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OF, BY, AND FOR
THE BROADCAST
ENGINEER

The Television Clamp Circuit—By C. L. Townsend

Technical Papers of the 1949 Radio Engineering Meeting

VOL. 16, No. 1 JANUARY, 1949

OFFICIAL PUBLICATION OF N. A. B. E. T.

National Association of Broadcast Engineers and Technicians

J. R. McDONNELL,
President, NABET

A MESSAGE
to the
NABET MEMBERS
from

JOHN R. McDONNELL,
President, NABET

C. WESTOVER
Executive Secretary

As we face the start of a new year it would perhaps be well to review some of the issues of 1948 and look at the prospects for 1949.

During the past year there was a considerable movement among the rank and file radiomen towards one union to represent the radio and television men in the industry. NABET and its officers have lent themselves wholeheartedly and unreservedly to this cause. At the moment the movement would seem to have a long way to go before arriving at the desired end—like many desirable objectives it is not easy of achievement—and not all of us are convinced as to its desirability. But substantial progress has been made to allay the suspicion and animosity which has kept the radio men in separate unions in the past, and there is a general realization of the mutual problems we all face. It is to be hoped that in 1949 we will be able to strengthen the bonds established in '48 and co-operate in the solution of our problems.

This last year saw the increasing effects of the Taft-Hartly Act on the operation of unions. NABET suffered with the rest of organized labor from the restrictive—coersive—destructive effects of this legislation—and looks forward to changes for the better from the new Congress.

One particular aspect of the TH law has encouraged various managements to try to remove "supervisors" from the union. To date we have been successful in resisting this encroachment of our ranks—and jurisdiction,—and will continue to fight this battle with every means at our command. In order to be assured of continued success in this respect, we will need the understanding and support of the men in question,—as well as the membership as a whole.

The rising cost of living has added impetus to the normal needs of our members for better wages. Our negotiators have been reasonably successful in this respect and the contracts signed in '48 compare favorably with those obtained by other unions—not only in the Radio Industry but throughout the country. This in the face of the restrictive effects of the Taft Hartlev Act—and the special problems that prevail in the Radio industry.

The problems facing unions were not all solved by the election of a purportedly "pro-labor" congress. In fact we may well expect that it will be some time befor the new Congress will change the present laws. Despite this—1949 offers the opportunity for NABET and all radio-TV men to make solid progress. Let us all work—and think towards that end.

It is a pleasure to be able to take this opportunity to express my personal Best Wishes for a Happy and Prosperous 1949 to the membership and Officers of NABET — and all of our friends in the Radio and Television Industry.

Sincerely,

J. R. McDONNELL,
President, NABET.

NABET is proud to announce that

MR. CLARENCE WESTOVER

has been appointed Executive Secretary of NABET
Effective January 1, 1949

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NABET rank-and-file **members control** their union.

NABET means **good** trade-union practice.

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THE TELEVISION CLAMP CIRCUIT

By C. L. TOWNSEND

The original Clamp Circuit Article, Part I and Part II, was first published in our Feb. and March 1945 issues. They were quickly out of print, and were reprinted with certain revisions in our Jan. and April 1947 issues. Since that time, the great influx of TV engineers makes it propitious to again publish this important work. Mr. Townsend has since become TV Engineer-in-Charge for NBC in Chicago.—Ed. S.

PART I.

Summary

Electrical "clamp" circuits have long been used by a relatively small group of men mainly engaged in television and radar research. This article presents an informational discussion of the capabilities of such circuits, together with enough basic design information to permit construction and operation of satisfactory equipment.

General

FOR many years equipment intended for television use has been built including as part of the electrical design certain circuits known in the laboratories as "clamps." Several articles have been published giving precise analyses of these circuits. However, they have had somewhat limited circulation, and because of their completeness and generality of exposition were somewhat difficult to use in practical circuit construction. This article, to the contrary, will concern itself primarily with simple circuit designers' concepts, and experimentally obtained operational information.

It would be well to note that the term "clamp circuit" as used herein refers to pulse-driven switch type circuits and specifically excludes grid-current dc restorers of usual types.

Capabilities of the Circuit

The clamp circuits to be discussed have many properties and abilities peculiar to themselves which should be understood as being the purposes for which the circuits were developed. The following is a partial list of the functions which may be expected of them.

Reproduction of complex wave shapes requiring wideband amplifiers is greatly complicated if that band includes very low frequencies. In such a case, critical design of low-frequency compensation circuits is required, utilizing large coupling and filter capacitors, and usually based on low power-source impedance. If the wave to be reproduced includes a certain reference point, the use of a clamp circuit will permit the complete elimination of the low-frequency portion of the pass band. The requirement that a reference be established is characteristic of the circuit. Such a reference would consist of any "flat" portion of the wave which recurs at a frequency which is high in proportion to the frequencies to be eliminated, and which is always at the same potential when the wave is accurately reproduced. An ordinary television horizontal line voltage-shape is such a wave, since "back-porch"—that portion of blanking immediately following supersync—fulfills the requirements. Thus a video amplifier intended to pass picture voltage after blanking has been added can be designed without regard for those frequencies well below line frequency, automatically removing the listed problems.

Since the frequencies controlled by clamp action are all those reasonably below the clamp frequency, the circuit may also be used to eliminate effects of switching surges, transients due to gain control movements, power line variations, and, where long cables are concerned, ground current fluctuations. Such a circuit design often permits the production of a good wave shape under conditions of interference which would make ordinary circuits useless.

The action of the clamp circuit is to force the "reference point" to a constant potential, irrespective of interference. Consequently, a clamp may be used to place a suitable wave on some certain portion of a vacuum tube characteristic, thus controlling the operating point of the tube, making the amplification of any particular part of the wave a quantity independent of shifts in its ac axis. Supresync can be held on a fixed point of amplification, for instance, establishing a stable black-level independent of amplifier potential, supersync may also be controlled as to amplitude independently of the picture changes. Voltages representing picture may also be processed independently of supersync on the same basis. Thus compensation for previous amplifier

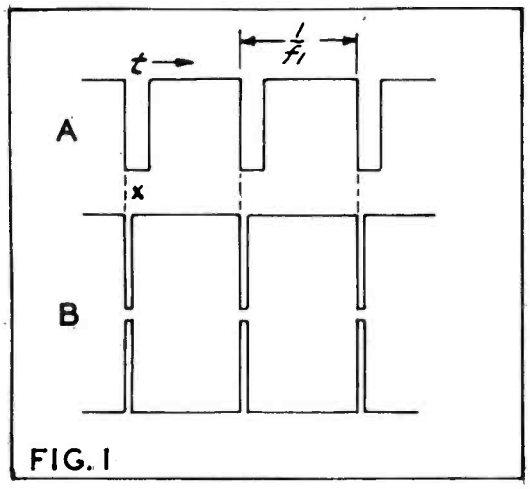

FIG. 1

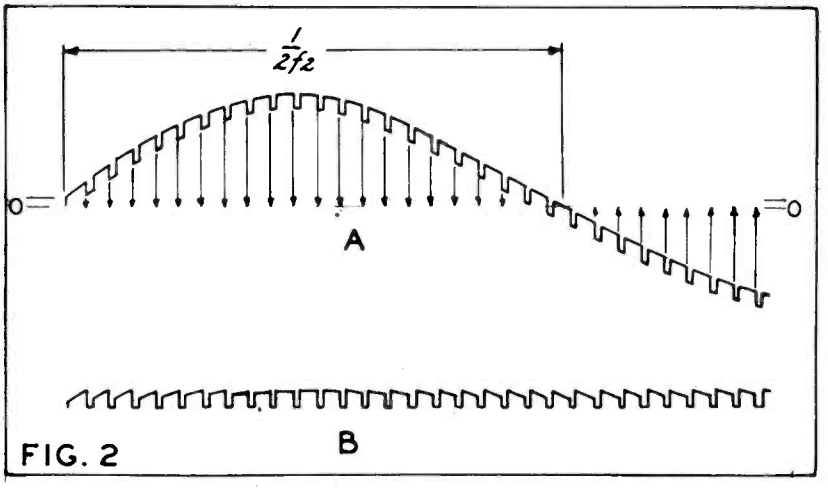

FIG. 2

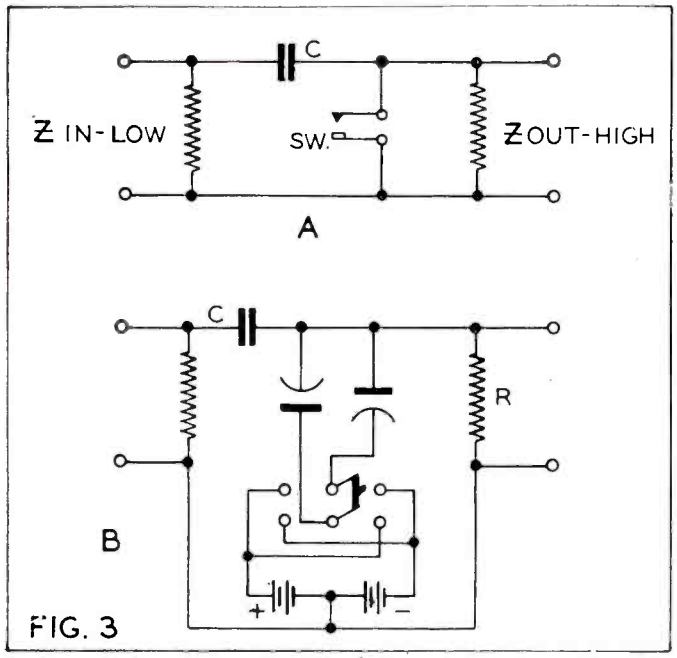

FIG. 3

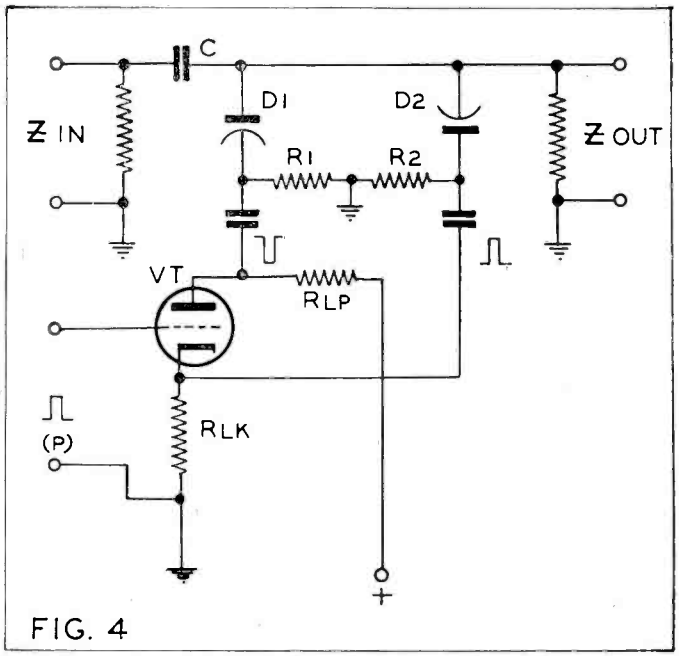

FIG. 4

non-linearity and for improper sync-to-picture amplitude ratios may be effected through the aid of a clamp.

The use of a clamp as an accurate means for dc restoration in television circuits is immediately suggested by its action in holding blanking at a fixed potential. For those cases in which supersync is of varying amplitudes a clamp is far superior to ordinary grid-current, or diode current type dc inserters.

Circuit Development

Understanding of the basis upon which a circuit capable of producing the above results may be built is facilitated by reference to the diagrams of Figure (1). At (A) a simple wave of the type which can be treated successfully with clamp action is shown. It consists of a rectangular wave, drawn for convenience with a short-duration negative stroke. As generated, this wave contains no frequencies below f_1. In Figure (2-A) the same wave is shown with an interfering low-frequency, f_2, added. It is the purpose of the clamp to remove f_2.

If the beginning of each cycle of f_1 (marked with an "x" in Fig. 1 "A," in this instance) could be brought to a constant voltage, action such as that indicated by the arrows in Figure (2-A) would take place. As f_2 crosses its axis in a positive direction, the clamp action forces the "x" points of the wave down to the zero potential line. When the voltage of f_2 swings negative, the clamp action forces all of the "x" points *up* to zero potential. Consequently, as shown in Figure (2-B), all that remains of f_2 is that portion of its voltage change which occurs within the cycle of f_1. With f_1 very high in proportion to f_2, this residual effect is vanishingly small, and usually can be neglected.

Consider the generic circuit shown at Figure (3-A). Across the input terminals the wave-shape of Figure (1-A) is impressed, and across the output terminals the wave is reproduced faithfully when the time-constant of R and C is long in proportion to the time of one cycle of f_1. If the wave of Figure (2-A) is impressed across the input terminals, it is likely that with RC long, some of f_2 will appear in the output. However, if the switch (S) is closed at the instant (x) in each cycle of f_1 only long enough to discharge (C) through (Z-in), and then opened again, it can be seen that the flat portion of the wave following (X) will always be at ground potential. Following the opening of switch (S), the voltage *changes* applied to C will be reproduced across R. These are represented by the steep rise in positive direction, the long horizontal positive period, and the return negatively to point (X). The charge representing the wave f_2 has been removed from (C) at point (X) by short-circuiting it through the switch. However, the f_1 wave-form requires no charge on C during that period and is consequently unaffected by the switch action. It is this zero-charge period which is the reference point previously mentioned as being required in a wave to be clamped.

Since the operation of (S) in Figure (3-A) must occur at high frequencies, the use of a pair of diodes suggests itself immediately. The circuit of Figures (3-B) indicates the basic principle of diode switch operation. When the double-pole-double-throw switch is in the left-hand position, both diodes are biased open, and the RC time constant is unaffected by the presence of the diodes. When the switch is in the right-hand position, both diodes are conducting, and a low impedance path is provided from C to ground. If the charge on C has produced a positive potential to ground across R, the right-hand diode provides the path to ground, and if the signal potential is of the opposite sign, the left-hand diode provides the discharge path. Also, since the battery merely supplies polarizing voltage, it and the switch can be replaced by voltage pulses from an amplifier, provided that the pulses have the same polarity and duration of voltage as was previously obtained from the battery-switch combination.

The above reasoning results in the circuit of Figure (4). It is assumed that the input pulse (P) is timed as shown in A and B of Figure (1). All circuit elements can be used at high frequencies, and excessive shunt capacitance on the signal circuit is avoided. Such an instrument is therefore practical, and subsequent design modification will be in the nature of refinements rather than basic changes.

Consider the action of the circuit of Figure (4). When a positive pulse of short duration is applied to the triode grid, a similar pulse of smaller amplitude is generated across

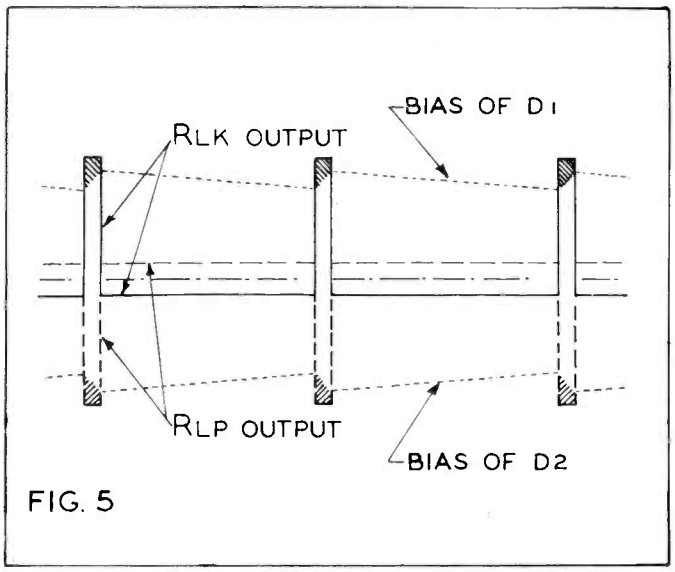

FIG. 5

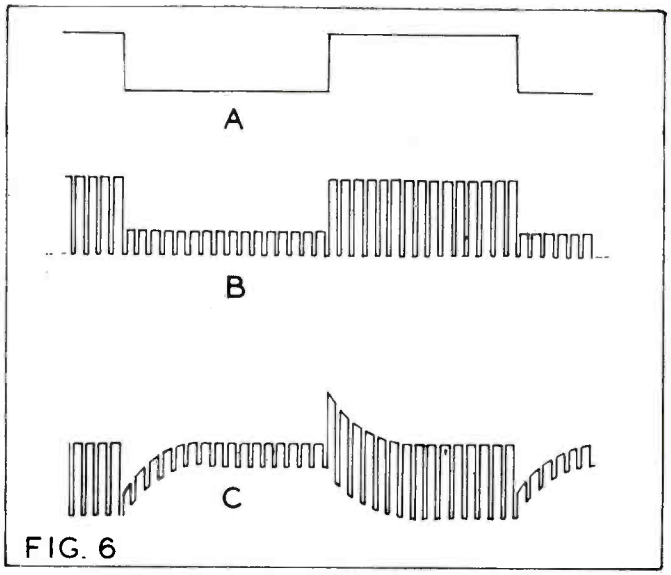

FIG. 6

RLK. Another pulse, identical except for reversed polarity, is produced in the plate circuit when RLP is of the correct value. These two pulses form the waves of Figure (1-B). The pulses are coupled into the diodes through blocking condensers, the diodes themselves being shunted by R_1 and R_2, charging the blocking condensers in such a way as to reduce the diode current. Thus the D_1 blocking condenser shows a positive dc voltage on the diode side, and the D_2 blocking condenser shows a negative dc potential, with respect to ground. The pulse current, therefore, is only sufficient to supply the losses which have occurred in R_1 and R_2 during the cycle. This action is precisely similar to that occurring in the grid circuit of a vacuum tube which is self-biased.

Figure (5) is a diagrammatic representation of the clamp potentials. Diode current flows only when the pulse voltage exceeds the bias voltage. This portion of the cycle is shown as the shaded area of Figure (5). During the remainder of the cycle both diodes are non-conducting. The required switch action has therefore been obtained, since the diodes conduct precisely as in Figure (3-B).

The operation of the clamp of Figure (4) is the same as the generic types. If during the clamp period there is a charge on C, it is removed through the diodes. If the charge produces a positive potential at the output, D_1 provides the discharge path, through its blocking condenser and the RLP and VT combination to ground. If the charge is of opposite sign, D_2 provides the path through its blocking condenser, and the RLK and VT combination. Both of these paths are of low impedance as required for rapid discharge of C.

It was previously stated that the use of a clamp circuit such as has been developed should permit the elimination of the very low frequencies usually present in a television picture signal.

As an illustration of this action, consider the diagrams of Figure (6). At (A) a wave is represented which it is desired to reproduce. This wave has no reference point, since no part of it returns to a constant potential at a frequency high in proportion to the low frequencies of the wave. At (B), however, high-frequency pulses have been added to the wave of (A), and these pulses have been adjusted in length so that their negative tips are always at the same potential, regardless of the amplitude of the (A) wave. This potential is represented by the line (X-X). These pulses do not destroy the basic shape of the wave to be reproduced, and are so timed as to avoid interfering with its usefulness. Now if the low-frequencies are eliminated from the wave of (B), the wave of (C) results. The long horizontal portions of the (A) wave have been lost, but the amplitudes of the reference pulses have not been changed. Therefore, if clamp action is applied to the (C) wave at the most negative point of each reference pulse, all these pulse tips will again be forced to a constant potential, and the wave of (B) complete with its original low-frequencies will again be produced.

Consider a television system operating at sixty fields and 525 lines per second. The low frequencies in question are those from 60 cps to approximately 1,000 cps. These frequencies provide information as to the average brightness of one line with respect to others, and define the slope and amplitude of vertical pedestal. In the early video amplification following the pick-up tube these frequencies are usually carefully preserved until blanking is added. Blanking is then "clipped" at a constant "blacker-than-black" potential. Since this level is constant, all brightness changes in the picture, whether line-to-line, or frame to frame, are produced by voltage changes with respect to the blanking level. It is, therefore, only necessary to clamp all horizontal blanking periods to the same potential to produce an accurate reproduction of the original picture. If the video amplifier used includes a coupling circuit such as that of Figure (4), the value of (C) may be made very small, and other stages of amplification preceding may be treated in the same manner, completely eliminating the normal-wave field structure, yet retaining all necessary information. Such a wave, properly clamped, will regain its vertical pedestal and blanking voltages in their original amplitudes. If the clamp circuit starts each *line* at the proper brightness, then the *frame* will also be at proper brightness, for variations in average brightness can only occur within the time of a line, and will be corrected at the beginning of the following line. Since both vertical and horizontal blanking were originally held at a fixed potential, clamping them to a fixed potentail after variations have occurred will restore them to the original conditions.

PART II

Circuit Design

An actual clamp circuit is shown in Figure (7). It is presented as being fairly typical, and offering a basis for discussion of circuit design. The lower-right hand portion shows an interstage coupling circuit commonly used in television, which is to have a clamp applied to the grid of V_5. A source of pulses is provided at the terminals marked "Pulse Input." These may be derived in many ways: from skimmed supersync, from the horizontal deflection yoke retrace stroke, or from a separate oscillator. The pulse source is not of present concern, except as it provides properly timed and polarized pulses of constant amplitude. The problem, then, is to utilize the pulses to correct the low-frequencies of the wave applied to the grid of V_6.

Usually the input pulses are of fairly low amplitude. V_1 is used as an amplifier and phase reverser, needed to provide large amplitude and proper polarity for the differentiation to take place on the input to V_2.

Differentiation is usually required in clamp service in order to obtain a narrow pulse through inherently narrow-band triode amplifiers. Such amplifiers might otherwise widen and distort the wave shape too greatly to be tolerated.. Differentiation also permits the selection of a delayed part of the wave, useful in applications in which the clamp pulse is too early.

To obtain such differentiation the coupling between V_1 and V_2 includes a voltage divider whose factor of division is an inverse function of frequency. This divider is C_2 and R_5 in series. The value of C_2 is made such that its reactance at the low frequencies of the pulse wave is high in proportion to the value of R_5, causing a large voltage division. For the high frequencies of the pulse wave, however, the reactance of C_2 is reduced, and since the value of R_5 is constant, the voltage division is small. Thus the steep portions of the wave, where its high frequency components add in-phase, are passed on to the grid of V_2 with little division, while the horizontal portions are greatly attenuated.

Capacitor C_3 and resistor R_6 are merely a long time-constant coupling circuit provided to permit V_2 to be run partially self biased. If the pulses on the grid of V_2 take a mall amount of grid current the lowest possible plate resistance is obtained in V_2, desirably reducing the source impedance for the clamp pulses. Also some small automatic gain control is obtanied, tending to hold constant the output pulse size with variations of input or circuit constants. If the pulse amplitude at the grid of V_2 is smaller han is required to overcome the negative bias resulting from the presence of R_7, it may be necessary to return R_6 to a positive potential of appropriate value.

The differentiation circuit results in a wave shape similar to that drawn above V_2. The leading edge of the negative pulse drives negative, and the trailing edge drives positive. Since the grid of V_2 is self biased to some extent, the trailing edge voltage will lie on its normal operating characteristic, and if the pulse amplitude is great enough the leading edge voltages will fall below grid cut-off. This will result in only the trailing edge of the original pulse being used to drive the clamp. This will provide a delay which is assumed to be desirable. If no extra delay is needed the opposite polarity of input pulse will result in the use of the leading edge only, and minimum delay will result.

V_2 provides push-pull output. The output voltage waves are shown above the plate and cathode connections, and should be precisely similar waves of opposite polarity. To obtain equal amplitudes R_7 and R_8 are usually somewhat different in value, and these values should be adjusted to provide good equality in pulse output. If this is done no great trouble will be experienced in adjusting the "clamp balance" potentiometer R_{12}. Exact symmetry of pulses should not be expected, however. Due to the presence of R_7 the plate resistance of V_2 is quite high, making plate-to-ground capacitance more effective than is usual in rounding the pulse corners. The source impedance of the pulse from the cathode of V_2, on the other hand, is very low, giving good high-frequency reproduction. This inherent difference in the wave shapes will not adversely affect the clamp operation under ordinary conditions.

The two output pulses are coupled to the dual diode V_3 through blocking condensers C_4 and C_5. Their values are such that C_5 and R_{11} in series with one half R_{12} produce a time-constant long in proportion to a pulse cycle. Similarly, $C_4(R_{10}+R_{12}/2)$ should be larger than $1/f$.

As previously explained, a bias builds up across R_{10}, R_{12}, and R_{11} in series. Point "A," the arm of the "Clamp Balance" potentiometer, will be at the same potential as point "B" during the diode-conducting times, since "A" and "B" are similar points of a bridge circuit. If, then, the arm of the "Clamp Balance" potentiometer is set at the electrical center of R_{11}, R_{12}, and R_{10} in series, this will be at zero potential, and point "B" will be clamped to zero. In certain applications, however, it is desirable to clamp "B" to some point other than zero potential. In such a case, the desired voltage is inserted at the point marked "Y.." Such a voltage would be required, for instance, when the clamp is used in

the grid circuit of a kineoscope for DC restoration, if brightness control by grid bias is desired.

The "Clamp Balance" potentiometer R_{12} provides, also, some control of the ac balance of the clamp. The wave at point "B" should be watched closely while the potentiometer is operated, leaving it set at that point which results in minimum residual output. Even when the diode circuit balance is best some pulse from the clamp current is likely to appear at point "B." This pulse will be at least partially integrated by C_5 through R_{15}, producing a saw-tooth waveform. This saw-tooth should reverse polarity as the "Clamp Balance" potentiometer arm is moved through the balance point. This minimum saw-tooth obtainable should be very small if the design is good.

Those circuits which have very low video levels at the clamp point require a more accurate adjustment of balance than the high level circuits. Often it is difficult to obtain a residual sawtooth below .01 volt especially if external bias is added at point "Y." Any conductance in the grid circuit of V_5 will produce a sawtooth, since the capacitor C_6 is charged during the clamp-closed period to the bias voltage. If some conductance causes this bias to leak off appreciably during the clamp-open period, a steep charging current will be required at the start of the next cycle, and the sawtooth will be present. Also, even when no external bias is needed a sawtooth may appear due to the action of V_5. This appears to be a function of the amount of gas in V_5. Positive ions go to its grid, making that electrode appear like a source of positive voltage. The action of the clamp forces this voltage to charge C_6 between pulses, and removes that charge during the pulse-on time, creating a sawtooth. Sometimes a very high value of resistor connected from V_5 grid to ground will load down this new voltage source to a point where it is negligible. The value of this resistor is usually from six to twenty-five megohms, depending on the tube.. A low value of resistor will defeat the clamp action, and if external bias is needed, no resistor should be used as it would be a grid-circuit conductance, as mentioned above.

Given a maximum peak swing of either polarity on the grid of V_5 of twenty volts, the pulses from V_2 should be reasonably greater than 20 volts. A safe value of peak pulse amplitude would be 35 to 40 volts, a value easily realized with conventional triodes.

In all well-known video coupling circuits, R_{13} will be a value below three thousand ohms, fulfilling adequately the low source impedance requirement. The value of C_6 depends upon the actual tubes used, but in general it should be only large enough to provide a flat horizontal pedestal with the clamp working; the time-constant of C_6, and the circuit leakages should be long in proportion to the clamp cycle.

It is generally considered good practice to derive at least part of the grid bias for the clamped stage from a cathode resistor. In the case shown, V_5 is a cathode-coupled stage, with R_{14} and the load resistance providing the required potential drop. During the period between pulses the grid circuit resistance of such a stage is quite high, making cathode bias advisable. If additional bias is required, it should be inserted at the point marked "Y."

Limitations of the Circuit

In any circuit there are possible adverse effects which should be understood, and against which safeguards should be raised. The following discussion lists some of these in order that they may be avoided at once, rather than as the result of experience.

It has become quite usual to combine R_{11}, R_{12}, and R_{10} into one potentiometer. The entire bias developed by the diodes therefore appears across the "Clamp Balance" potentiometer. This bias is always large in proportion to the grid bias of the clamped stage. Accidental or rough ad-

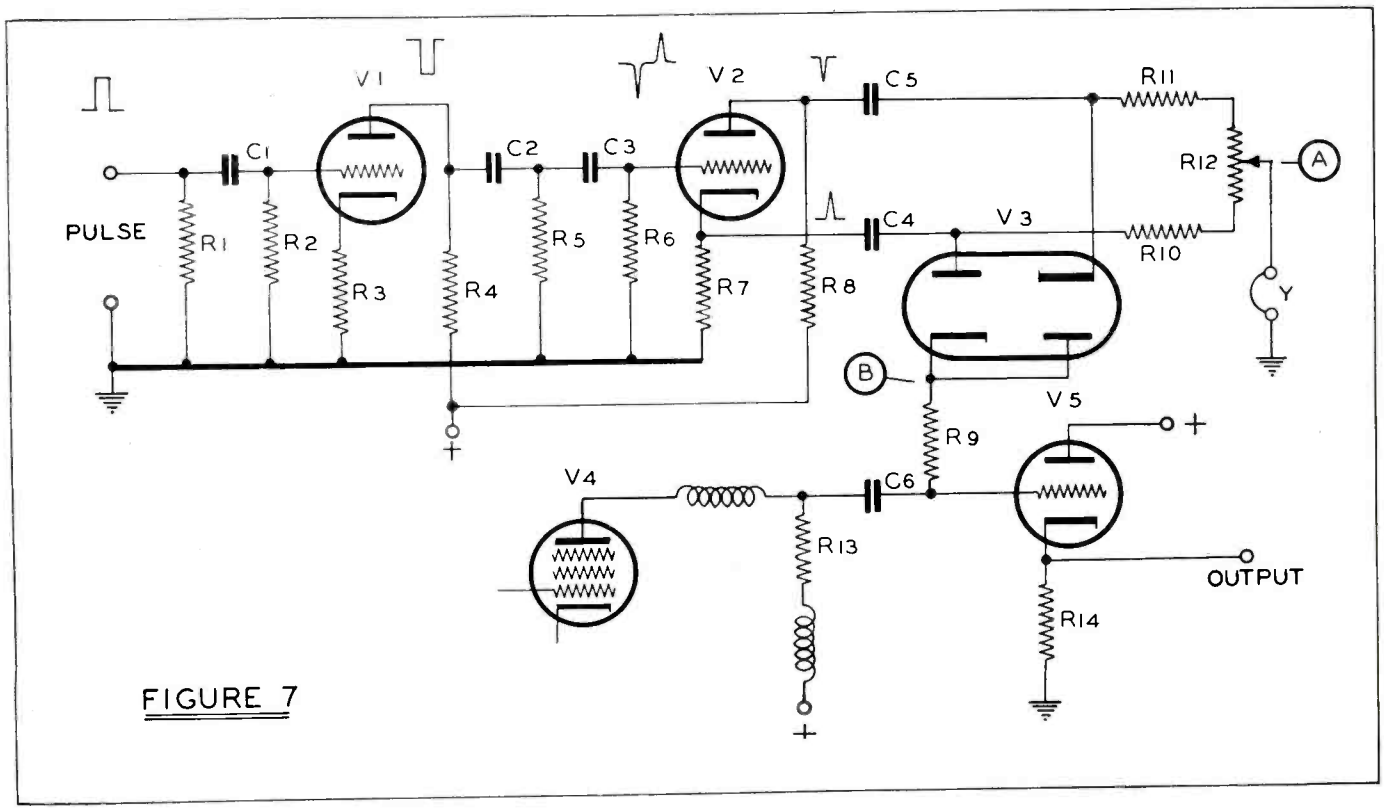

FIGURE 7

justment of the potentiometer may result in its arm being far from electrical center. In such a case the clamped grid is held at the potential of the point at which the arm rests. Since one side of the potentiometer is highly positive, the clamped tube may lose its bias, or be biased highly positive, resulting in overload of associated resistors and possible ruin of the tube. Or, if the potentiometer arm is off-center negatively, the stage may be biased enough to produce saturation or complete cut-off. To avoid such difficulties the resistors R_{10} and R_{11} are inserted as fixed limits on the potentiometer. They are dimensioned to permit the use of a potentiometer large enough to care for normal tube and resistor tolerances, but too small to permit large errors of adjustment. Adjustment of the potentiometer is facilitated if a plate current indication for the clamped stage is provided. As a preliminary setting the potentiometer should be set in such a way that there is no change in the plate current when pulses are applied to the clamp. No video signal should be present during the adjustment. The direct current balance-point of the potentiometer may be quite different from the alternating-current balance point. This will be true when the two pulses supplied to the clamp are of different amplitudes. Since final adjustment is usually made to provide best ac balance, the dc balance should be acceptable at that point. Careful equalization of pulse amplitudes will accomplish this result.

It should be borne in mind that interfering frequencies close to the pulse frequency cannot be controlled adequately by the clamp. Attempts to eliminate frequencies having large change of amplitude durnig the time of the clamp cycle will result in "horizontal tilt" during certain portions of the field period, producing stripes of annoying intensity. Although all lines will begin at the proper black level, during that period when the interfering wave is increasing positively, the lines will shade toward white on the right hand side of the picture. When the interference is of negative polarity they will shade toward black. However, proper design of the amplifier preceding the clamp circuit should provide sufficient attenuation of these frequencies to eliminate their effect almost entirely, and permit the clamp to function only as an instrument for re-establishment of vertical pedestal and blanking.

Pulse timing may be critical in some instances due to a peculiarity of the clamped wave shape. If it is the intention to clamp on a narrow flat portion of the wave, the pulses should always be derived from the wave itself if this is at all possible. Use of a multivibrator, or deflection yoke pulses under automatic frequency control conditions may introduce shifts in pulse timing which would cause the clamp to operate when the input wave is not flat. In such a case the whole following line will be clamped to the wrong potential, producing stripes of polarity opposite to that of the signal at the clamping instant. If, for instance, the clamp time is so late as to get into picture time, and there is a white area on the left edge of the picture, the lines which should start white will be clamped to the black level, and a dark streak will appear to smear away from the white area, across to the right edge. When a steep portion of the input wave itself is used to make clamp pulses, timing once set will always be good. The problem then is the simple one of provision of proper fixed delay.

Although, due to bias on the clamp diodes, only the pulse tips are actually used, it is generally desirable to provide clean pulses. If the pulse waves are erratic in shape, it is difficult to get good mirror symmetry. In such a case, steep portions

CLAMP CIRCUIT—from Page 7

of the wave will be transmitted to the video circuit even though the diodes are cut off. This is due to the diode capacitance. The clamped tube grid circuit is very high impedance during the cut-off period, making the few micro-microfarads capacitance of the diodes a fair coupling capacitor. Pulse "troughs" should be free from rapid rates of change.

The use of R_9 is optional. It is included in the circuit diagram as an indication of a means by which the capacitance of the two diodes may be isolated from the video line. In extremely wide-band circuits this may be of some importance. A value of approximately 10,000 ohms is usual. The use of this resistor may produce inferior results if the clamp pulses are of too short duration to permit complete discharge of C_6. The discharge path impedance is usually near 7500 ohms. With C_6 set at 250 micro-microfarads, 63% discharge is obtained in about 2 microseconds. Usually more complete discharge is required, making necessary at least twice the clamp-closed time. With R_9 added to the discharge path, the discharge time between 4.2 microseconds for 63% discharge, and about eight microseconds for even fair performance. Under some circumstances the flat portion of the signal wave may not have a duration sufficient to permit such a wide pulse as R_9 makes necessary.

A rather serious problem arises if the clamp circuit is used when random high frequency "noise" is present. Ordinarily, noise appears in a television picture as short black or white lines having a duration equal to the noise period. However, when a clamp is used it is possible that a noise burst will occur during the clamp period. If that noise has a large energy content, it may add or subtract from the effective blanking amplitude, and the clamp level will be changed, making the whole following line differ from its proper brightness in the opposite polarity from the noise pulse. Consequently an interference which would ordinarily be a short white dash becomes a dark line across the whole raster. Thus noise, in some instances adding to the black level, and in others subtracting from it, can produce a field of rapidly changing stripes one line wide, affecting both contrast and definition adversely.

The presence of resistor R_9 may tend to reduce the effect of noise upon the clamp. R_9 and the ditributed capacitance at its terminals may be thought of as forming a low-pass filter, effectively supplyng to the clamp a band wiide enough to establish the horizontal pedestal but not wide enough to permit the clamp to "see" the noise. In those instances in which R_9 is permissible a reduction in noise streaks may be obtained in this manner. Further investigation is necessary to demonstrate the usefulness of other low-pass configurations which may not seriously reduce the effectiveness of the clamp.

Figure (7) has shown triodes as pulse amplifiers. For the sake of clarity of function, some circuit details are omitted. Among these are oscillation suppressor resistors in both grid and plate leads. It is recommended that where large positive pulses appear on grids a resistor of two or three hundred ohms be used immediately at the socket terminal. Plate parasitic suppressors need not be used if point-to-point wiring with no interposed wires is used, a suppressor of value of fifty to one hundred ohms provides a useful safeguard.

Conclusions

With care in design and good judgment in application, the clamp circuit described will give excellent performance of a type not duplicated by any other circuit. The advantages accruing to the user of a clamp circuit in simplification of low-frequency design, reduction in low-frequeqncy interference design, reduction in low-frequency interference, reduction in the number of large circuit elements, control of amplifier operating, points and saturation effects, and accurate direct current component restoration, make this circuit an important asset to the video designer. Its simplicity and ease of design should provide an ample basis for broadening application as new circuits and new uses are discovered.

ROCHESTER NEWS

By ORMOND BULLIS

The Rochester Chapter NABET, long silent, has definitely not been inactive—not by a long shot. For a recap, all stations, except two, now are affiliated NABET stations—namely, WHAM, WHEC, WRNY and WVET and WENY, Elmira.

Contract negotiations have been completed at WHAM with tops of 102 at the six-year level, and an all inclusive TV clause. At the close of negotiations, a question remains of whether the boys or the management were the happier. A staff Christmas party several days after its completion was most congenial with everyone filled with the Christmas spirits.

WVET contract consummated several weeks ago was not all we wished but may turn out satisfactorily for a starter.

WHEC and WENY, Gannett stations, contracts are up soon so more and better news is expected by them.

Embarrassing situation occurred when WHAM was requested to handle WKJG basketball pickup. Upon finding (not from NABET Journal) WKJG men were out on lockout, we did not desire to handle, so WARC (non-NABET) was contacted, and they handled it. After broadcast, Bob Emch, C.E., at WARC, when told circumstances, was apologetic, and, we understand, cancelled remaining broadcasts of series.

All Rochester Chapter men would appreciate to the utmost a more complete coverage of NABET current events. How about the rest of you? (Amen!—Ed. S.)

TV is coming to Rochester with most of WHAM's equipment now in storage and camera equipment now arriving from RCA. The building is well along, with installation due soon. First pattern is expected in May.

Other TV's, to share WHAM's antenna structure on Pinnacle Hill, have been held up pending FCC's wishes. They are WHEC, and WARC or Meridth Publishing.

Other honors also come to Rochester. Our Chairman, Ed (Drop dead!) Lynch is on the Executive Board, but due to the antique independent telephone setup here is unable to get his TWX for those conference calls. A coin flip with Freddie Ambrose, General Secretary, found Tel. Co. unable to string one to his house either! (Try the N. Y. Public Service Commission, the FCC, the N. Y. State Dept. of Labor, and the Pres., N. Y. Telephone Co.—Simultaneously.)

Personals: Bum Holley spending most of his time at General Hospital with side trips to home—bad kidney or flat feet or sumpin'. Dick Reber, Ensign, Maritime Service, now in Radar School after leaving WHAM.

WASHINGTON

By Warren Deem

Howard Dugamel is the name of the new man working for television station WNBW. He reported for work just in time to accompany the field crew out to Bowie Race Track for their scheduled telecast. The first day there he claims that he learned more about racing than he did about television procedure. Howard completed a four year hitch with the 9th Army Signal Corps, was discharged and as a civilian chose Bliss Electrical School as his civil preparatory course. He used to work at the WRC transmitter so you fellows out there will remember him. Now he is out at Severn "eagle nest" on micro-wave duty.

It couldn't have happened to a nicer bunch of fellows—JOE COLLEDGE, WALLY WARD, VERN SWEIGER and WARREN DEEM one damp afternoon out at Bowie race track. Jointly the four laid $2 on the nose for four different combinations for the "daily double" and won—that is if you can call an 85c profit winning after all of the brainwork it involved deciding on the combinations. The day before that the daily double had paid off $2948.60—better late than never, but not half so profitable.

Remember that all night session on election day and who in radio or television doesn't? Well, one man sat and watched the whole proceedings over the NBC network, "JIM BUTTS."..... He had to watch it as did the other fellows who were attending micro-wave and monitoring stations between here and Boston. Bleary eyed the next day along about noon JIM laid down the phone after receiving instructions to close down and he slowly walked over to the power switch and mumbled something about "won't happen again for another four years thank gosh...!" JIM plans to head for Iowa State College about the middle of Decembre—by the time this issue is out he should be there if all goes well.

GENE BEALL is not working at the WNBW transmitter as last reported, but is out at Station WOIC. While I am correcting my last report DODD BOYD didn't sell his Chevie and get a new Ford.

It may or not be true, draw your own conclusions or ask PAUL ANDERSON at the WNBW transmitter. He was reported to be toying with the idea of installing a time elapse meter in the power supply of his recently purchased television set to check the number of hours per day his wife has the set in operation. Could be the results of his systematic way of doing things? Maybe he just wants to keep an accurate account of tube hours used like he did at the transmitter.

WALLACE BUSH and VERN INGERSOLL are doing a little micro-wave duty at Severn.

Scene at the field shop Friday evening: "So you went to work at 6 A.M. Friday, worked eight 3/4 hours before you had a meal period, used your car, driving 23 miles to and from the pick-up point, worked until 5 A.M. the next day starting a new week at midnight, you were called in early off a holiday payback day and your question is Mr. Anthony,—"how far is it to Singapore?" This starts the ball rolling though and everyone puts in his two-bits worth about how much overtime, 4f, 3b, 3c, etc., to put down where. Finally WALLY WARD comes to the rescue with his small size red bound "bible" and lays the facts on the table in plain simple English. "JOE COLLEDGE" places his stamp of approval and everyone finishes filling in his time sheet with confidence.

ROCKY MOUNTAIN NEWS

By G. A. SOLLENBERGER

First, in my initial column, let me say that I am glad to be able to report the happenings of this chapter. What's new around here? Well, Russ "Creosote" Thompson had to disown the apple borers when he replaced the basement stairs with "Channel No. 5" lumber.

And the copper termites are still chewing away at George Anderson's unfinished projects but they'll never run out of equipment, it seems.

But no bugs have entered the gray steel shelters of KOA's new 10 kw FM transmitter. Even with the temporary low pylon antenna, a good signal was reported heard near Laramie, Wyoming. The transmitter staff didn't realize radio had advanced so far until they wired the rig and associated audio equipment.

The complex way of life has left George Pogue without his favorite slippers since the pow-wow in Detroit; say Rudd, how about returning Pogue's bunnies to him right away?

Denver's experimental TV still doesn't have a picture on the air. Various complications like Charlie Eining becoming engaged to Frances Morgan, Stan Neal's addition of a basement bar, and Al McClellan's senile car, have somewhat retarded experimentation. But they have a picture of Frances on Charlie's seven-inch CR tube once a week. Don't laugh, but did any of you engineers ever build TV from scratch?

Vern Andrews is closer to the DX century club than Kenny Raymond but Ken is a sly DX man and will frequently turn up with some new country not yet heard by WØZEA so for spite, Verne goes home and works five or ten new ones while WØNWW's coat gets soft from having CQ-DX go thru it so long!

Denver Master Control is being enlarged to accommodate two new recorders. The "fishbowl" grows and grows.

Secretary-Treasurer Carl Drebing is having trouble with the code and may have a ham ticket if the speed is reduced to five words per minute. But for now, my last five words are, "73 until next month's journal."

General Electric reports that the FCC has licensed the Syracuse University's 2½ watt FM campus transmitter, which is under the direction of the Syracuse University Radio Workshop. G. E. says the transmitter has a service range of 5 to 6 miles radius, and can readily be supplemented for higher power.

DETROIT NEWS

By
HARRY C. "RED" LEWIS

CUPID AND HIS OVERTIME—There are times without number, when the Detroit gang wonders, and in cadence, why one HCL writes this tripe! Particularly do they wonder, when they know we have available some real "Pegler-in-reverse"..... "Gawd! but I'm talented" literary power in the ample shape of WALTER (I'm just muscular) BAKER. WALT has the usual unusual characteristics of the dyed-in-the-wool WWJ'er. This gentleman of sorts has the perpetual squint of the TV man, and thinks anything lacking the greenish caste of a TV screen is anemic. Be that as it may, this lad, who now treads so firmly on the doorstep of radio's latest innovation, i.e., television, recently undertook a real project; one that will keep him alternately on his toes and on his ear for the balance of his video ridden daze (cute, huh?). A flashback on this two and one-half reeler might go like this: one fine day, in some moldy old month, WALT pranced gaily to the door of the elevator—and he was humming. WALTER prancing is one thing; MR. BAKER humming is strictly out of this world. His upper register is vaguely reminiscent of the mating call of a pair of gooney birds, as they do their dance on a pile of old Simmons bed springs. His shoes still smoking from the violence of his travel, he surveyed wtih pride, the air conditioned confines of our favorite mausoleum without candles, WWJ. Our ruggedly individualistic elevator at this moment deigned to arrive at the ground floor, and shuddered to its usual building shaking, teeth gritting stop. WALT pressed the knob for the third floor and then planted his spacious lower east side in the corner, contemplating, as the car rattled up, another eight hour day in that wondrous and promising field of TV. Our elevator is, to put it mildly, ignorant. It can't add worth a damnn! Press button two and you get floor four—press button four and you get floor number seven. This could be disasterous, especially in our five floor building. Friend elevator decided to stop, the door rattled wide and

WALT plunged froth, ready for action. It was the wrong floor! Our boy, still floating placidly on his TV inspired sea of rapture, was suddenly jarred into some semblance of normalcy by the sight of an extremely comely lass partially hidden behind a typewriter. He abruptly realized this was NOT the third floor; too, he realized, all of a sudden, that he didn't seem to give two hoots. He brow beat the yl into giving her name, and then instigated a snappy conversation concerning her marital status, or as it happily turned out, lack of same. WALTER had a new outlook on life! "Hell with TV!" roared bilbious boy WALTER, "I want to live—live!" and his wild laughter rang through the hall, richocheting from the door of the little girl's room, through the stairway, and into MCR, where ROY (vat 69) BRIDGEMAN suddenly awoke screaming "WEST OF DENVER!"—CALL AT&T—STRIKE THE JOINT—TWO MORE BEERS—BIG ONES!" MARY JANE, the terrified recipient of this explosive amorousness, didn't bother going around the desk, getting away from this suddenly actvated Lothario—she went over it. We are not saying the story happened this way, but it could have. MARY JANE and WALTER spliced the knot a short time ago, and WALT already epitomizes domesticity. He used to go out with the boys for lunch. Now he sits sedately in some corner, daintily gnawing his way through twelve or thirteen sandwiches carried in a new and shiney lunch box. Luck, and more of the same to two people who fill every requisite of being just plain "nice." Egad! How we digress! We started to say that WALT was a student of journalism, but decided that while starving for his art was noble, being a TV man was a lot more practical. The Detroit editor would like to push the whole thing off on WALLY—and has tried to do just that. The column would be dished up in a form more literarily palatable to you who read—and you who have it read to you.

ABC SURPRISE PACKAGE—You Chi boys think you have a stockyard there in your windy city, and we were of the same opinion until a few nights ago. At this time, the Detroit ed had a lengthy chat with one of the members of the ABC WXYZ staff, here in Detroit, and in the course of this conversation, he ran into more bull than the Chi stockyards ever saw. It was tremendous! As you know, WXYZ is in the IBEW fold. IBEW is a "radioman's union"! This statement occasions much hilarity around these diggings, but the WXYZ boys seem to have an intense interest in this organization of wire stringers. The young lad contacted was very cooperative. He proudly stated that WXYZ was getting FIVE IRON STOVE LIDS MORE PER WEEK than ABC, NY or CHI or points west. Now, ain't youse guys surprised? According to our fifth grade math, that gives you boys a top of $105 because WXYZ gets $110. Frankly fellows, you can do a lot better than that. With this startling bit of info now public domain, we can just see a mass exodus of NABETians flocking to the standard of the IB recruiter. We understand he is still busily engaged signing up short order cooks who use electricity for cooking. (Rubbing two cats together will qualify you, if interested.) Upon presenting their initiation fee, these ex-NABET members will receive, from this emancipator of the broadcast man, the degree of T. A. B. To an electrician, this means "Technical Adviser—broadcast," but to someone really in the know, it means "that's all, brother"—you've been had! This degree makes you a member of the most ambitiously misguided electricians union in the world, and then—like Abou Ben Adam, may you RIP—but good! We Detroiters have repeatedly tried to crack the barb wire

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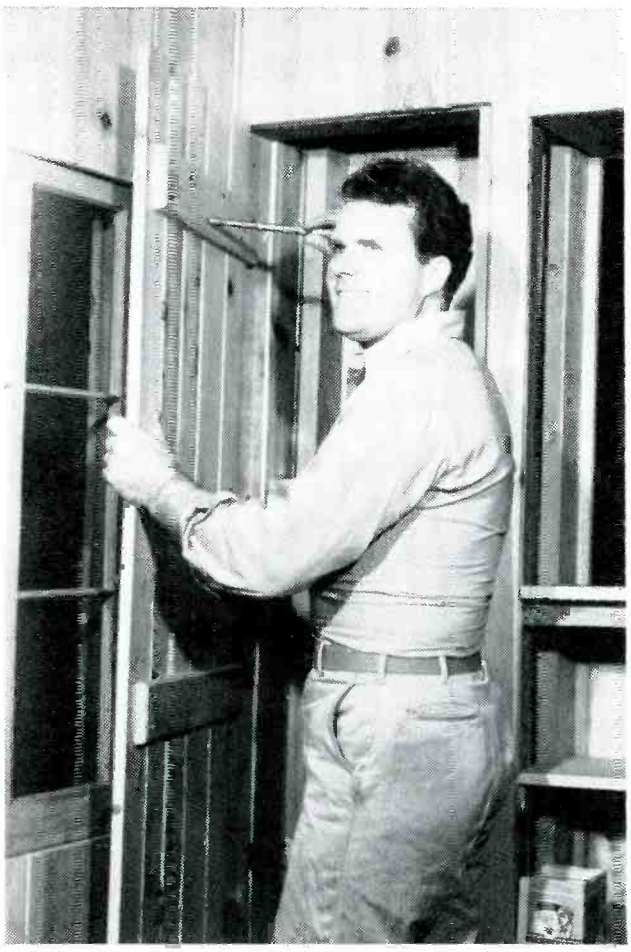
HOBBY CORNER —

RELAXING FROM BROADCASTING

If it's true that a hobby offers rest and relaxation, then Bill Dunbar hasn't found his hobby yet. But, if it's the activity that one engages in to "get away from it all", and from which you could derive a lot of satisfaction when the work's all done, then we guess you'd say that's what he does at Lazy Lodge.

Bill grew up in a small town—Fremont—which is to the west of Omaha, and spent a great deal of time in the summers on what is known as "The Big Island" on the Platte River. He had always hoped to have a cabin out there, so during one of his first leaves in the Navy, he returned home and looked over a spot that his father had found. They liked it a great deal so they purchased their "Acre of Sand."



BILL DUNBAR

Bill's father is a master carpenter, and with the help of his mother, an able painter, they built the bulwark of what is now known as "Lazy Lodge." In four years they came up with a large living room, 12 x 18, with a beautiful stone fireplace that burns 4 foot logs, two bunk rooms in one wing, a kitchen and dinette in the other wing, and a spacious screened porch (which he hopes to get enclosed before winter this year).

Since Bill returned from the Navy in '46, he has been busily engaged in building bunks, clothes closets, built-in benches, cabinets, window seats, wiring, furniture, and lining the interior with knotty pine panelling.

Speaking of wiring, the place is wired for sound. Many outlets in each room allow the access of two twisted pair shielded busses for tuners, players, amps, etc. Telephone outlets and plug and jack arrangements make the instruments ever handy. Since it is loaded with quite a few service keepsakes, and also many other things of value, the lodge is protected with a low-voltage-relay-operated burglar alarm. Opening of doors or windows, cutting power lines, etc., operate the battle alarm horn, gong, and turn on all of the yard lights. The latter is quite effective at night. Once set off it goes for five minutes and then recycles.

Of course, as yet, they don't have all the comforts of home. There's still a path into the woods, but even out there electronics has its place in the pin-up lamp, and the electric heater focused "you know where" for cold weather operations. However, he does have a fine automatic water plant, all electric kitchen, with built in corner sink and windows, electric foot warmers and heaters. The before-mentioned fireplace is built around the heatilator principle, and when the room thermostat calls for heat and the "heat bonnet thermostat shows heat present in the fireplace" it automatically starts the circulating fans which pull cold air in ducts from the side of the room, and replace it with warm air from the heat bonnet. It's warm in the severest of Nebraska winter weather—as is attested by all who've shed the many sweaters they thought they'd need.

Someday when all of the last minute touches are finished, he'll just rest and relax there, but it won't be any more fun than it's been fixing it up. It's going to be an ideal spot for a ham rig, and I guess when he gets a hobby, that'll be it. (The power ckts are in for it!)

—NABET—

HOLLYWOOD HANGOVER

By NORMAN DEWES

TAG.....two bullfrogs sitting on a lily pad, one croaking, one glum:

Glum Frog: "What tha H— are you croaking about?"

Other Frog: *"My HOPPINESS! . . ."*

NEXT MONTH: A column about the Yearbook!

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

LABOR - MANAGEMENT NEWS

What Is NABUG?

"NABUG" is the National Association of Broadcast Unions and Guilds in the radio and television industry, organized on behalf of their respective memberships for the solution of parallel problems and the working together of the unions and guilds in those directions—cultural, legislative, economic—where mutual interests coincide.

A Statement of Aims and Purposes was adopted on September 26, 1947, and subscribed to by the member unions and guilds comprising NABUG, four of which are American Federation of Labor and two independents, including NABET.

There is a National body in New York which meets each month jointly with the New York Council—total membership is 26.

There are also councils in Hollywood, Chicago, San Francisco and Pittsburgh. There are new councils in the making in Washington, D. C., Boston and Detroit. New councils are contemplated in the near future in Atlanta, Ga.; Cincinnati, Ohio; Cleveland, Ohio; Kansas City, Mo.; Minneapolis, Minn.; Philadelphia, Pa.; Portland, Ore.; Raleigh, N. C.; Rochester, Ore.; Raleigh, N. C.; Rochester, N. Y.; Seattle, Wash.; St. Louis, Mo.

—o—

New Year's Day Message From Sec'y of Labor M. J. Tobin

The year 1949 finds the American wage earner better off than any other wage earner in the world, and assured that his freedom will be protected and his economic advantages improved.

Our standard of living has been mounting steadily for a century. Today an ordinary worker's hourly wage buys four times what his great grandfather's hourly wage bought in 1847.

His weekly wages represent a three-fold gain in purchasing power over 100 years ago, for a workweek that has shrunk by one-third.

The quantity and quality of goods and services available to him beyond the basic requirements of living have contributed substantially to his well-being and enjoyment of life. They are the measure of the high standard of living which he enjoys.

There have been marked improvements also in his health and life expectancy, education, recreation and travel, civil and political rights.

The growth of the labor movement has given him a greater participation in group economic and political decisions, and a more direct voice in his government.

Two factors have contributed to the constant improvement of the purchasing power of his hourly and weekly wages: increased productivity and greater bargaining power.

Increases in real wages, or purchasing power, have more nearly approximated increases in productivity in recent years when union strength was on the upswing and protection of the right of collective bargaining became a government policy.

The labor movement is 16 million strong today, and showing signs of continued vigorous growth.

American wage-earners and their unions have contributed to the trength and welfare of the Nation.

Productivity is again on the upswing as technological developments made during the war are adapted to peacetime production.

This will provide for further improvements in our standard of living if the workers are given their just share of the productivity increases.

The future welfare of labor and the Nation depends on a free, democratic union movement that can bargain wisely and well with free management for a just balance between productivity, wages and prices.

Government has its part to do, to improve the health and insurance facilities available to all the people, epecially the unfortunate and weak, and to keep the economy strong.

Those programs add up to a policy of progress and evolution attained through a democratic government and a democratic free people.

We are going forward, the way we always have, under a system of justice and freedom to all our citizens.

—o—

What's Ahead

Secretary of Labor Tobin on record for 75c minimum hourly wage rate, along with other reforms long overdue in terms of the present price level. The U. S. Chamber of Commerce has other ideas, with revisions detrimental to the workers—hey!—they're the consumers, too. Without a paycheck big enough to buy the country's production, soon we have crowded warehouses, showrooms cluttered with refrigerators, washing machines, radios, etc.,—comes quickly the unemployment, fewer consumers who have money, followed by even less employment. Given reasonable paychecks, the consumers will buy TV sets and other luxury items.

NABET Negotiating Committee has pile of data that will make it easy to know what the members want come May 1st. Quite a bit of effort went into this at Detroit, and will undoubtedly be mimeod for Chapter—Council—and Membership information and coordination, from which a "degree of support" questionaire will make the rest automatic.

NABUG National Office: 37 West 46 St., New York 19, N. Y. Telephone: LUxemburg 2-5130.

New York State reports lowest unemployment in three years, and refunding unemployment insurance payments to employers—in itself a source of an additional 2.7% automatic wage increase—since employers have been charging this item against "the cost of labor."

Democratic Party reported in favor of "labor unity" and a more realistic labor law. Anyone interested in labor, the labor movement, and labor unions, might well read *Juggernaut* —by Wellington Roe, for a recounting (if that's necessary) of the vicious scabbing, strike-breaking, and member-raiding both within and between the AFL and CIO and between the various Railway Brotherhoods. Labor might well look over these two successful unions: American Medical Ass'n. and the Bar Assn. These professionals have long since recognized the need for "one union for lawyers" and "one union for medicos." NABET offers the obvious solution for radiomen.

IBEW rejects telephone workers. From the Telephone Workers *TWOC-CIO Organizer,* the changeless face of the IBEW is reiterated in their first paragraph: "Continuing the craft domination of building trades electricians within the IBEW, that union by direct refusal to act, denied representa-

tion to telephone workers within the IBEW-AFL framework in its recent convention in Atlantic City." And the last paragraph, which merely sums up the slurring atttiude of the IBEW toward radiomen for the past twenty years: "A similar resolution to establish a national radio department with the IBEW for the radio broadcast industry was offered by Delegate Calame of New York Broadcast Local 1212. This resolution met the same fate as that offered by the telephone worker captives of the IBEW." Amen. NABET offers the obvious solution.

The NAM reports that hundreds of top industry leaders are being sent to school to study labor-management problems, and "means for improvng relations between worker and manager in an inflated economy."

Both political parties had planks calling for broader social securtiy coverage; increased payments, and lower retirement ages are also vitally-needed improvements in Social Security, as a form of Marshall Plan for the American Taxpayers.

It is of interest to note that 86% of the captive Berliners voted in their recent elections, whereas about 50% of the eligibles here took the trouble on Nov.. 2nd.

Negotiations: Let us not overlook that under Washington dateline July 9, the railroads were granted a 17% fare increase; that General Motors increased its earnings about 200% and its dividends 33%; that similarly RCA increased its dividend 66%, to be paid Jan. 1949. A three-cent investment in the New York Times any day of the week, will provide lists of "extra dividends" and "increased dividends." Understand, we don't object to prosperous business. "Good times" for business automatically means "Good times" for the wage-earner, and that's just about all any wage-earner has ever asked for, or had to strike for.

For the first time since the International Labor Organization (ILO) came into being in 1919, the "guaranteed annual wage" was recommended as extremely desirable. The people of the earth have to eat and maintain certain minimum health standards. It is in the best interests of every government that these minimums be at least maintained. If the workers don't get the necessary "money" from their employers, the governments must step into the breach, take the deficiency from the employers in one form of tax or another, and subsidize food, health, and housing. You'd think the big-business anti-socialization lobbies could understand that the cause of socialization is theirs, and the remedy is therefore within their power to grant.

We have received many graphs, charts, tabulations and "findings" relative to the inflation index, and they all show the same sad story—regular monthly *pay decreases* for wage earners. Union contracts for one-year terms used to provide adequate protection; today, a union contract covering wages would have to run in 30-day periods to avoid *automatic pay decreases*—while managements' earnings, dividends, and bonuses to non-union employees continue to increase. Obviously the forest is too dense for management to see the trees. The big pace-setting employers overlook the fact that while the employer has complete and utter domination across the negotiating table, that the wage earner still has a ballot box. That's what happened Nov. 2nd. The employer has the choice of paying a practical salary in line with employer-earnings, and thus enjoy the complete loyalty of his employees. Or, the employer may wish to pay only 70%, and via increased taxes make up the other 30% which the employee receives thru subsidies of various forms, and for which the employee's loyalty becomes more and more oriented toward his benevolent government, and less and less toward a begrudging employer. You'd think the average $50,000—and-up boss would see it this way: A denial of maintenance of living standard, is tantamount to an ultimatum to "get it from your government."

A new publication titled "Off Mike," (undated) of six mimeod sheets made its appearance under the auspices of the broadcast department of the ACA, 5 Beekman Street, New York City. Good luck. This issue points up the death of an ACA technician at Mackay radio while working on what developed to be an allegedly unlicensed transmitter, and the strike that resulted therefrom.

"Off Mike" also reminds us that network starting pay is $57 to $62 week, whereas the ACA independent contracts start at $65 to $80 a week.

The sad mess of strike breaking at WFIL, Philadelphia, is still going on. "Off Mike" says the conditions at WFIL are so bad, the scabs are about to go out on a strike of their own. At WBNY, Buffalo, ACA reports a $5-week increase in recent negotiations.

THE TAFT-HARTLEY LAW MUST GO!

Many people sincerely believe that the Taft-Hartley law was repealed on November 2.

Such thinking is fallacious, even mischievous. True, a president and a party and many representatives were elected on a platform that promised repeal of the obnoxious anti-labor Taft-Hartley Act, but does that assure repeal or even substantial amendment of that vengeful law? Read this from one of the New York newspapers:

"While the labor campaign knocked out many members denounced by the unions as unfriendly, latest tabulations show that of the new Senate's 96 members 54 (four then in the House) voted to override the President's Taft-Hartley veto. Also that of the new House membership of 435, anti veto votes were cast by 224."

Lethargy has usually borne a foul, even corrupted fruit. Labor, much too often, has had to taste its bitterness.

Must this continue? It won't if we all move ahead clearly and vigorously.

NABUG and NABET is vitally interested in what comes out in the form of substitute legislation. We are threatened in a special way because there are some employers who would call a number of our members supervisors and thus attempt to avoid bargaining with us. The Taft-Hartley law makes the processes provided by government unavailable to supervisors. Therefore, such employees must use every other legal right, including strike, to gain their just demands.

It seems rather stupid that a law which claims to provide means for diminishing strife between labor and management, actually encourage it.

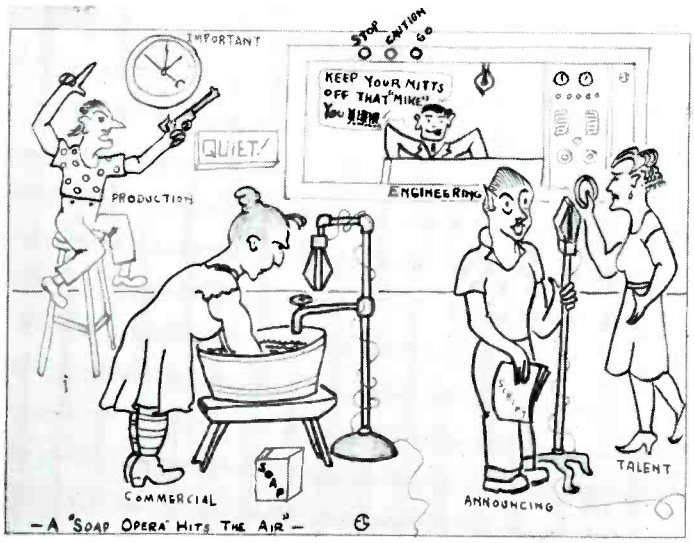
The Taft-Hartley Law must go, and the old, proven, and well functioning Wagner Act of 1935 re-enacted. Under such a law, NABUG and all its members would be protected and we could enjoy the rights of all other employees.

Remember, lethargy is dangerous. We can and must play an important role in formulating and achieving good laws. Write your congressmen regularly!

DETROIT—From Paage 10

barrier surround WXYZ with its barbs of distortion and evasiveness—but to no avail. If you NY, CHI and west coast ABC boys could get some info to these engineers, it might do some good. One thing is certain—we can lose no ground there—we have none to lose and any change must be for the better.

STATUS QUO . . . or, them is the conditions what prevail. At this writing, the Detroit negotiations have been temporarily halted while about two hundred and thirty pounds



of national representative meat goes gamboling about the countryside. This vat sized dispenser of NABET policies and brotherly love (it says here), clad in the greatest expanse of suiting material this side of a Barnum and Bailey tent, specializes in discussing monetary matters with big hearted and empty walleted (honest guys, we can't afford it) radio station owners. The Detroit bout has, at present, gone three rounds of rough and stumble more or less (mostly less) effective chit chat. What has transpired has been harmonious—and that's good—but nothing has been settled—and that's bad! The wheels of WWJ apparently think that CLIFF (super suds) GORSUCH is quite a boy, and we of the Motor City chapter agree completely. A few interesting facts have evolved from these meetings; among the more or less harmless innovations requested by the gentlemen on the other side of the table, was one dealing with the esteem in which they hold employees of many years service. Quite simply, the powers that be feel that two separate contracts, or at least two separate seniority lists entirely independent of each other, one covering TV, and the other AM/FM, would be just peachy. As the professional wolf said to the sweet, young, inexperienced girl, "I don't have any etchings to show you, but you can see the handwriting on the wall!"

PIGEON PATTER—It isn't often that scuttlebutt concerning the inhabitants of WWJ's lofty TV/FM pigeon roost falls in our direction; any such info is handled as a luscious tidbit—a precious gem. By the very nature of this tale, its subject must epitomize anonymity—he will go nameless and blameless—but it's still funny. This child of nature wanders aimlessly through the great and musty halls of his little aerial empire, and because he is an outdoor man, he dreams of spring and of the straight furrows he will plow. He is strong—he is virile—he is also a bull slinger of the first water. This last recommendation is donated by the writer, who bases his remark on oratorically exhaustive research via the inter-comm. This lad's obvious reticence, during the original telling of the tale, convinced us of its authenticity and simple charm. This lad developed a terrific tan this past summer—and was justly proud. However, with the waning season his tan faded, and it caused him some concern—so much, in fact, he decided on a sun lamp as his tan replenishing agent. During the course of these self-administered treatments, he noticed there were portions of his extremely ample anatomy which, during the summer at least, had been conventionally covered, and these areas were of a color consistent with old bread dough. He thought that corrective measures, on this portion of his southern exposure, could be easily accomplished, and in a hurry, too! Twenty-four hours and three gallons of sunburn lotion later, our boy was going his usual rounds with the spriteliness of a chafed ballet dancer. He developed a distinct aversion to sitting down, and once down, he couldn't get up! Cliff, what's the market on roast rump these days?—73's, HARRY LEWIS, W2IIA.

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.

NABET EMPLOYMENT SERVICE

Due to the day-to-day changes in status and availability of unemployed NABET members, it has not been deemed practical to publish such a list of names in each issue of the Journal. Instead, each available member should immediately notify the National Office, with copies to his Chapter Chairman, of availability together with brief resume of experience, etc., and notify them immediately of any change in status or availability. The Chapter Chairman for the area, and the National Office, each of whom are called upon to fill vacancies, will thus be kept up-to-date to the mutual advantage of all concerned.

GENERAL ELECTRIC ANNOUNCES

General Electric has demonstrated the transmission of finger prints by facsimilie microwave transmission, for the quicker apprehension and identification of criminals.

A new remote control unit, Type EC-8-A, for control of a remote central station in a land-mobile system. Meets FCC standards for remote control facilities.

Radar application makes it possible to continue dredging operations during darkness, by marking off dredging boundaries with metal-topped buoys, which are easily spotted by the radar.

Two new TV receivers. A ten-inch console model at $360, and a 12-inch table model at $390. Both receivers use AFC synch (now standard, like round wheels on autos) and metal-backed picture tubes, which afford noticably better brightness and contrast.

Sands Point, L. I., navy school to give TV lecture rooms a trial at mass training, via large screen TV receivers at Kings Point, N. Y.

An actual TV studio and equipment to

simulate actual TV operations. Present factory test studio will soon be shipped to KLEE-TV, Houston, Texas. Studio camera picks up test pattern, fed to monitors, cameras are switched, etc. The equipment works when delivered.

Five new germanium crystals provide wide variety of specs for diode rectifiers. Replace 6H6, 6AL5, copper-oxide and other rectifiers. Feature 0.8 MMF shunt capacity, quick recovery time, 10,000 hour life expectancy, minus usual hot-cathode heater hum, weight few grams. They are about the size of a half-watt resistor.

The TV clamp circuit, or signal stabilizer, is now an integral part of G.E. TV installations. Especially beneficial to de-jitter and de-bounce TV field pickup pictures, and gives them stability of studio pickups.

Five kw TV installation to Brazil, complete with three cameras. A 28 to 30 hour a week TV schedule is planned for the Rio De Janeiro station.

Video Broadcasting Co. of the West Coast has purchased TV transmitters from the General Electric Company. The TV transmitters will go on the air in Portland, Oregon, and San Diego, Calif. First to go on the air is KTVU, Portland, about March 1, 1949. The West Coast Company is managed by Charles B. Brown, formerly program director of KFI. Technical Director of the Company is C. Wesley (Wes) Turner, well known former NBC TV Engineer, and recently RCA-TV sales engineer in the West Coast area.

TV FILM PROJECTOR

A new 35mm sound motion picture projector which will enable television broadcasters to expand their programming facilities by using standard 35mm films, has been announced by the Television Equipment Section of the RCA Engineering Products Department.

The new RCA film projector (Type TP-35A), which projects 35mm pictures directly on to the pickup tube of a television film camera for conversion to video signals, is based on the famous Brekert professional theatre motion picture projector, and incorporates all the outstanding features of this equipment.

The use of film made for projection at the motion picture standard of 24 frames per second in a television system requiring 60 interlaced fields—or 30 complete frames—per second is made possible by employing a sprocket which holds every alternate frame of film for two scannings and the remaining frames for three scannings.

A pulsed light source, electronically triggered to provide 60 high-intensity flashes per second, eliminates the need for a shutter, and also has the advantage of being virtually free from heat. The intermittent light pulses emanate from a gas-filled bulb called a "gap-lamp."

The entire RCA projector assembly, including lens system, upper film magazine, light source, sound head, and motor drive, are mounted on a pedestal which also houses the lower film magazine and synchronous motor field supply. A control panel on the rear of the projector contains relay swiches for starting and stopping the unit.

To monitor the picture projected on the film camera, and to provide adequate facilities for changeover switching when two projectors are used, auxiliary equipment is housed in a standard cabinet rack. The rack equipment includes the pulsed-light power supply, remote control switching panels, exciter lamp power supply, and the 10-inch picture monitor.

The rack-mounted picture monitor is used for cueing purposes to inform the operator when to switch from external operation to film, or when to change from one projector to slides or to another projector. Immediately below the picture monitor on the rack is the change-over panel, which contains the switches for the sound circuits and remote starting or stopping of projector, as well as the remote controls for operating the slide projector.

The TP-35A projector is entirely enclosed. The housing is finished in an attractive umber gray crackle finish, matching that of other RCA equipment. Shatterproof glass windows permit viewing the operation of the mechanism without removing any door or cover. All moving parts of the projector are automatically and continuously lubricated. A pump inside the housing delivers a continuous flow of oil from the reservoir at the base of the main frame to the rotary lubricator, which throws the oil over the gears and to every bearing. An oil sight gauge provides an indication of the amount of oil in the reservoir.

ULTRAFAX

Ultrafax's remarkable speed is possible because full pages of information are transmitted as television pictures at the rate of fifteen to thirty a second. The principal steps in transmitting and receiving by Ultrafax are:

1. Preparation of data to be transmitted, to assure a continuous flow at high speed.

2. Scanning of this data by what is known as a flying-spot television scanner, at the sending terminal.

3. Transmission of the television image as ultra-high radio-frequency signals over a microwave relay system.

4. Reception on projection-type television kinescope, or "picture tube," from which incoming messages are recorded on motion picture film, or ultimately directly onto photographic paper.

At the end of a transmission, the exposed film can be trannsferred quickly to a special processing unit developed by Kodak Research Laboratories. The film is passed through a miniature developing tank, rinsed and fixed in less than 15 seconds and dried in 25 seconds more. This unit, regarded as an important advance in photographic art, resulted from advance equipment built for the armed services during the war.

The Ultrafax film may be enlarged to full-sized copy by means of a high-speed continuous processing machine. The equipment is similar to that used during the war for V-Mail enlarging. There is no limit to the number of Ultrafax messages which may be printed from a single film.

Elmer W. Engstrom, Vice President in charge of research at RCA Laboratories, pointed out the significance of the Ultrafax demonstration with respect to the construction at this time of nation-wide radio-relay networks which are capable of transmitting interchangeably both television and Ultrafax signals. Mr. Engstrom stated: "We have succeeded in obtaining results which show that Ultrafax can now promise practical commercial use, and at a time when demands are greater than ever for speed, speed and more speed in communications."

TRADE NEWS

ABC has acquired the Vitagraph properties in Hollywood for its TV center, according to Exec. V-P Kintner of ABC.

Edward J. Noble, board chairman of ABC, announced that there had been negotiations with Twentieth Century-Fox Film Corporation to acquire control of ABC. However, the offer of Twentieth Century-Fox while substantial, was not acceptable to ABC. Negotiations have been terminated.

Sylvania announces that it has licensed

RCA to use some 200 Sylvania patents, including indirectly heated cathodes, the television picture tube ion trap. RCA is licensed to use Sylvania's patents for a seven year period.

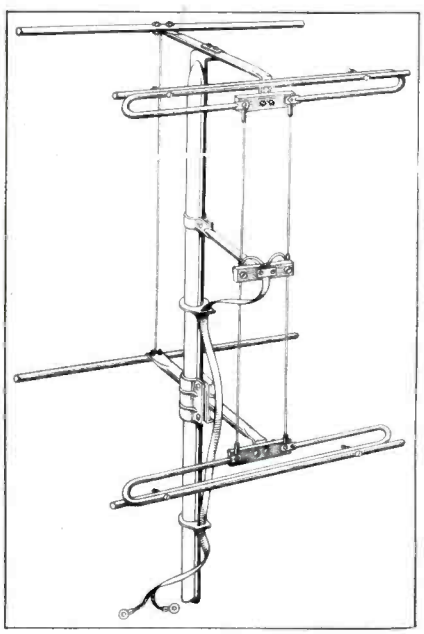
Philips Labs has been issued three new patents on its new magnetic ferrite materials. Trade-named Ferroxcube.

New York University announces development of a new tube—a mercury vapor diode with a perforated anode, four inches in diameter and twelve inches long. Low velocity electrons excite the mercury vapor, and when in the proximity of a magnetic field, the glow changes into a spiral or other configuration Visual effects are similar to patterns obtain with iron filings, but are three-dimensional. NYU is also doing work on jet and rocket propulsion, cosmic rays, atmospheric energy and circulation, among others.

Sylvania Electric announces continuing investigation of its long standing research and development of germanium diodes and triodes as amplifiers and modulators.

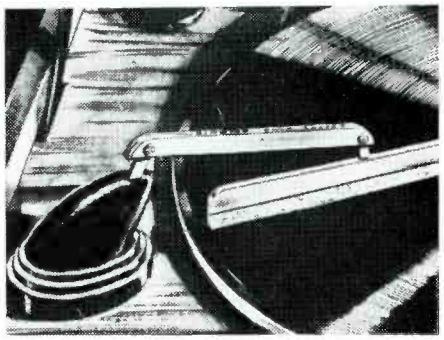
Aerovox Corp. announces new electrolytic capacitor ratings for TV replacements, already available thru jobbers. They will be fully listed in the new Aerovox catalogue.

Audio Devices, Inc., 444 Madison Ave., NYC, announces the ninth edition of a complete handbook entitled, "How to Make Good Recordings." Available from Audio Devices dealers at $2.00.



TACO announces its type 444 TV antenna, high frequency adapter, complete with mounting clamp, matching stub for channels 7 thru 13, and intended to mount directly on top of the usual low-band antenna.

American Standards Ass'n committee on radio has been reactivated, sponsored by IRE to review former JAN specs, and to formulate new JAN specs. This will keep our national security in step with electronic advances.



Audio Devices, Inc., announces that it is now marketing a unique and highly effective chip-chaser, which prevents the recording chip or thread from fouling under the recording stylus. Is consists of a lightweight, aluminum-backed strip of felt, attached to and supported by a heavy cast iron base. The chip-chaser is self-aligning. Available in two sizes, for records up to 12", and a larger model for discs up to 16".

New York University announces availability of a 4-page folder titled "FM telemetering Transmitters" which is illustrated with photos and circuit diagrams. Send 10c to NYU Bureau of Public Information, Washington Square, NYC 3, N. Y.

Newark Electric Co. announces enlargement of its facilities and services, and will now be able to supply nationally advertised products in jewelry, silverware, watches, furniture, household appliances, toys and gifts.

IRE 1949 National Convention will be held from March 7 to 10 at the Hotel Commodore and the Grand Central Palace, NYC.

The graduate division of NYU announces a new course called "Fundamentals of Gaseous Electronics" during the second term of the 1948-9 academic year. The course will cover gaseous conduction, energy-level diagrams, collision and energy transfer, Townsend Discharge, glow discharge, corona, spark, arc, and electronic source of light.

FMA advises that over 35% of the nation's FM stations are affiliated with newspapers. There are now 687 commercial FM stations, 243 of which are owned in some degree by newspapers. Newspapers hold construction permits for an additional 48 FM stations.

FMA membership continuing to rise, and FMA advises us there is no basis for the wishful thinking among the NAB-ers of an impending or probable merger of the FMA with the NAB.

Production and sale of FM receivers continues to rise. Demand increases for FM auto radios, naturally.

Detroit—A recent visit disclosed quite a bit of broadcast activity, AM, FM, and TV. The various stations are WEXL and WEXL-FM, WJLB and WJLB-FM, WJR, WWJ and WWJ-FM-TV, and WXYZ. We expect to hear about these stations in future Detroit columns.

The NABET National Office announces its removal from 66 Court St., Brooklyn, to Room 1002, 421 Seventh Ave., New York, telephone Wisconsin 7-0327.

We received an undated partial tear-sheet from about a ten-year-old copy of this magazine which contained a photo of these NABET people, whose names will be remembered by many: "New York Field Engineers at Pine Camp. Reading from left to right: Whittemore, Stoddard, Peck, Thomson, Jackson, Davis, Brown, Lewis, and MacMahon from Cleveland." The text also mentioned H. P. See and H. T. Ashworth as being present.

RMA 25th Anniversary will be celebrated May 16-20, at the Stevens Hotel, Chicago, coincident with the Annual Parts Trade Show.

RMA announces a new Television Export Promotion Committee to develop plans for the promotion of American television standards and equipment in foreign markets.

Total set production by RMA member-companies, including both TV and radio receivers, was 1,116,127 in November or about the same ratio as in October. The November production report covers the four week period, Nov. 1-26, and does not include the last two working days, Nov. 29-30. Following is a monthly table on television and radio set production for 11 months of 1948:

	TV	FM-AM	AM	All Sets
Jan.	30,001	136,015	1,173,240	1,339,256
Feb.	35,889	140,629	1,203,087	1,379,605
March	52,137	161,185	1,420,113	1,633,435
April	46,339	90,635	1,045,499	1,182,473
May	50,177	76,435	970,168	1,096,780
June	64,353	90,414	959,103	1,113,870
July	56,089	74,988	552,361	683,438
August	64,953	110,879	759,165	934,997
Sept.	88,195	171,753	1,020,498	1,280,446
Oct.	95,216	170,086	869,076	1,134,378
Nov.	122,304	166,701	827,122	1,116,127
Total	705,653	1,389,720	10,799,432	12,894,805

1949 RADIO ENGINEERING MEETING AND SHOW

The exhibits in the 1949 Radio Engineering Show will exceed all past records. Although it is still a few weeks until the show opens, 192 firms and organizations have taken space amounting to a gain over 1948 of 12½%. One hundred and eighty-five organizations exhibited in 1948, indicating that in spite of consolidations in the industry, the show is attracting wider interest. Exhibitors are placing a definite emphasis on "spotlighting the new" in their equipment and materials.

Exhibits will range from raw materials used in radio and electronic manufacture to complete transmitters and studio equipment. Advances in Test Equipment will also be a major interest to the 12,000 engineers expected as members and visitors.

New features are: A Nuclear Centre, for exhibiting the test, control and laboratory equipment of nucleonics, in which 14 firms are taking part; Special Sound Theatres, in which six firms with Audio Equipment are demonstrating.

Fourteen half-day technical sessions will be held in lecture halls in Grand Central Palace, right where the exhibits are. Additional sessions will be at the Hotel Commodore. The technical program is one of the most progressive and interesting in the 36 year history of The Institute of Radio Engineers. The dates are March 7-10, 1949, at Grand Central Palace, New York City.

TECHNICAL PAPERS PROGRAM

Monday Afternoon, March 7, 1949

Systems I—Modulation Systems

"Development of a High Speed Communication System."—Donald S. Bond.

"Distortion in a Pulse-Count-Modulation System with Nonuniform Spacing of Levels."—P. F. Panter and W. Dite.

"Cross-Talk Considerations in Time-Division Multiplex."—S. Moskowitz, L. Diven, and L. Feit.

"Experimental Verification of Various Systems of Multiplex Transmission."—D. R. Crosby.

"Interference Characteristics of Pulse-Time Modulation."—E. R. Kretzmer.

"Factors Involved in the Design of an Improved Frequency-Shift Receiving System."—Colin C. Rae.

Antennas I

"Some Properties of Radiation from Rectangular Waveguides."—J. Bolljahn.

"Elliptically Polarized Radiation from Inclined Slots on Cylinders."—G. Sinclair.

"A Broadband Transition from Coax to Helix."—C. O. Lund.

"Theory of End-Fire Helical Antennas."—A. E. Marston and M. D. Adcock.

"Equivalent Circuits for Coupling of Waveguides by Apertures."—N. Marcuvitz.

Symposium: NETWORK THEORY

"Modern Developments in the Topology of Networks."—R. M. Foster.

"A Summary on the Status of Linear Network Theory."—E. A. Guilleminn.

"Recent Developments in Broadband Active Networks."—Linvill.

"A General Review of Linear Varying Parameters and Nonlinear Circuit Analysis."—W. R. Bennett.

Instruments and Measurements I—Microwave

"Measuring the Efficiency of a Superheterodyne Converter by the Input Impedance Circle Diagram."—H. Wheeler and D. Dettinger.

"Electrolytic-Tank Measurements for Microwave Delay Lens Media."—S. B. Cohn.

"Impedance Instrumentation for Microwave Transmission Lines."—P. A. Portmann.

"A Michelson Type Interferometer for Microwave Measurements."—B. A. Lengel.

"A Broadband High-Power Microwave Attenuator."—H. J. Carlin.

"An Absolute Method for Measuring Microwave Power of Low Intensity."—H. Herman.

Audio

"The Reproduction of Sound."—H. F. Olson.

"New Developments in Studio Design in Europe."—L. L. Beranek.

"The Technique of Television Sound."—R. H. Tanner.

"The Measurement of Nonlinear Distortion."—A. Peterson.

Tuesday, Morning, March 9, 1949

Antennas II

"Antenna Systems for Multichannel Mo-

bile Telephone."—W. Babcock and A. W. Nylund.

"Wide-Angle Metal-Plate Optics."—J. Ruze.

"The Measurement of Current and Charge Distributions on Transmitting and receiving Antennas."—T. Morita.

"The Diffraction Pattern from an Elliptical Aperture."—R. Adams and K. S. Kelleher.

"A Low-Drag Aircraft Antenna for Reception of Omnidirectional Range Signals in the 108- to 122-Mc Band."—J. Shanklin.

Passive Networks I—Synthesis

"Amplifier Synthesis through Conformal Transformation."—J. Pettit and D. L. Trautman, Jr.

"Exact design of Bandpass Networks Using $_n$ Coupled Finite-Q Resonant Circuits ($_n$=3 and 4)."—M. Dishal.

"Network Approximation in the Time Domain."—W. H. Huggins.

"A Method of Synthesizing the Resistor-Capacitor Lattice Structure."—J. L. Bower, J. T. Fleck, and P. F. Ordung.

"The Design of Frequency-Compensating Matching Sections."—V. Rumsey.

Instruments and Measurements II—Oscillography

"An Impulse Generator-Electronic Switch for Visual Testing of Wide Band Networks."—T. R. Finch.

"A 50-Mc Wide-Band Oscilloscope."—A. Levine and H. Hoberman.

"A Timing-Marker Generator of High Precision."—R. C. Palmer.

"The Evaluation of Specifications for Cathode-Ray Oscillographs."—P. S. Christaldi.

"Photographic Techniques in Cathode-Ray Oscillography."—C. Berkley and H. Mansberg.

Electronic Computers

"The Binac."—J. P. Eckert, Jr., J. W. Mauchly, and J. R. Weiner.

"An Electronic Differential Analyzer."—A. B. Macnee.

"An Analogue Computer for the Solution of Linear Simultaneous Equations."—R. M. Walker.

"The Electronic Isograph for a Rapid Analogue Solution of Algebraic Equations."—B. O. Marshall, Jr.

"A Parametric Electronic Computer."—C. J. Hirsch.

Tuesday Afternoon, March 8, 1949

Symposium:

ELECTRONIC COMPUTERS

"The Binac."—J. W. Mauchly.

"Mark III Computer."—H. H. Aiken.

"IBM Type 604 Electronic Calculator."—Ralph Palmer.

"Electrostatic Memory for a Binary Computer."—F. C. Williams.

"Counting Computers."—G. R. Stibitz.

"Programming of a Chess Game on a Computer."—Claude Shannon.

Wave Propagation I—Television

"VHF Television—Propagation Aspects."—E. W. Allen, Jr.

"Propagation Variations at VHF and UHF."—K. Bullington.

"Propagation Tests at UHF."—J. Fisher.

"A Test of 450-Mc Urban-Area Transmission to a Mobile Receiver."—A. Aikens and L. Y. Lacy.

"Echoes in Transmission at 450 Mc from Land to Car Radio Units."—W. R. Young and L. Y. Lacy.

Passive Networks II—Analysis

"Impedance Curves for Two-Terminal Networks."—E. Michaels.

"An Analysis of Triple-Tuned Coupled Circuits."—N. Mather.

"The Bridged Parallel-Tee Network for Suppressed-Carrier Servo Systems."—C. F. White.

"Transient Response of Linear Networks with Ampitude Distortion."—M. Di Toor.

"Spectrum Analysis of Transient-Response Curves."—H. Samulon.

Components and Materials

"Subminiaturization of IF Amplifiers."—G. Shapiro and R. L. Henry.

"New Applications of a Four-Terminal Capacitor."—A. A. Pascucci.

"Frequqency Control Units."—A. E. Miller.

"Type 5811 and Type 5807 Tubes, The Smallest Commercial Pentode Amplifiers."—L. G. Hector and H. R. Jacobus

"Conductive Plastic Materials."—M. A. Color, A. Lightbody, F. Barnet, and H. Perry.

Nucleonic Instrumentation

"Industrial Thickness Gauges Employing Radioisotopes."—J. Carlin.

"The Design of a G-M Counter Tube for High Counting Rates."—W. Mangan.

"Electrometer Tubes and Circuits."—F. H. Starke.

"Proportional Counter Equipment for Beta Detection."—W. Bernstein.

"A High-Voltage Supplier for Radiation-Measuring Equipment."—R. Weissman and Stewart Fox.

Tuesday Evening, March 8, 1949

Symposium: NUCLEAR SCIENCE

"The Fundamental Particles."—D. J. Hughes.

"The Detection and Measurement of Nuclear Radiation."—H. L. Andrews.

"The Effects of Ionizing Radiation on Tissue."—J. P. Cooney.

"The Application of Nuclear Radiation to Industry."—J. R. Menke.

Wednesday Morning, March 9, 1949

Television I

"A Unidirectional Reversible-Beam Antenna for Twelve-Channel Reception of Television Signals."—O. M. Woodward, Jr.

"A Method of Multiple Operation of Transmitter Tubes Particularly Adapted for Television Transmission in the Ultra-High-Frequency Band."—G. H. Brown, W. C. Morrison, W. L. Behrend, and J. G. Reddeck.

"Transient-Response Tests in the WPTZ Television Transmitter."—R. C. Moore.

"The Synchronization of Television Stations."—R. D. Kell.

"Television by Pulse-Code Modulation."—W. M. Goodall.

Symposium:

RADIO AIDS TO NAVIGATION

"The Radio Technical Commission for Aeronautics—Its Program and Influence."—J. H. Dellinger.

"Frequency Allocations to the Aeranautical Services above 400 Mc."—V. I. Weihe.

"Experimental Multiplexing of Functions in the 960 to 1660-Mc Frequency Spectrum—Its Influence on Weight and Complexity of Equipment."—P. C. Sandretto and R. I. Colin.

"The Philosophy and Equivalence Aspects of Long Range Radio Navigation Systems."—M. K. Goldstein.

"The Future in Approach and Landing System."—H. Davis.

Active Circuits I

"G Curves as an Aid in Circuit Design."—K. A. Pullen.

"A Direct-Coupled Amplifier Employing a Cross-Coupled Input Circuit."—J. N. Van Scoyoc and G. Warnke.

"Annular Circuits for High-Power Multiple-Tube Generators at VHF."—D. H. Preist.

"Considerations on Electronic Multicouplers."—W. R. Aylward and E. G. Fubini.

"Improved Degenerative Regulators."—Y. P. Yu.

Instruments and Measurements III

"Radar Circuit Powered X-Ray Movie Equipment for Operation at 150 Frames per Second."—D. C. Dickson, Jr., C. T. Zavales, and L. F. Ehrke.

"An AM Broadcast Station Monitor."—H. Summerhayes.

"The Speed of Electronic Switching Circuits."—E. Williams and D. F. Aldrich.

"A Magnetostrictive Delay Line."—E. Bradburd.

"An Electromechanical Strain-Gage Multiplier."—C. Woods, E. St. George, L. Isenberg, and A. C. Hall.

Electronics I—Tube Design and Engineering

"Microphonism Investigation." — Lester Feinstein.

"A Critical Survey of Methods of Making Ceramic-to-Metal Seals and Their Use for Vacuum Tube Construction."—R. P. Wellinger.

"Rugged Tubes."—G. W. Baker.

"An Improved Method of Testing for Residual Gas in Electron Tubes and Vacuum Systems."—E. W. Herold.

"Design Factors, Processes, and Materials for the Envelope of a Metal Kinescope." —R. D. Faulkner and J. C. Turnbull.

Wednesday Afternoon, March 9, 1949

Television II

"The Measurement of the Modulation Depth of Television Signals."—R. P. Burr.

"Development and Performance of Television Camera Tubes."—R. B. Janes, R. E. Johnson and R. S. Moore.

"An Anastigmatic Television Deflection Yoke and Associated Circuits."—K. Schlesinger.

"A High-Efficiency Sweep Circuit."—B. M. Oliver.

"Progress Report on UHF Television."—T. T. Goldsmith.

Wave Propagation II

"An Analysis of Distortion Resulting from Two-Path Propagation."—I. H. Gerks.

"On the Origin of Solar Radio Noise."—A. V. Haeff.

"Geometrical Representation of the Polarization of a Plane Electromagnetic Wave."—G. A. Deschamps.

"Propagation Conditions and Transmission Reliability in the Transitional Microwave Range."—T. F. Rogers.

"A Forward-Transmission Echo-Ranging System."—D. B. Harris.

Active Circuits II

"A Laboratory and Analytical Analysis Comparing the L-C Toroidal Filter with the Parallel-Tee Feedback Amplifier Filter."—A. J. Stecca.

"A Peak-Picker Circuit."—M. J. Parker.

"Low-Frequency Synchronized Sawtooth Generator Providing Constant Amplitude Sweep with Aperiodic Synchronization Input."—P. Yaffee.

"High-Power Sawtooth Current Synthesis from Square Waves."—H. E. Kallmann.

"Regenerative Amplifiers."—Y. P. Yu.

"A Rectifier Filter Chart."—R. Lee.

Instruments and Measurements IV

"High-Impedance Millivolt Measurements above 5 Mc."—W. K. Volkers.

"Some Aspects of the Performance of Mixer Crystals."—P. D. Strum.

"A Wide-Band Audio Phasemeter."—J. R. Ragazzini and L. A. Zadeh.

"A Device for Admittance Measurements in the 50- to 500-Mc Range."—W. R. Thurston.

"An Improved RF Capacitometer."—E. F. Travis and T. M. Wilson.

"A Radio Frequency Discharge Phenomena and its Application to Mechanical Measurements."—K. S. Lion and J. W. Sheetz.

Electronics II—Electron-Tube Cathodes

"The Effects of Various Barium Compounds with Respect to Cold-Cathode Behavior as a Function of Life in a Glow Discharge."—H. Jacobs and A. P. LaRocque.

"Oxide-Cathode Properties and their Effects on Diode Operation at Small Signals."—G. C. Dalman.

"Microanalysis of Gas in Cathode-Coating Assemblies."—H. Jacobs and B. Wolk.

"Exposure of Secondary-Electron-Emitting Surfaces to the Evaporation from Oxide Cathodes."—C. W. Mueller.

"The Use of Thoriated-Tungsten Filaments in High-Power Transmitting Tubes."—R. B. Ayer.

Thursday Morning, March 10, 1949

Systems II—Relay Systems

"A Microwave System for Television Relaying."—J. Z. Miller and W. B. Sullinger.

"Synchrodyne Phase Modulation of Klystrons."—V. Learned.

"Intercity Television Radio Relays."—W. H. Forster.

"Video Design Considerations in a Television Link."—M. Silver, H. French, and L. Staschover.

"A Six-Channel Urban Mobile System with 50-Kc Spacing."—R. C. Shaw, P. V. Dimock, W. Strack, and W. C. Hunter.

Navigation Aids I

"The Determination of Ground Speed of Aircraft Using Pulse Radar."—I. Wolff, S. W. Seeley, Earl Anderson, and W. D. Hershberger.

"The Dimeal Aircraft Approach and Landing System."—L. B. Hallman, Jr.

"Theoretical Aspects of Nonsynchronous Multiplex Systems."—W. D. White.

"Band-Pass Circuit Design for Very-Narrow-Band, Very-Yong-Range Direction Finder Receivers to Minimize Bearing Error Due to Receiver Mistuning."—M. Dishal and H. Morrow.

"Crystal Control at 100 Mc for Aerial Navigation."—S. H. Dodington.

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CHICAGO

By L. E. HEIDEN

By this time, every one in the Chicago Chapter of NABET should know that Art Hjorth has resigned effective as of Nov. 30, 1948, as the Chicago Chapter Chairman. Art has been assigned to cover the Horace Heidt show for NBC, which will require extensive traveling from coast to coast for the next six months. A new election is being conducted by Secretary Washburn to select a fit candidate to fill the office so capably handled by Art Hjorth. Art is to remain in the office of National Vice-President.

At a recent council meeting of the Chicago Chapter there were two items of general interest. A committee was appointed to revise the present by-laws of the chapter to conform with the Taft-Hartley Act. Two additional councilmen for ABC TV were tentatively approved subject to by-law changes. Instead of one general TV councilman there will be one for Studio-Transmitter, one for Field and one for the Civic Studio.

Have You Heard

Station KSD has taken all of their former audio men into TV operations with the exception of one, hiring new men for audio operation. This has also been done to a great extent at WOW and KSTP. On the NBC TV network opening of Nov. 20, Ted Mills representing NBC production has reported the crew of KSD did a swell job of operation.

The Ben Parks tape recorded production, which is recorded by non-Union personnel for exclusive playback on WMAQ, is being taken to arbitration.

The ABC in Chicago has appointed assistant Field, Maintenance and Transmitter supervisors in TV but no full supervisors. Can some one tell us to whom these supervisors are assistant? Several jobs are being done by group 12 in TV, which rate higher pay. There are those in NABET who think some things need pinning down in a new contract.

RADIO ENGINEERING SHOW—From Page 19

Symposium: MARKETING

"Market Research."—E. H. Vogel.
"The Application of Market and Field Research in Product Planning and Design."—O. H. L. Jensen.
"Sales Planning and Distribution."—Lee McCanne.
"National Advertising."—M. F. Mahony.

Electronics III—Electron-Tube Theory

"General Solution of the Two-Beam Electron-Wave Tube Equation."—A. V. Haeff, H. D. Arnett, and W. Stein.
"Aspects of Double-Stream Amplifiers."—J. R. Pierce, W. B. Hbenstreit, and A. V. Hollenberg.
"On the Theory of Axial Symetric Electron Beams in an Axial Magnetic Field."—A. L. Samuel.
"Electron Beams in Axial Symmetric Magnetic and Electric Fields."—C. C. Wang.
"Space-Charge Effects and Frequency Characteristics of CW Magnetrons Relative to the Problem of Frequency Modulation."—H. W. Welch, Jr.

Thursday Afternoon, March 10, 1949

Symposium:

GERMANIUM AND SILICON SEMICONDUCTORS

"Electrical Properties of Germanium and Silicon."—K. Lark-Horovitz.
"The Metallurgy of Germanium and Silicon Semiconductors."—J. H. Scaff.
"Theory of Rectification."—F. Seitz.
"Transistors."—W. H. Brattain.

Information Transmission and Noise

"Design in Nature as Exploited by the Communication Engineer."—L. A. de Rosa.
"Experimental Determination of Correlation Functions and the Application of These Functions in the Statistical Theory of Communications."—T. P. Cheatham, Jr.
"The Transmission of Modulation Through Band-Limited Transmission System."—W. P. Boothroyd and E. M. Creamer, Jr.
"Signal-to-Noise Improvement Through Integration in a Storage Tube."—J. V. Harrington and T. F. Rogers.
""The Theory of Receiver Noise Figure."—L. J. Cutrona.

Navigation Aids II

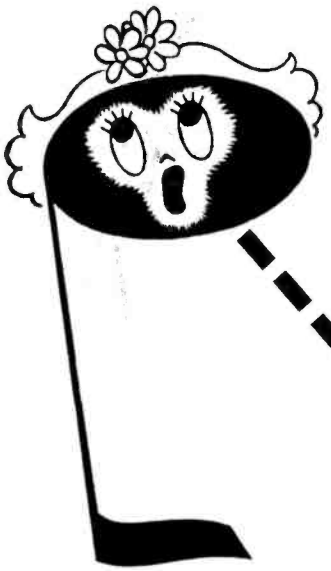
"Very-High-Frequency Airborne Navigational Receiver and Antenna System."—A. G. Kandoian, R. T. Adams, and R. C. Davis.
"Certain New Performance Criteria for Localizer and Glide-Slope Ground Installations."—P. R. Adams.
"Phase and Other Characteristics of 330-Mc Glide-Path Systems."—S. Pickles.
"Principles of Volume Scan."—D. Levine.
"The Control of Structural Resonance effects on the Radio Bearings of an Aircraft High-Frequency Direction Finder."—M. Goldstein.

Oscillators

"An Analysis of Oscillator Performance under Varying Load Conditions and an Electronic System for Automatic Load Compensation."—E. Mittelmann.
"Low-Power Wide-Tuning-Range UHF Oscillators."—J. N. Pettit and F. J. Kamphoefner.
"Reactance-Tube Modulation of Phase-Shift Oscillators."—F. R. Dennis and E. P. Felch.
"A Low-Distortion AF Oscillator."—C. W. Clapp and C. L. Hackley.
"An Automatic-Frequency-Control System for Mechanically Tuned Oscillators."—J. G. Stephenson.

Electronics IV—New Forms of Tubes

"TheGraphechon—A Picture Storage Tube."—L. Pensak.
"The Pencil-Type UHF Triode."—G. M. Rose and D. W. Power.
"Practical Applications of the Resnatron in the High-Power Transmitter Field."—W. W. Salisbury.
"The Electron Coupler—A New Tube for the Modulation and Control of Power at the Ultra-High Frequencies."—C. L. Cuccia and J. S. Donal, Jr.
"A Low Power Wide-Band CW Magnetron."—L. R. Bloom and W. W. Cannon.



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way up here...

Or he sings
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These transmission measuring sets are accurately designed instruments for the measurement of the transmission characteristics of audio frequency communication systems. This equipment may be applied to measure gains or losses through amplifiers, repeaters, attenuating networks or communication lines without the use of laborious calculations, complex setups, or sensitive meters.

The sets shown here are sturdy compact units built to exacting specifications. Your further inquiry is invited. Technical questions will be answered by our Engineering Department.

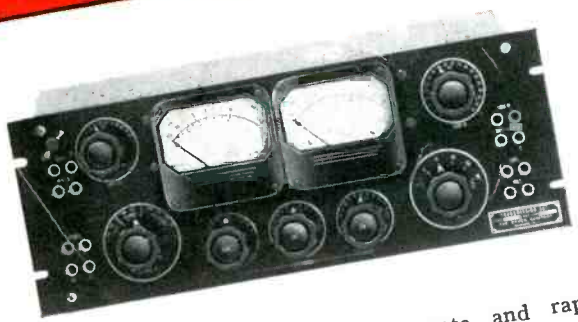
TYPE 8A

A portable battery operated set . . . weight 14 pounds.

TRANSMITTING SECTION: Contains an internal oscillator, operating at a frequency of 1000 cycles. Output impedance is 600 ohms either balanced or unbalanced to ground. Output levels are 0 DBM* and —20 DBM*.

RECEIVING SECTION: Frequency response is ±0.3 DB from 30 to 10,000 cycles. Input impedance is 600 ohms terminating, and 6300 ohms bridging either balanced or unbalanced to ground. Will measure levels of —30 to +10 DBM* at zero VU meter indication, when terminating a line.

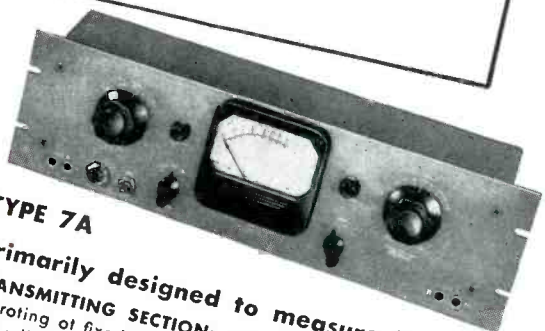
DIMENSIONS: 9⅜" high x 6½" wide x 12⅞" long.



TYPE 10 A

The industry's standard for accurate and rapid measurement of transmission characteristics of audio systems including AM & FM broadcasting.

1. Completely shielded wide range isolation transformers used in the Input, Source and Load networks. Set functions equally well from balanced or unbalanced oscillators and measures balanced or unbalanced systems.
2. Accuracy ±0.1 DB, 50 cycles to 15 KC.
3. Accuracy independent of level over the range +26 to —100 DBM.
4. Attenuation steps of 111 DB in steps of 0.1 DB.
5. Source and load impedances within ±2% over range 50 cycles to 15 KC.



TYPE 7A

Primarily designed to measure losses.

TRANSMITTING SECTION: Contains an internal oscillator operating at fixed frequencies of 500, 1000, and 2500 cycles and will provide output levels of —13, 0, +4, and +10 DBM*.

RECEIVING SECTION: Frequency response is ±0.3 DB from 30 to 10,000 cycles. Will measure levels of —30 to +10 DBM* at zero VU meter indication when terminating a line. Impedance is 600 ohms in both the transmitting and receiving sections.

* DBM is based on a reference of 1 MW into 600 ohms.

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