because of inadequately accurate frequency control of both transmitting and receiving equipment, the present systems require bandwidths far in excess of that necessary for the transmission of intelligence. As an illustration, the band-widths necessary to transmit a 3,000-cps voice channel now spread over several megacycles, but with more accurate frequency control the bandwidth can be reduced to a value nearer that of the intelligence. In so doing, the transmitted power necessary for operation is reduced in proportion to the bandwidth reduction.

55. The Type 5811 and Type 5807 Tubes—the Smallest Commercial Pentode Amplifiers.

L. GRANT HECTOR AND H. R. JACOBUS,
Sonotone Corporation, Elmford, N. Y.

The Sonotone type 5811 and type 5807 sub-subminiature pentode amplifier tubes were designed for the new small-size hearing-aid equipment. They are the smallest electronic tubes manufactured commercially. They are less than one-third of an inch in diameter and have greater gain and power than the larger subminiature tubes they replace. The mechanical design that permits the assembly of an electrode structure having high electrical gain in a T-2 envelope is discussed and compared to the subminiature and miniature tubes of similar characteristics. Circuit applications for both socket and soldered-lead type are shown.

56. Conductive Plastic Materials.

MYRON A. COLER, *Markite Company, New York, N. Y.*

F. ROBERT BARNET, ALBERT LIGHTBODY,
AND H. A. PERRY, *Naval Ordnance Laboratory, Silver Spring, Md.*

The properties of a new class of plastic materials are presented by means of data secured on representative types. The outstanding characteristic of these materials resides in the fact that they have substantial and predeterminable electrical conductivities, and yet possess the general mechanical and fabrication properties of ordinary plastics. Thermosetting, thermoplastic, and elastomeric variants have been produced. Many of the materials exhibit enhanced thermal conductivity and heat stability. Data have been obtained showing the effect on resistivity of changes in major variables such as frequency, current density, temperature, and continuous loading. Practical applications in the field of electrical engineering devices are indicated.

NUCLEONIC INSTRUMENTATION

Chairman, L. J. HAWORTH
*(Brookhaven National Laboratories, Upton,
L. I., N. Y.)*

57. The RF System for the University of Rochester 130-Inch Synchrocyclotron.

WINFIELD W. SALISBURY, *Collins Radio Company, Cedar Rapids, Iowa.*

The design and construction of the rf system of the University of Rochester 130-inch synchrocyclotron are described. This cyclotron produces protons having energies of approximately 270 Mev. The rf system includes an oscillator, nominally rated at 160 kw. The principal frequency-determining element is the cyclotron dee itself, which forms a part of the oscillating circuit. The frequency of the system is modulated between the limits of 25.5 Mc and 18.5 Mc by a rotating capacitor connected from the dee to the ground.

58. Electrometer Tubes and Circuits.

H. F. STARKE, *Raytheon Manufacturing Company, Newton, Mass.*

Special characteristics of electrometer tubes used in radiation-detecting and measuring devices will be discussed. Sources of spurious grid current will be pointed out, while the form of the variation of grid current with operating potential and filament temperature will be indicated. Circuits to take proper advantage of tube characteristics will be described.

59. Design of a G-M Counter Tube for High Counting Rates.

W. W. MANAGAN, *The Victoreen Instrument Company, Cleveland, Ohio.*

The problems encountered in the design of Geiger-Mueller counter tubes for high counting rates differ from those encountered at low rates near background. The major problems are presented and their solutions discussed in terms of a novel counter tube, the 1B89, capable of counting at rates greater than 10,000 counts per second. The 1B89 is used in an X-ray diffraction spectrometer.

60. High-Voltage Supplies for Radiation-Measuring Equipment.

RICHARD WEISSMAN AND STEWART FOX,
Nuclear Instrument and Chemical Corporation, Chicago, Ill.

Two new high-voltage-source circuits are described which provide the stability, control range, and small size often required by radiation-measuring instruments. They use small receiving tubes operated at less than rated voltage, regardless of the voltage output of the supply. One of these circuits uses a saturable reactor, while the other, which provides control over an unusually large range, uses a specially developed dc-controlled "diverted-flux" transformer.

A relatively efficient battery-operated portable high-voltage supply, providing regulated output, is also described. This supply uses a moving-coil vibrator system and high-voltage subminiature VR-type regulator tubes also designed specifically for the unit described.

61. Proportional-Counter Equipment for Beta Detection.

WILLIAM BERNSTEIN, *Brookhaven National Laboratory, Upton, L. I., N. Y.*

Methane-flow proportional counters are now in use for the detection of both soft and energetic beta particles. Counters of this type offer advantages over conventional end-window or thin-wall Geiger-Muller tubes with respect to window absorption, geometry, background, spurious counts, and resolution time. They are also more easily adapted to quantitative analytical chemistry techniques.

Experimental results are submitted to illustrate the performance of these counters under general operating conditions. A detailed description of the counter construction is given. The requirements of the amplifier, pulse-height selector, scaler, and power supply are discussed in detail, and some circuits in current use are described.

Some applications of proportional counters to specific beta counting problems are considered briefly.

62. Industrial Thickness Gauges Employing Radioisotopes.

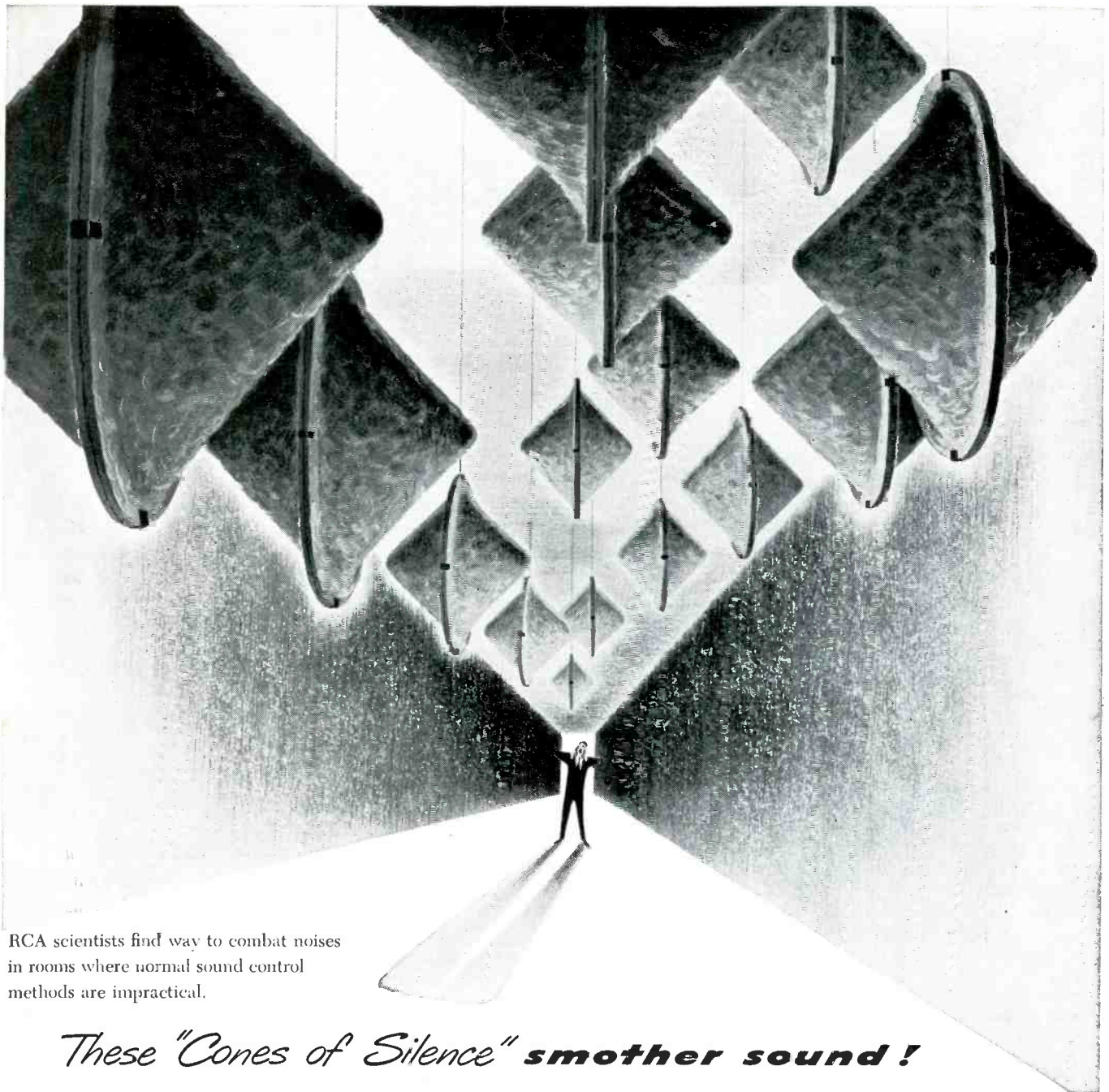
J. R. CARLIN, *Tracerlab, Inc., Boston, Mass.*

Two general types of industrial thickness gauges are described. One employs the principle of absorption of radiation by matter. The second utilizes the backscattering effect of beta particles by matter and provides a method of measuring thickness of one material superimposed on another of different atomic number. Both types can be adapted to measure continuously the thickness of moving sheets of material or individual samples, without physically contacting the specimen. Ionization chambers serve as the detecting units.

Theoretical expectations and empirical findings concerning sensitivity, accuracy, and scale linearity are presented, together with a discussion of ion-chamber design criteria.

N A B E T

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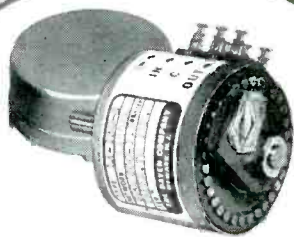


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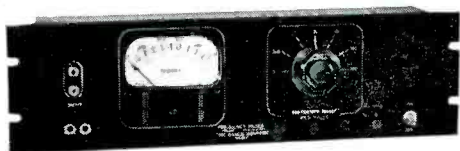


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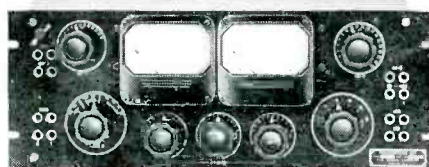


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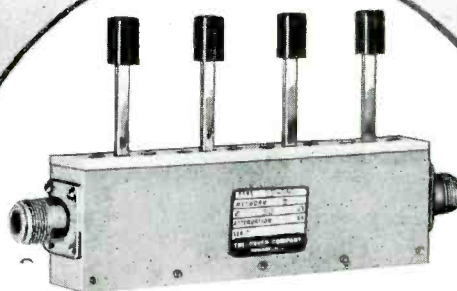
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