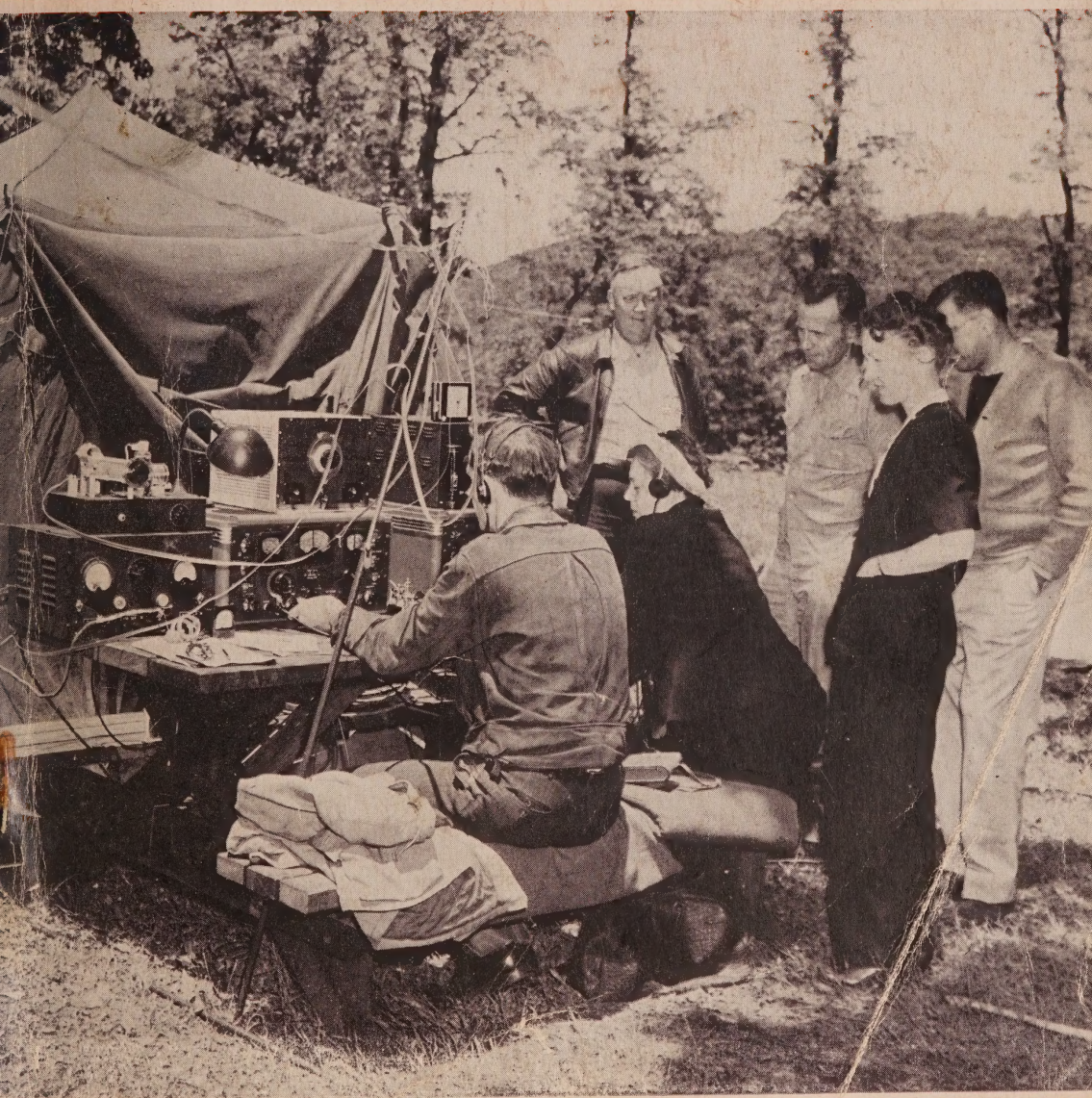
CQ

AUGUST, 1947

The Radio Amateurs' Journal

35¢

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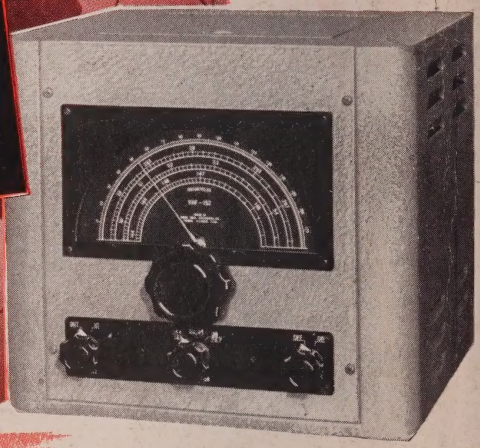


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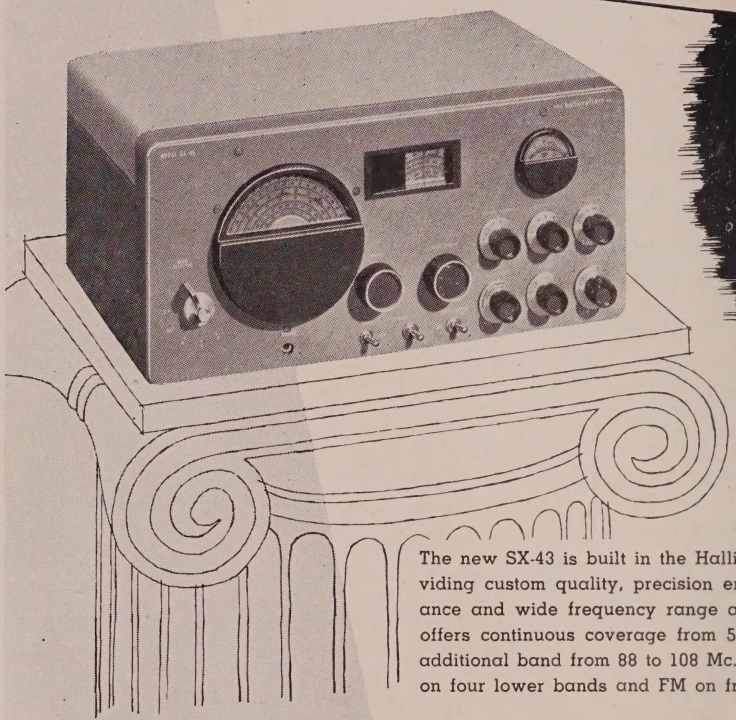
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CQ

The Radio Amateur's Journal

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Vol. 3. AUGUST, 1947 No. 8

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COVER

Members of the Washington Radio Club in the Shenandoah National Park for the 1947 Field Day, operating with the call W3AM. Power was 30 watts on 20, 40 and 80 meters, c.w. Eight operators stood the watches. A. Prose Walker, W2BMX, and Elizabeth Zandonini, W3CDQ, are at the keys. Standing are: Warren Andrew, W3AM; Ren Collins, W3KDP; Catherine Barclay, W3LSX, and Ev Battey, W1UE.

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The New MEISSNER
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With more amateurs going on the air almost daily, the ability to dodge QRM has become of utmost importance. As the ham bands become increasingly crowded, amateur operators all over the world have come to regard the Meissner Signal Shifter as their most useful single piece of equipment. Built-in band switching, all controls on front panel, crystal control on all bands plus many more new, exclusive features all combine to make this new instrument the finest variable frequency exciter ever offered. At your dealers or write to the address below for full information.

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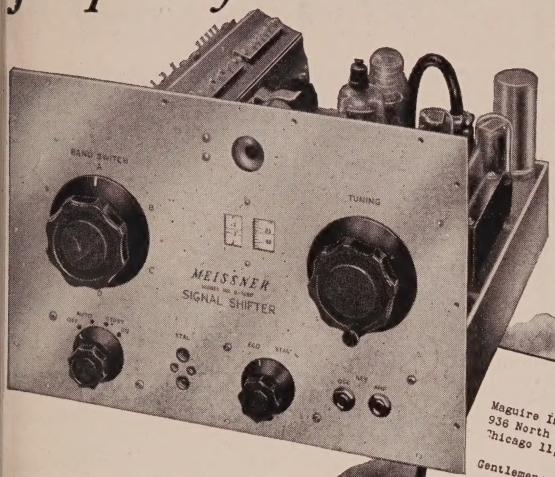
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frequency exciter

Plays Important Role In Texas City Disaster



Maguire Industries, Inc.
936 North Michigan Ave.
Chicago 11, Ill.

c/o CAA Box 779
Galveston Texas
April 20, 1947
W5KVM

Gentlemen;

I know you will be interested to learn what an important role your Meissner Signal Shifter has played in the recent Texas City disaster; Series 712. I had just about gotten it out of the box and was temporarily checking it into the xtal stage of the xmitter for 75 meter fone work when the shack was rocked by the explosion from the first blast of the Texas City disaster. At first we did not know what had happened except that we could see high flames and black smoke mushrooming like an atomic cloud over Texas City, nine miles away.

Three days ago I got delivery on my new Meissner Signal Shifter, #3007,

Another terrific explosion followed on the heels of the first and we immediately listened in on the BC band. In a few minutes our local radio station here in Galveston advised us that a ship had blown up in Texas City. We immediately got on 75 fone and inquiries started to pour in from Houston Texas, 50 miles away. W5FQQ started out for Texas City and was soon set up over there on 75 fone. At that time I was the only "out" known on 75 fone and 5FQQ the only means of communication into Texas City. Thus, in those first few hours, our two stations were the only means of communication between the stricken city and Galveston.

To make a long story short, your Signal Shifter stayed in operation, in my station W5KVM, for two solid days of continuous operation without "missing a beat". In that time we handled close to 1000 messages and utilized three radio operators, 2 clerks, 1 shorthand operator and two others on the special lines that the telephone company ran into W5KVM for us. I don't know what we would have done without the Shifter since, previous to purchasing it, I had always operated xtal control and thus would never have been able to have operated the clear channel of 3860 Kcs assigned to us by the FCC.

Very truly yours,

Julius J. Bamberg W5KVM

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• • Letters • •

"Young Squirts" Club

4 Elizabeth St., Glen Cove, N.Y.

Editor, *CQ:*

I would like to mention in *CQ* that I am starting a club for amateurs 15 years old and younger. (I am 13 years old.) We would form a net on 40 or 80-meter c.w. Anyone within the above age limit who would like to join should write me stating his age, crystal frequencies and the kind of rig he's using.

Dennis Shapiro, W2URX

W6GRL/XU

LOS ANGELES, CALIF.

JUST BECAUSE DOC STUARTS TRANSMITTER IS USED IN CHINA YOU DON'T HAVE TO PRINT IT UPSIDE DOWN STOP WHO KNOWS MAYBE IT WILL WORK THAT WAY STOP

HERB BECKER, W6QD

107 Biddle St., Pittsburgh 21, Pa.

Editor, *CQ:*

May I congratulate *CQ* on its farsighted educational policies. For these many years I have wondered how things look on the bottom of the world. Your picture of page 35, June *CQ*, is the first Chinese radio transmitter I have ever seen. It is interesting to know that the Chinese not only read and write upside down, but that they also build transmitters with the power supply on the top and the r-f section on the bottom. I'm going to try the idea as it appears to shorten the connections between the final tank and the coax cable. According to my calculations, however, I'll have to use larger bolts to hold the power supply components than those used in the picture.

Or is that picture upside down?

William G. Walker, W3NUG

5700 copies of CQ were printed with the photo of XU6GRL's commercial offspring inverted. So far 5699 readers have called it to our attention. Where is that last letter?—Ed.

The Amateur Newcomer

58-1424 Chapin St., N. W., Washington 9, D. C.

Editor, *CQ:*

"The Amateur Newcomer" in the June issue of *CQ* is a praiseworthy endeavor, bespeaking timely editorial planning in behalf of the newcomer. Moreover, being devoid of stilted technical phraseology, usually so much QRM for the neophyte, the newspaper style of presentation assuredly ought to bring deserving commendation to the authors, including *CQ*, from readers fortunately subscribing. Congratulations!

Charles W. Havlena

Organized Net Frequencies

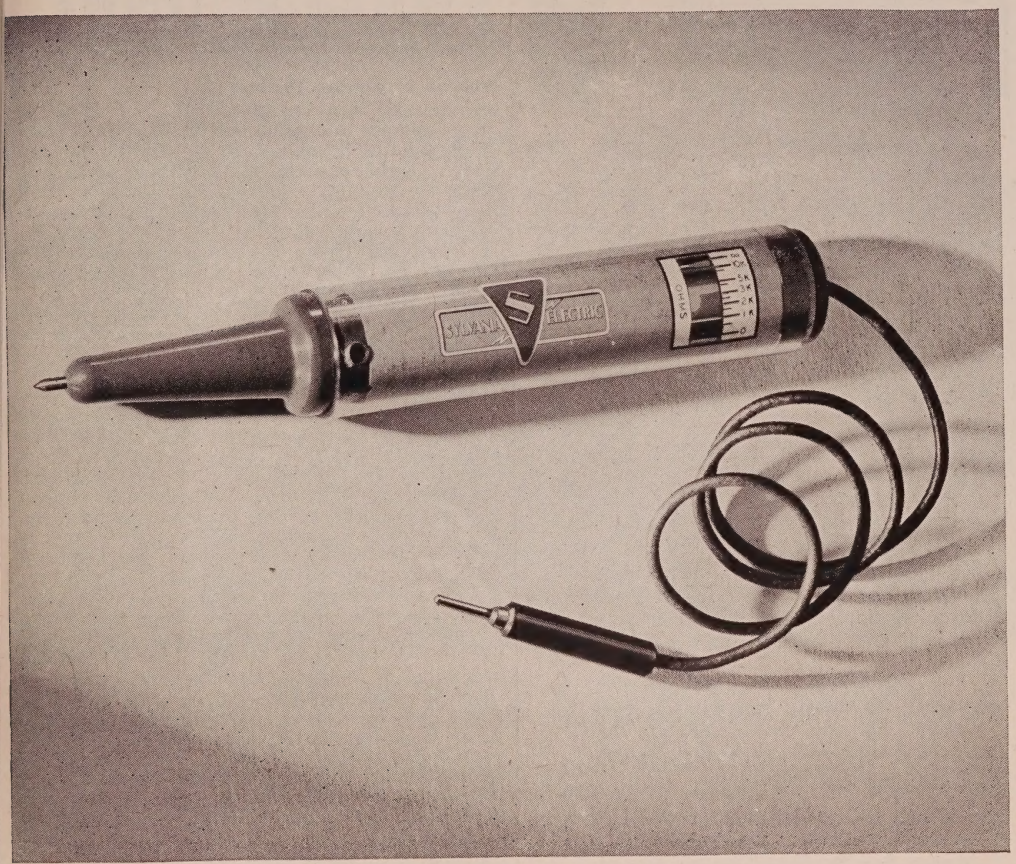
RFD 3, River Rd., Bethesda 14, Md.

Editor, *CQ:*

The letter from W8RN published in April *CQ* under the title "Organized Net Frequencies" certainly calls for comment. Amateur activity may be divided into the following groups: design and construction, emergency communications, rag chewing,

[*Continued on page 72*]

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Note to Prospective Authors

SOMETIMES THE DELAY between our letter of acceptance of a submitted manuscript and its appearance in print in *CQ* is called by the prospective author entirely too long. Except in rare cases, we attempt to secure publication within three to four months after acceptance. In special instances, this time lapse may be considerably shorter, but it may be as long as five or six months. To illustrate our point let us consider a hypothetical manuscript.

If the idea is sound (not particularly new or startling) and is not being currently beat to death in the other radio journals, there is a good chance we will be interested. Once the manuscript is in our hands a number of things happen. First, it is carefully read by a member of the staff who is familiar with the subject. Then if it sounds even slightly plausible or possible to him, it is referred to the Managing Editor for final consideration. Unless we are overstocked in that particular subject, or some other circumstance has arisen which prevents our publication (if the manuscript is rejected the Editor will tell you why), we will accept it for future publication. Unless the author is a very good writer the manuscript must be rewritten by a staff member, which means that it will be corrected, shortened or lengthened to conform to editorial policy of *CQ*. After the text has been edited, formulas and all math work checked, the subject may require the reading of an expert in that field. If the opinions given by the expert differ too widely from those in the manuscript, the author is notified and revised material is requested. Once again after the text has been edited, it is time to prepare the drawings. Here time may be lost writing to the author to clarify blurred pencil sketches or obtaining missing parts values. All in all, the complete editorial process involves a time lag of about four months between acceptance and the time the magazine is on the newsstands. So if you have a manuscript which we have accepted and which you think has gone into the wastebasket, fear not, for we haven't forgotten you, you'll be surprised one of these issues.

Consulting Services

We have been asked by outside interests if the staff of *CQ* is available for small consulting projects. Unfortunately, we can not give an over-all answer to this question. Individually, the members of the staff are free to partake in projects outside the scope of the magazine, and in some instances where the member of the staff is an authority in his field he is already engaged in a small scale consulting service. As a unit, the editorial staff is available in a limited fashion. If you have some problem, wherein you believe we may be of service, you may write the Managing Editor personally. He will be able to give you a prompt answer and will, naturally, keep all inquiries in the strictest confidence.

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Field Day

FIELD DAY, one of the most popular activities of the ARRL, has just concluded. If the myriad of signals sporting a slant bar after their call is any indication, the number of individuals and stations participating will have reached an all-time high. Among the many operating activities sponsored by the ARRL and other amateur organizations none has more practical value than field day. But after looking around this past week-end we wonder if the competitive spirit hasn't completely dominated the real purpose of field day; that is, preparedness for emergency operation.

Our observations pretty well confirm the fact that most field-day stations were operating from large gasoline-driven generators. War surplus has made them more plentiful than ever before and at a fraction of their original cost. But this ready source of a.c. has altered the complexion of many field-day stations, for in effect they are merely fixed stations operating under special conditions, i.e., they bring along their own power plant. Too many of the stations we saw or had decribed to us were strictly 110-volt a-c operated jobs, which would be out of action under many types of conditions which could arise in an emergency. Too many of the clubs depended upon one single power source. Practically none of them had battery operated gear and those that did, often had only the receiver working from this power source.

The argument against one centralized power plant is obvious. If it were to be disabled for any reason, the entire station would be off the air. Small generators contributing the total wattage required for the various transmitters and receivers would be preferable. They would also permit the establishment of additional stations should conditions require them. Greater emphasis should be placed on the use of purely battery-powered equipment because batteries are generally available and can be commandeered from automobiles in an emergency. Simple antennas that can be quickly erected are more likely to be used in an emergency than high-gain beams and long wires. After all, it is assumed that the primary purpose of emergency equipment is to provide communications from a disaster area to an area where normal communications facilities exist, not to work DX.

Also to be seriously considered, and largely overlooked during field day, except on 2 meters, is inter-area communications. The ability to dispatch equipment within the emergency zone to communicate with each other may be just as vital as being able to work hundreds of miles. The very-high frequencies may not always provide the answer. Highly mobile, compact, battery-operated transmitters are also desirable, if not essential.

The clubs that used radio to establish an intercommunication system between their transmitters were on the right track, but there is ample room for more work along such lines.

As a parting thought, it might be of interest to many readers to know that some of the most succesful public service work yet contributed by amateurs has been with "walkie-talkie" type portable equipment. This service has ranged from providing fire departments with communications between men and equipment to keeping the judges informed of progress in an amateur championship golf tournament. Disaster isn't the only time amateurs can use portable equipment . . . if you have the equipment.

The Public Welfare?

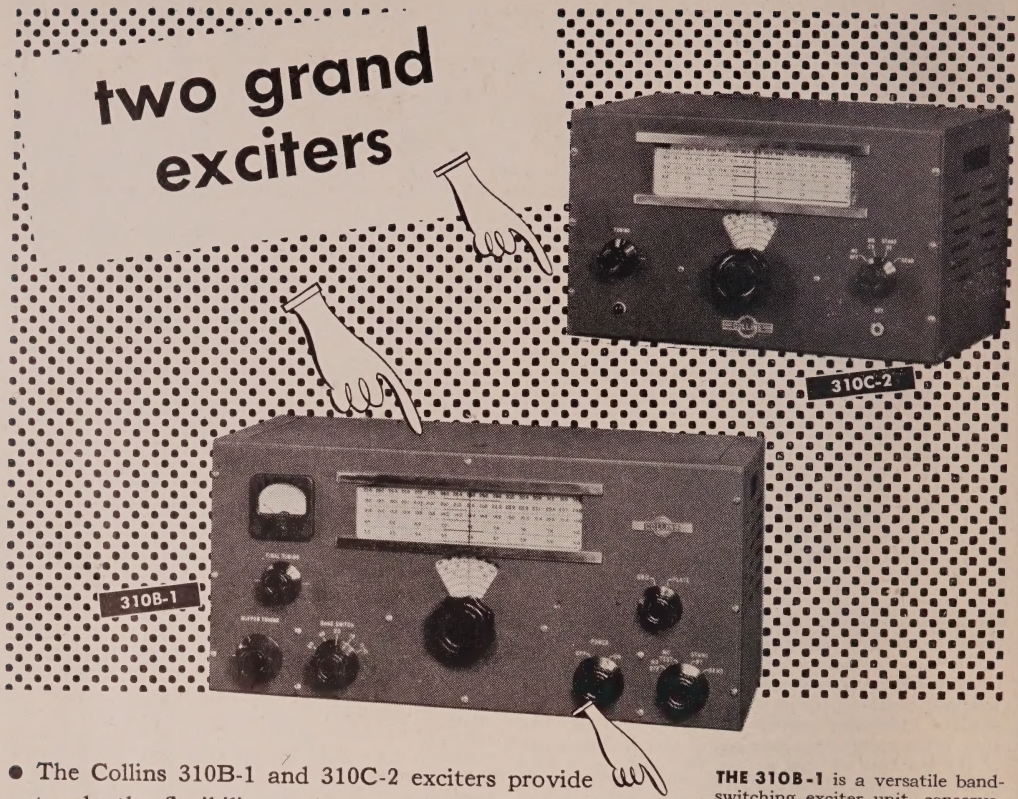
IN ARIZONA, at the height of the recent nation-wide telephone strike, an interesting situation arose, one that could have far-reaching ramifications. As far as we know, this one was cleared up with no particular harm done, but it serves to emphasize the responsibility of the ham to his community, yet points up why emergency communications demands participation by the highest calibre amateurs. H. T. Murphy, Phoenix strike director, charged local amateurs with being a party to an "unlawful strike-breaking measure" taken by the telphone company. Newspaper reports stated that the amateur network was being organized as a news-gathering agency for Phoenix. This is contrary to the statements by the net director who flatly stated the network was for emergency traffic only, that the hams were not going to become involved in a labor controversy under any circumstances.

Amateurs are of course, duty bound to give service to the public during an emergency. We believe that, even at the risk of being accused as strike breakers, unless reasonable doubt exists in the mind of the amateur concerned, he should accept traffic designated as emergency and question the propriety of it later. But the fact that such a consideration can arise shows the need for a fully integrated emergency system involving public officials as well as amateurs, at all times. The responsibility for making a decision on what is or is not emergency traffic is really that of public officials. They should either declare an emergency or absolve the ham of any responsibility in relaying traffic during a utility's strike. The Phoenix incident raises a question if perhaps the meaning of "traffic in the public welfare" might not require clearer definition should there be a reoccurrence of this situation. In the meantime, amateurs might have to prove their adroitness as diplomats.

That is why we say emergency communications requires top-notch, intelligent amateur participation. We could otherwise get into some very embarrassing situations.

—*W2IOP*

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● The Collins 310B-1 and 310C-2 exciters provide not only the flexibility and convenience of variable frequency, but also the accurate calibration and high stability inherent in the Collins 70E-8 permeability tuned oscillator. They give you a precision frequency control usually found only in laboratory instruments. Yet they are built for continuous service under all normal fluctuations in operating conditions.

Frequency is read directly from the dial. There are no reference charts or curves to interpolate. Accuracy is within 0.015% under normal conditions. Thus you can read your actual operating frequency to within 150 cycles per megacycle—to within one dial division on all bands.

Both of these exciters have self-contained power supplies. A third, the 310C-1, is similar to the 310C-2, minus power supply. All three are fully described and illustrated in a new Collins bulletin, just off the press. Write for your copy.

THE 310B-1 is a versatile band-switching exciter unit, conservatively rated at fifteen watts output on all amateur bands under 32 megacycles, and can be used as a complete low power cw transmitter. It has ample drive for a kilowatt final utilizing the new pentode tubes available. With additional multiplication it makes an excellent frequency control for amateur bands in the VHF and UHF regions.

THE 310C-2 consists of a 70E-8 PTO and a multiplier, with an r-f output of approximately 80 volts rms across 40,000 ohms. Its frequency range is from 3.2 mc to 4.0 mc. Its output can be plugged into the crystal socket, or applied to the grid of an 807 buffer stage, thus providing a versatility far greater than any number of crystals, while at the same time maintaining crystal accuracy and stability.

FOR BEST RESULTS IN AMATEUR RADIO, IT'S . . . COLLINS

COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Street, New York 18, N. Y. 458 South Spring Street, Los Angeles 13, California

A Broad-Band, Automatic, PHONE & C-W MONITOR

G. H. FLOYD, W2RYT,* and R. L. WATTERS, W2RDL**

An audio tone for c-w monitoring on any band, a one-stage amplifier for receiver output, and a phone monitor are features of this invaluable station accessory.

EVEN THOUGH YOUR power transformers emit a hollow groan when you press the key, or the house lights flicker nicely in step with your dots and dashes, there is no substitute for a clean, clear audio note for monitoring your fist. This is usually accomplished in one of two ways. First, a receiver of some sort may be used to pick up your transmitted signal. Second, an audio oscillator may be used, and keyed simultaneously with your rig.

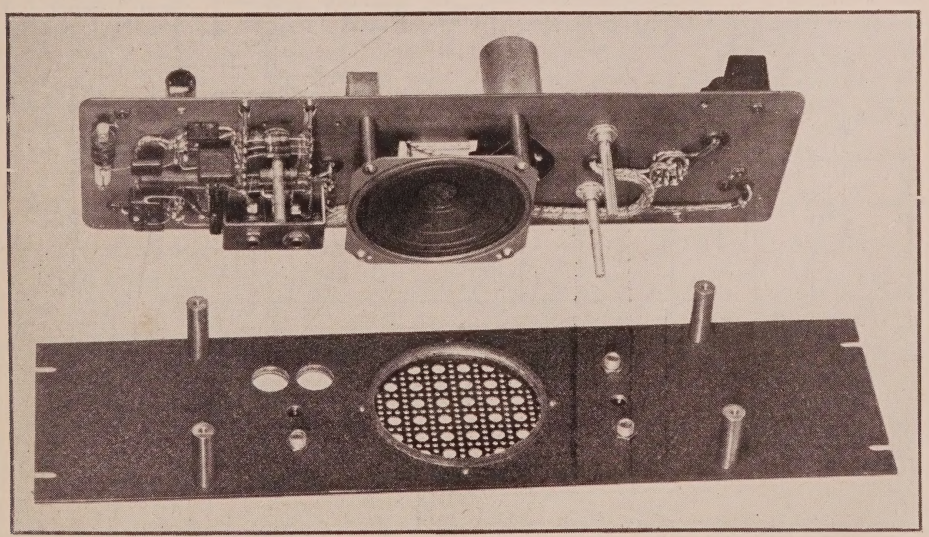
The Problem

The first method, that of actually receiving your own signal, has one big disadvantage. The receiver must be tuned if your rig is v-f-o controlled. This disadvantage is particularly obvious after you have chased back and forth several times between your own signal and some weak DX signal. The audio oscillator method has its own disadvantage. Your rig can be off the air and your oscillator still lulls you into believing your signal is blasting the ether.

In addition, both methods have a common difficulty. The monitoring signal is heard either on earphones or on a small loudspeaker. If earphones are used, it is necessary to remove them or transfer them to the receiver to hear the received signal. (One enterprising ham has a pair of earphones arranged so that one earphone connects to his monitor and the other to his receiver!)

After investigating the popular methods of monitoring a c-w signal, the authors decided to design a monitor which would overcome all of the foregoing disadvantages. The unit which finally evolved does more than was originally intended, and is simple to build. In addition, there are no critical adjustments to make, and all parts are readily available.

*Tube Division, G. E. Co., Schenectady, N. Y.
**Research Lab., G. E. Co., Schenectady, N. Y.



The broad-band, automatic, phone and c-w monitor, showing the relay rack panel with its 1½-inch brass pillars for connecting to the subpanel on which the components are mounted. The P-M speaker projects through a hole cut in the subpanel. Mechanical construction may be varied.

The monitor described herein will do the following:

1. Provide an audio note for monitoring purposes, regardless of the frequency of the transmitted signal (operation on microwaves is not guaranteed!). An audio note is heard only when your signal is on the air. No direct connection to transmitter or keyed circuit is necessary. No tuning is necessary. No band switching is necessary.

2. Provide a one-stage audio amplifier for the output of the receiver, so that received signals are heard on the speaker in the monitor (or on the same set of earphones used for monitoring). No send-receive switch is required. When the transmitter in on, the monitoring signal is heard. Turning off the transmitter automatically causes the monitor to then amplify any signal tuned in on the receiver. It is assumed that the receiver is normally silenced during a transmission. If this is not the case, and break-in operation is desired, the unit will amplify both received signal and the audio monitoring note at the same time.

3. Provide a monitor for a phone transmitter. This requires that the OFF-C.W.–PHONE switch be set at "phone." The monitor still automatically amplifies the received signal.

Circuit Details

Reference to the circuit diagram (*Fig. 1*) shows that three tubes are used, one being used as a rectifier only. Operation is as follows. The right-hand triode section of the 6J6 acts as a plate detector which triggers the screen-grid of the 6BA6 when a sufficiently strong radio-frequency signal is impressed on the 6J6 grid. The 6BA6 is an audio oscillator which is caused to go in or out of oscillation depending upon the applied screen voltage.

The output of the 6BA6 drives the left-hand section of the 6J6 which acts as an audio amplifier driving either the speaker or earphones. A 6AL5 tube acts as a half-wave rectifier to supply d-c voltage to the unit.

The action described above occurs when a radio-frequency signal is impressed on the 6J6 grid. This detector circuit is not frequency-sensitive, and will respond to practically any frequency (within the limits of the 6J6 capabilities). If operation is desired on one band only, such as 7.0 to 7.3 megacycles, the r-f choke could be replaced by a coil and condenser which would peak broadly over the 40-meter band. This would give additional sensitivity, and the antenna on the unit would not need to be as closely coupled to the transmitter.

The 1-meg potentiometer controls the frequency of the audio note generated by the 6BA6. The volume control is the .5-meg potentiometer. This control adjusts the volume of the audio note as well as the volume of the received signal. The output of the receiver (usually from the phone jack on the receiver) is fed into jack *J2*.

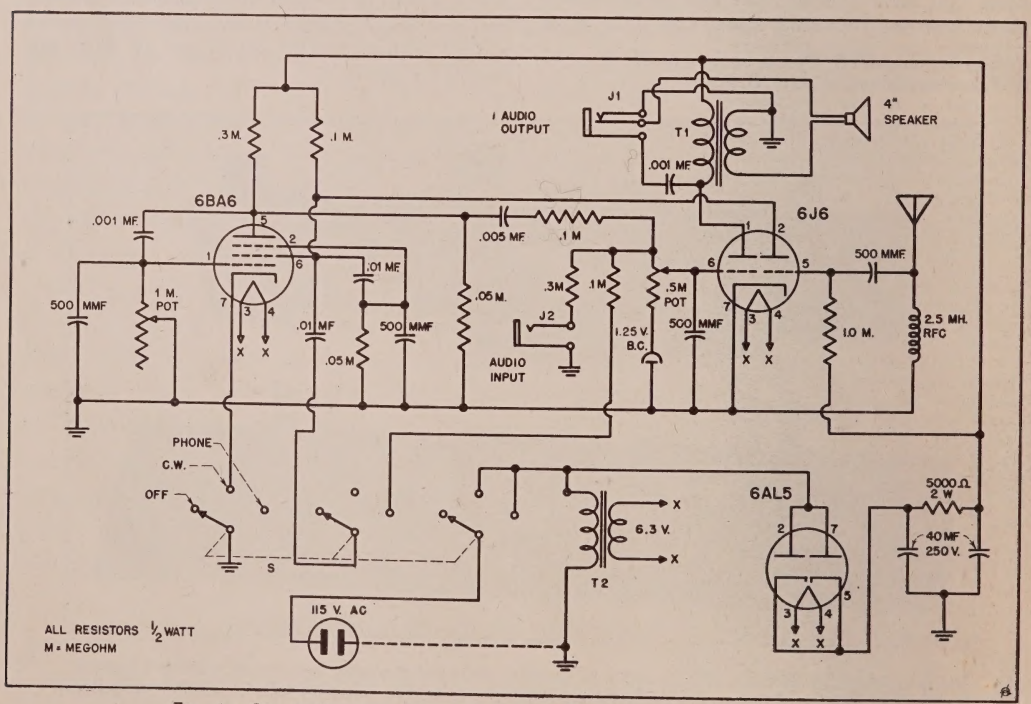
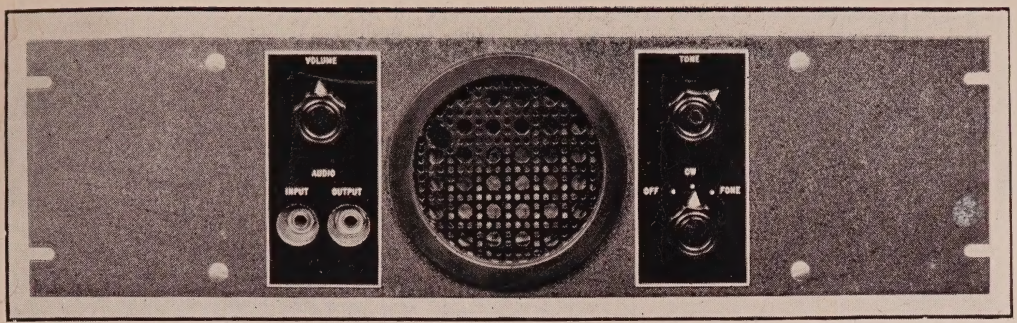


Fig. 1. Circuit diagram of broad-band, automatic, phone and c-w monitor.



The relay rack method of mounting is used for the keying monitor. The front panel may be removed without disturbing the wiring. Jacks at right are for audio input and output.

The amplifier section of the 6J6 works into a speaker transformer, and either earphones or the speaker may be used. A .001-μf condenser blocks d-c from the earphones, so that any type of earphones may be used.

When the switch is in the "phone" position, the 6BA6 is taken out of the circuit, and the modulation envelope from the detector section of the 6J6 is fed through a .01-μf condenser directly into the second section of the 6J6, allowing the unit to act as a phone monitor.

It is necessary to use a bias cell in the amplifier section of the 6J6, as this tube has a common cathode which must be grounded. If the bias cell is omitted, distortion will take place in the amplifier section of the 6J6.

A rectifier was added to the unit because in many cases the average ham shack has several other devices which are already taking power from the receiver. If this is not the case, the receiver power supply may be used, as the current drain is small. A resistor-condenser filter is employed, and is capable of supplying pure enough d.c. that no hum is evident.

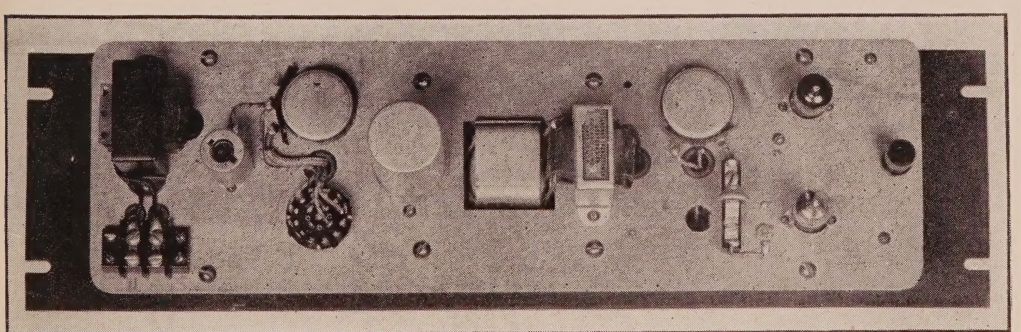
As with other rectifiers of the same sort, one side only of the a-c line is used, and care must be taken if a regular a-c plug is employed, to see that the polarity is correct. Removing one a-c plug prong normally going to the grounded side of the line, and providing this return by grounding the entire monitor will eliminate any chance of reversing the polarity.

This monitor is therefore seen to be an improvement over a keyed audio oscillator, because it is necessary for the transmitter to be on the air, and feeding energy into the monitor, before the monitor will produce an audio note. Further, it is possible to couple the monitor to the transmitter so that a decrease in output will cause the monitor to stop functioning.

A word of caution. This monitor will not tell you anything regarding the purity of your note. An occasional receiver check and on-the-air reports should provide sufficient check for this. Poor keying characteristics, such as might be experienced with a sluggish crystal will show up.

Constructional Details

With reference to the photographs, the monitor was designed to fit a standard 5¼-inch by 19-inch relay rack panel. However, the type of mounting and the placement of parts is not important. The monitor would fit nicely into a speaker cabinet, using space which otherwise would be wasted. The relay rack method of mounting is suggested because the average ham already has



The left-hand side of the panel contains the a-c input terminal block, the filament transformer, the 6AL5 rectifier, audio pitch potentiometer, OFF-C.W.-PHONE switch and the dual filter condenser. On the right are the r-f input post, the 6J6 and 6BA6 tubes, the bias cell, volume control and speaker transformer.

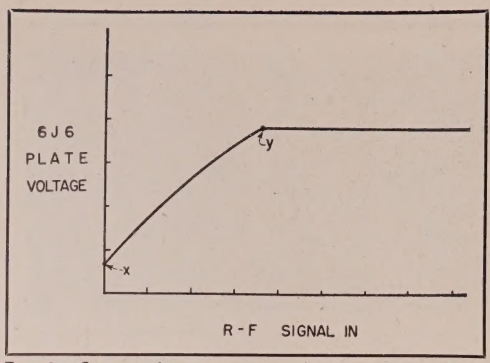


Fig. 2. Curve indicating action of 6J6 plate detector.

too many gadgets next to or on top of his receiver.

All component parts are mounted on a metal subpanel, sixteen inches long, five inches wide, with a thickness of 1/16 inch. A hole is cut in the central part of the subpanel to allow the four-inch P-M speaker to project through. Brass pillars, 1½ inches long, connect the subpanel to the relay rack panel. The front panel may be removed without disturbing any wiring.

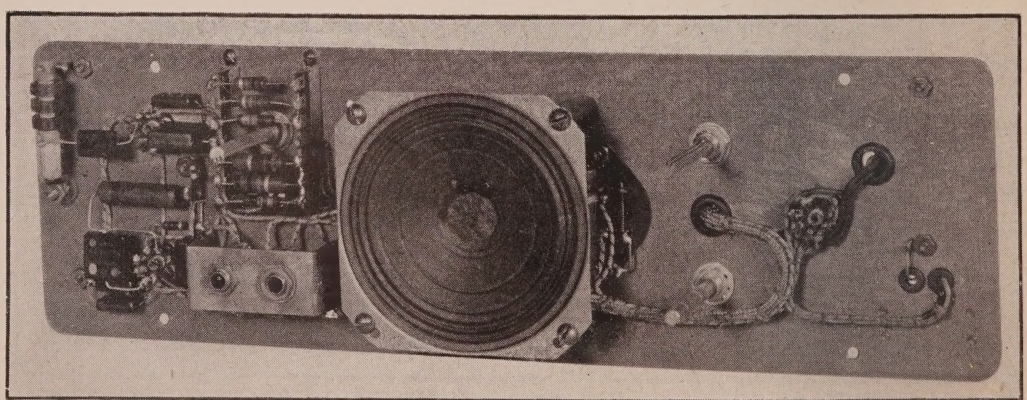
One end of the panel contains the r-f input post, the 6J6 and 6BA6 tubes, the 1.25-volt bias cell, the volume control, and the speaker transformer. The other end contains the a-c input terminal block, the 6.3-volt filament transformer, the 6AL5 rectifier, the audio pitch potentiometer, the OFF-C.W.-PHONE switch, and the dual 40-μf filter condenser. All resistors and condensers are mounted on the underside of the subpanel (the side toward the front panel). An angle bracket supports the two jacks, for audio input and output, and is so arranged that the jacks are spaced about ¼" behind the front panel.

Operating Adjustments

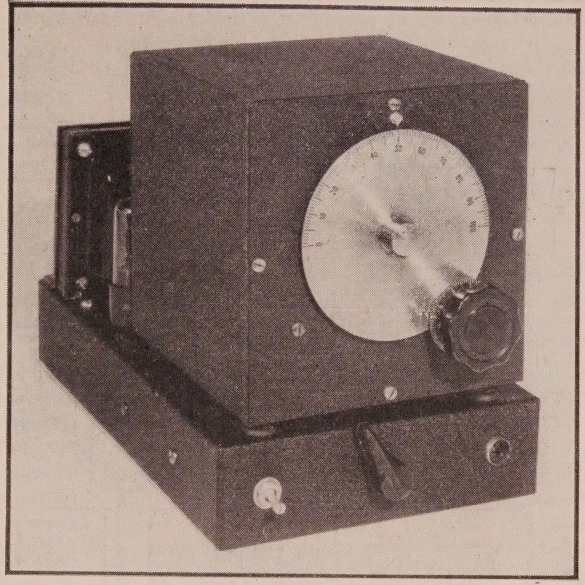
When the unit has been completed, it should be turned on, and an antenna placed on the binding post to pick up r-f energy from the final of your transmitter. Coupling should be increased until an audio note is heard with the transmitter operating. (Be certain the switch is in the "c-w" position). The amount of coupling needed will depend upon the transmitter power. A single 807 final required that a short length of lead be placed approximately three inches from the tank coil. A one-kilowatt transmitter put out sufficient field that a two-foot piece of wire twenty feet away gave enough coupling. In some instances, overcoupling or excessive r.f. floating around the shack had a tendency to "roughen" up the note from the monitor. If the difficulty is from too much pickup, the length of antenna on the monitor can be shortened. Stray r.f. would require additional shielding of the monitor, but is a condition not anticipated in the well-designed ham shack. Inasmuch as the coupling must be adjusted for proper phone monitoring, the curve in *Fig. 2* indicates the action of the 6J6 plate detector.

When the r-f input is zero, there is a given plate current drawn by the detector section of the 6J6, and therefore a small value of plate voltage (point "x"). Now, as r.f. is coupled to the grid, it causes the grid to go more negative, and less current flows through the .1-megohm 6J6 plate loading resistor. This causes a rise in plate voltage. This continues, as more and more r.f. is coupled to the grid, until the grid is at cutoff. At this point (point "y") further increases in r-f input cause no further change in the 6J6. For c-w monitoring the 6J6 may be operated at any point on the curve, even beyond point "y."

For phone monitoring it is necessary to work on the slope of the curve between points "x" and "y," in order that proper detection of the modulation will take place. This adjustment is easily made, as it is necessary only to overcouple, then reduce coupling until a minimum of distortion is present. [*Continued on page 72*]



All resistors and condensers are mounted on the underside of the subpanel (the side toward the front panel). To the left of the speaker is the angle bracket supporting the two jacks.



Over-all view of the Swish-less v.f.o. The r-f components are entirely contained in the six-inch cube utility box resting on rubber grommets. The power supply and the control circuits are located in the base chassis and connections are made by a cable and plug. The toggle switch at the lower left is the a-c On-Off switch. The lever in the center controls the Operation switch and is shown in the "stand-by" position. With the lever thrown to the center the v.f.o. is on "tune" and may be set on the exact frequency desired without causing QRM on the air. Thrown to the right, the v.f.o. is inoperative until the Transmit switch is closed.

Swish-less V-F-O Control

A. DAVID MIDDELTON, W1CA*

A good v.f.o. designed to encourage proper use of this valuable operating aid

PROBABLY THE BIGGEST gripe most of us have against v-f-o operation is the way some fellows abuse the privilege of using a variable frequency gadget hooked onto the front end of their transmitter.

Like the weather, v-f-o technique has been much maligned and often talked about, but seldom is anything done about it. This article provides one solution to the problem of v-f-o control and describes a technique that is prescribed by built-in electrical features. This information, while perhaps not new, really offers a practical solution to the tuning and control of a v.f.o. and makes it almost impossible to "swish" a transmitter.

There will be those who will scoff at such an idea. There will be others who will say, "Aw that's not for me." Some of these guys will continue "swishing" and thereby cause the rest of us to tear out more hair every time we have some choice bit of DX blasted right off our receiver when they grind their kilowatts onto a poor little wobbly R3.

However, believing that there are still a large number of real sportsmen in ham radio, here's the idea, and maybe some of you lads will take a look, incorporate these features in your rig, and thereby add a golden star to your crown and earn the never-ending thanks of the other fellow.

This method of v-f-o control could be added to many existing types of equipment and this article does not hold forth on the merits or characteristics of any particular circuit. The layout is presented as one approach to the control problem, as applied to a v-f-o unit so constructed.

There are three conditions of operation of any variable frequency control unit; namely, *stand-by*, *tuning*, and *operate*. During the *stand-by* period, the filament and plate power should be on, and the unit immediately available at the flip of a convenient switch. This permits a choice between the normal crystal oscillator and a v.f.o.

On the *tune* position, only enough signal is desired to permit the proper placement of the transmitting frequency when listening on the receiver. The transmitter r-f section should *not* be on. Furthermore, it should be incapable of output during this frequency-setting process, even if the *Transmit* switch is *on*, and the rig is in a normal operating condition.

*23 River Glen RFD, Farmington, Conn.

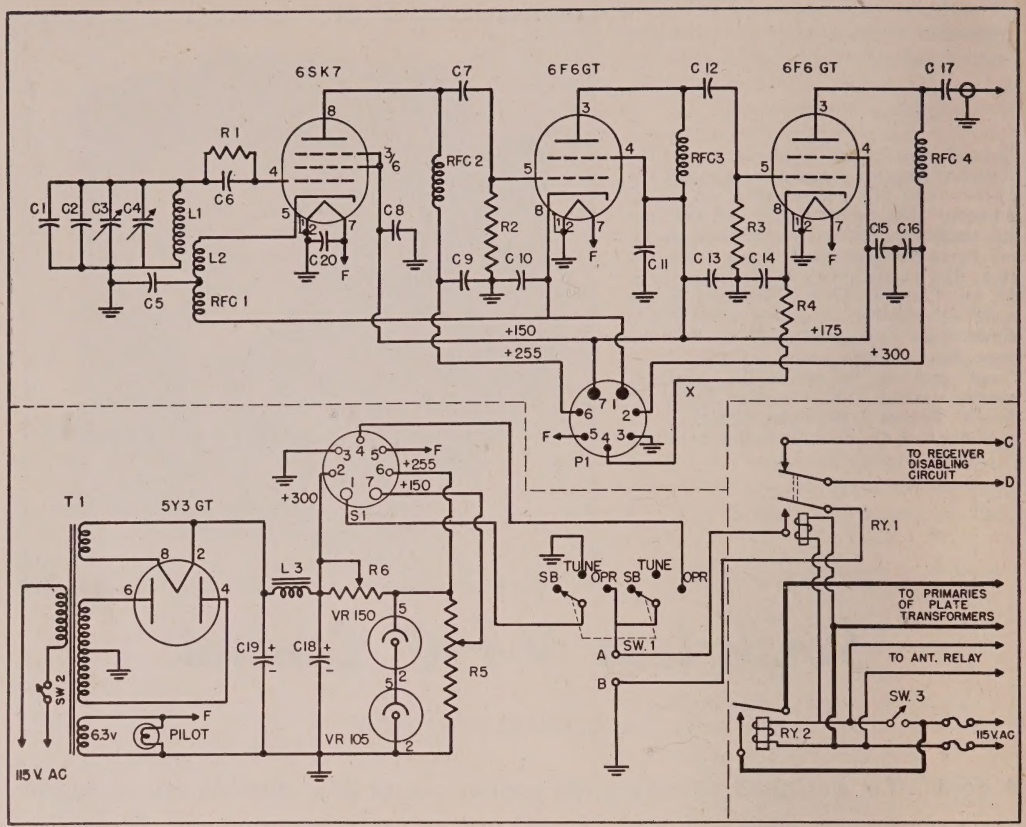


Fig. 1. Schematic diagram of the swish-less v.f.o. and the control circuits at transmitter and receiver. The r-f components are completely contained on a sub-base chassis and terminate in plug, P1. The supply cable socket, S1, the power supply and voltage regulation circuits are shown in the portion of the diagram enclosed in a dotted line.

C1—200 μμf zero-temperature coefficient ceramic.
C2—27 μμf zero temperature coefficient ceramic.
C3—50 μμf midget variable.
C4—100 μμf variable.
C5, C8, C9, C10, C11, C13, C14, C15, C16—0.01 μf, 400-volt, paper.
C6, C7, C12—100 μμf mica.
C17—250 μμf mica.
C18—40 μf, 450 volts, electrolytic.
C19—20 μf, 450 volts, electroyltic.
C20—0.002 μf, mica.
R1—750,000 ohms, ½ watt.
R2—50,000 ohms, 1 watt.
R3—100,000 ohms, 1 watt.
R4—220 ohms, 2 watt.
R5—20,000 ohms, 50-watt wirewound, variable.
R6—5,000 ohms, 50-watt wirewound, variable.
L1—16 turns No. 20, 1 inch diameter, 1¼ inches long, on ceramic form.
L2—3 turns No. 22 DCC interwound at ground end of L1.
L3—16 h 50-ma 550-ohms d-c resistance choke. Stancor C-1003.
SW1—3 position 2-pole rotary (Operation switch)
SW2—SPST (a-c on-off switch).
SW3—SPST (Transmit switch).
RFC1, RFC3—2.5 mh choke.
RFC2—6 mh choke.
S1—7-pin socket.
P1—7-prong plug.
RY1—2-pole, one open, one closed, relay (see text).
RY2—Single-pole relay, heavy-duty (see text).
T1—700-volts c.t., 70-ma transformer, with 5 v. @ 3 amp. and 6.3 v. @ 3 amp. Stancor P-4078.

When in the *operate* condition, the v.f.o. should be on frequency and ready to operate instantly, with its output controllable by means of the normal send-receive or transmit switch.

This method of v-f-o control is nearly foolproof. That word "nearly" is added since the operator himself would have to be innoculated with a "no swish serum" to obtain total foolproof operation.

This is definitely "old hat" and has been discussed in print and on the air, at great length, but from what one hears on the air any time day or night, a lot of the gang have either forgotten these truths, or they never read or never heard the previous discussions of the problem, or else—they just don't give a d--n!

As the Kingfish might say, "How do it work?" Switch, *SW1*, (see *Fig. 1*) is the answer to that

question. With the switch lever to the left, the v.f.o. is on *stand-by*, the plate and filament power is on, having had a.c. applied when a separate a-c on-off toggle (*SW2*) was closed. The cathodes of all the v-f-o tubes are open. If the transmitter is turned on, the v.f.o. will not supply any energy even if the circuit connected across terminals *A* and *B* is closed by the external relay. With *SW1* in the center or *tune* position, the cathodes of the oscillator and the 1st r-f tube are open. The 6SK7 is oscillating and its output is being amplified by the first 6F6GT. This signal is loud enough to use for calibration purposes. No v-f-o output is being fed into the transmitter, so no r.f. is getting out on the air.

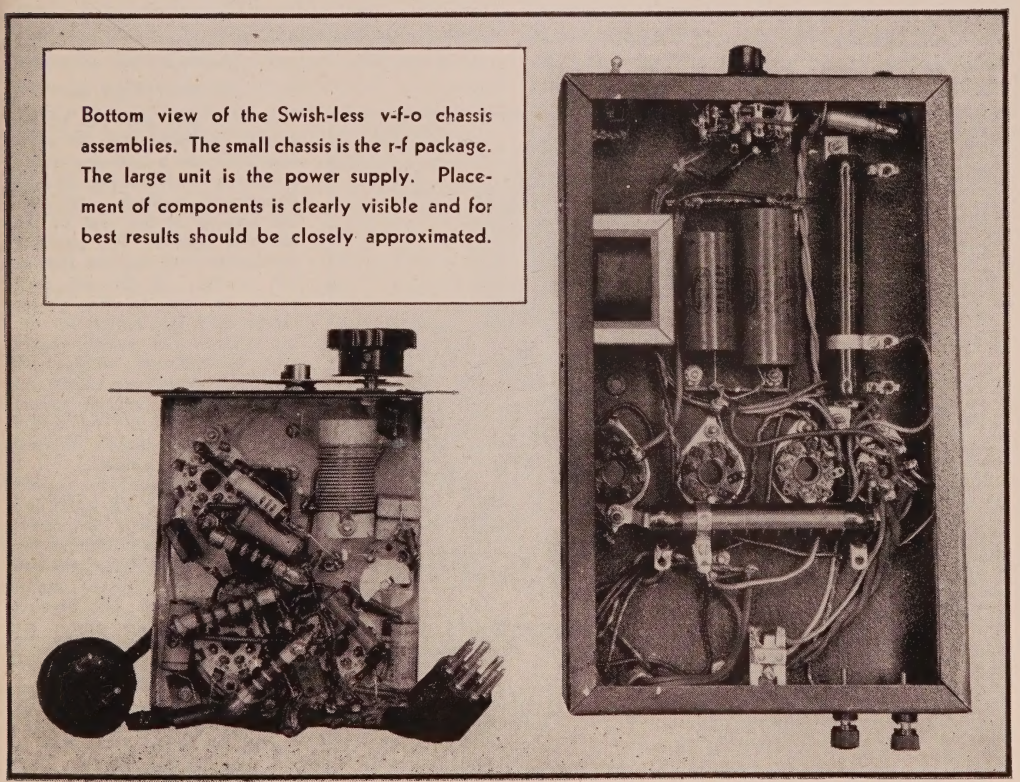
When *SW1* is to the right, on *operate*, all the cathodes are open and then ground returns are tied together and connected to terminals *A* and *B*. These are wired to a pair of contacts on the send-receive relay, *RY1*, in parallel with the relay, *RY2*, which turns on the input to the plate power supply. This control relay, *RY1*, may be some distance from the v.f.o. as this is merely a grounding circuit. Its lead length has no effect on the operation of the v.f.o. as it is by-passed for r.f. in the v.f.o.

Now, without starting an argument on the preferred practice or the actual tricks of handling a v.f.o., let's say it is desired to spot the transmitter on a given frequency on the receiver. The lever of *SW1* is thrown to the center (tune) position and the v-f-o dial rotated until the signal is placed where it will do the most good. (Did we get out of that one OK?)Even if the transmit switch is closed, there will be no "swishing" signal as the cathode output of the output tube in the v.f.o. is opened automatically by *SW1*, regardless of what has happened on Terminals *A* and *B*.

See how simple it is? You have already earned a gold star from each of the nine guys whom you did NOT QRM during that frequency setting operation. (Note—a Gold Star may be earned by doing a Good Act, or by *not* doing a Bad one!)

OK, so we have the transmitter frequency set where we want it. We are ready to pounce on the key or mike and let fly. The rig will stay in resonance over the small section of the band we are working, so we turn *SW1* to the right, *operate* position, and since our key or mike transmit switch is open, no signal is on the air until the circuit across terminals *A* and *B* is closed. The distant station signs and we press the transmit switch, and we're on the air!

Also, it might work like this. When we finish a transmission, we throw the transmit switch to



Bottom view of the Swish-less v-f-o chassis assemblies. The small chassis is the r-f package. The large unit is the power supply. Placement of components is clearly visible and for best results should be closely approximated.

off. This opens the relay contacts connected to terminals *A* and *B*, and closes those marked *C* and *D*, which makes the receiver operative and, also, the transmitter plate power is opened by *RY2*. We listen, set the v.f.o. on the next frequency by switching to *tune*, dial the v.f.o. and then switch to *operate*. We flip the transmit switch on, resonate the plate tank (this should take only a few seconds on the air) then open the transmit switch and sit back and wait for the next victim.

What has been accomplished? Well, we are on the desired frequency but since we have not swished the band, we have not QRMed the many other guys who are all just as interested in that distant station as we are.

Fool-proof? Well, almost. And all because of one automatic feature. If the relay method is used, the receiver is *dead* when the transmitter is actually energized and putting out r.f. The receiver is live when setting up the frequency, but dead when the final is on. You can't *hear* your transmitter when the power is on!

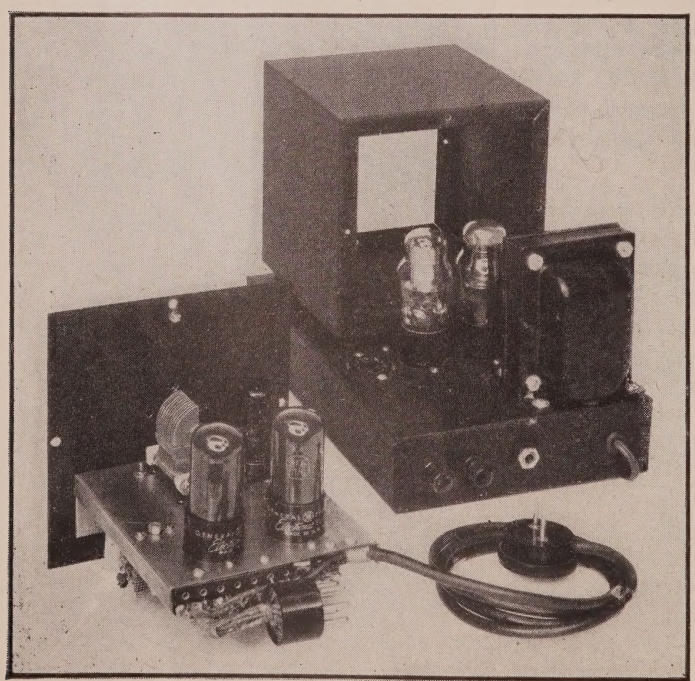
Already, I can hear the loud cries? What? NO break-in! After all, how many hams really use break-in especially when working DX. Now don't get me wrong! I personally am in favor of using break-in and do use it most of the time, by keying the oscillator, be it v.f.o. or crystal, so don't try to start an argument about the merits of break-in. It so happens that at W8AZU, like at many other stations, break-in is not used and this unit was built for him. Had it been, there would be a slightly different approach, such as some arrangement making the receiver live, when the transmitter is on which might refute the "swishless" feature.

The v-f-o circuit is not a new one, but it is darned good. It is merely a practical application of the best features of several types of v-f-o units well publicized in by-gone years. A 6SK7 is operated on the 80-meter band with plenty of padding and is tuned by a double-bearing type variable. Feedback is provided by a cathode winding interwound at the ground end of the grid coil. The cold end of the cathode coil is by-passed. The oscillator "plate" is formed by the screen and suppressor tied together, by-passed and fed approximately 70% of the voltage fed to the actual plate (pin) of the tube. This ratio has proven to give good stability. A VR105 and a VR150 in series, stabilize this higher voltage and a 20,000-ohm divider across it furnishes the proper lower voltage for the oscillator.

The electron-coupled 6SK7 is followed by an impedance-coupled 6F6GT and its cathode is tied into the oscillator cathode circuit *below* the r-f choke. A second 6F6GT is also impedance coupled. This particular v.f.o. was designed to take the place of 80-meter crystals, and high output was not necessary. Capacity coupling from the plate of the second 6F6GT to a coax line feeds the output of the v.f.o. into the grid of the normal crystal oscillator tube.

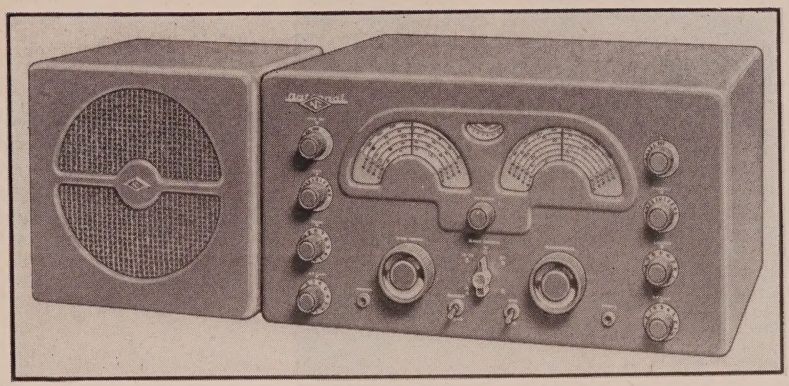
One very objectionable characteristic of many

[*Continued on page 77*]



The v-f-o unit with the r-f assembly removed from its case. The 6SK7 sits beside the tuning condenser and the two 6F6GT impedance-coupled amplifiers are located at the rear of the sub-base chassis. The padding condenser shaft may be seen at left center. A tie lug strip across the rear of the chassis serves as a termination for the short seven-wire supply cable and the internal wiring. A shielded microphone cable, terminated in an unused crystal holder connects the r-f output into the transmitter's normal crystal socket.

On the base chassis, the supply cable socket, the VR tubes and the rectifier are in a row across the chassis directly behind the r-f package. The filter choke and components are located underneath the chassis. The binding posts on the rear apron are Terminals A and B, connecting to the contacts on the send-receive relay. The closed-circuit jack on the rear apron permits keying the cathode of the output r-f tube as shown at point X in Fig. 1.



Modern Receiver Design

EUGENE BLACK, JR., W2ESO*

THE POSTWAR INCREASE in size of the ham fraternity, plus renewed enthusiasm on the part of old-timers due to the long layoff, has made ham radio a bigger business than ever before. With a larger market for receivers, for example, manufacturers in this field have been able to adopt techniques and mass production methods which were not previously economically justified with limited production schedules.

Probably the most obvious of the innovations is styling by industrial designers, a change recognizable even to the non-radio-minded OW and XYL. Dust-catching black crackle finishes are pretty much on the way out, replaced by smooth finishes and lighter colors, specified by consultants who are unhampered by traditions.

The bigger ham market is also having its effect on receiver circuit design. While it is still necessary to consider the needs of the average commercial user and the SWL, the larger percentage of ham purchasers gives the designer somewhat more freedom, and the more diversified ham activity of today demands more flexibility, including greater frequency coverage, than we had in our standardized prewar sets. As a result, the newer crop of receivers contains circuit features of interest not only to prospective purchasers but also to those who like to build their own, and to owners of older sets who have the courage to wade in and revamp them from time to time.

One of the most interesting of the new models is National's NC-173, which includes a number of new circuit refinements. A power take-off on the rear of the chassis to permit borrowing plate and heater voltage for a converter, monitor or other gadgets is a handy addition. A novel twist is the substitution of slots along the side of the lid in place of the usual latch or welded "dimple;" the reasoning behind this is apparently that since the antenna terminals are available from the back of the set, the user will have little need to lift the lid after his initial inspection. After you know the slots are there, the idea is accepted, but we heard one casual observer at an I.R.E. convention ask, "What do you do when you want to replace a bum tube—turn the set upside down so the lid will fall open?" (He got his answer with a grin and a wordless demonstration).

To the c-w man, the biggest single improvement is the noise limiter, which works on c.w.

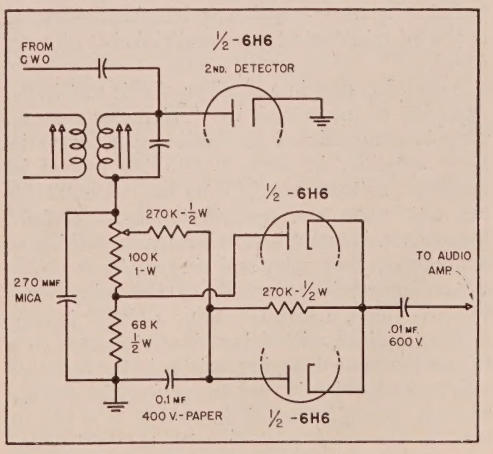
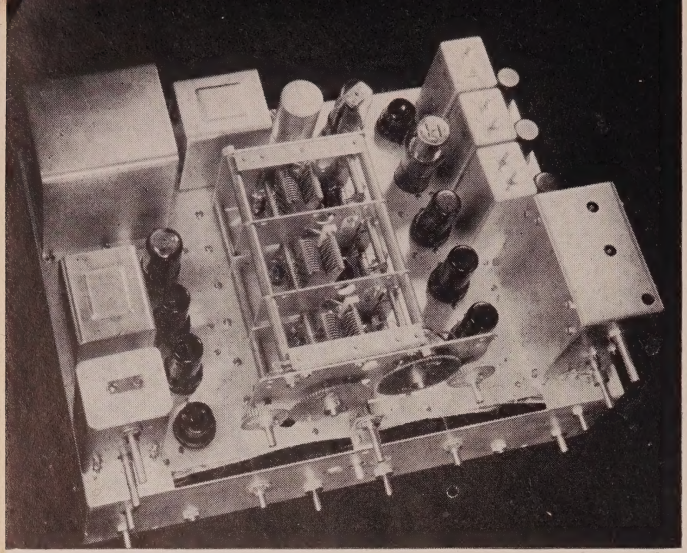


Fig. 1. Series-shunt noise limiter.

*446 Ocean Ave., Brooklyn, N. Y.



The modern commercial receiver has taken full advantage of machine-tool developments and as a result it approaches mechanical perfection. This is a top view of the NC-173.

as well as 'phone. The circuit is shown in *Fig. 1*, and is a combination of series-diode and shunt-diode limiters. By means of a 100K pot, the clipping level may be set, and the circuit will then adjust itself to maintain limiting at this relative level despite changes in carrier strength, providing such changes take place at a rate slower than the time constant of the filter circuit consisting of the 270K resistor and 0.1-μf condenser. With the values shown, this represents a frequency lower than about forty cycles per second.

The i-f system in the NC-173 is somewhat unconventional, in that the cathodes of both i-f amplifiers (as well as the r-f amplifier) are grounded; r-f gain is controlled by deriving a voltage negative with respect to chassis from the plate supply, and superimposing this controlled voltage on the a-v-c bus. Stability of the i-f system is further improved by the use of low-impedance slug-tuned transformers; since the fixed capacity across primary and secondary of these units is 500 $\mu\mu$f, variations in tube characteristics due to a-v-c action or changing the setting of the r-f gain control have negligible i-f detuning effect.

Something new in a receiver of this sort is the usability of a.v.c. and the "S" meter on c.w. This is accomplished by feeding a separate i-f a-v-c amplifier in parallel with the second i-f amplifier, so that voltage from the c-w oscillator can not reach and operate the a-v-c system. Since a.v.c. is really inverse feedback working at a relatively slow rate, and since flatness of the a-v-c characteristic depends on the gain within the a-v-c loop, a high *Gm* tube, a 6AC7, is used as the amplifier, with delay bias obtained from a tap on the same dropping resistor in the negative supply lead which is used to furnish bias for the r-f gain control. One diode section of a 6H6 is used as the a-v-c rectifier, with the "S" meter actuated by the rectified current of this tube; this arrangement insures against meter overload during warm-up periods or occasioned by tube failure, as current flows through the meter only when the a.v.c. is working. By returning the meter to the arm of the gain control, additional delay voltage is introduced when the gain control

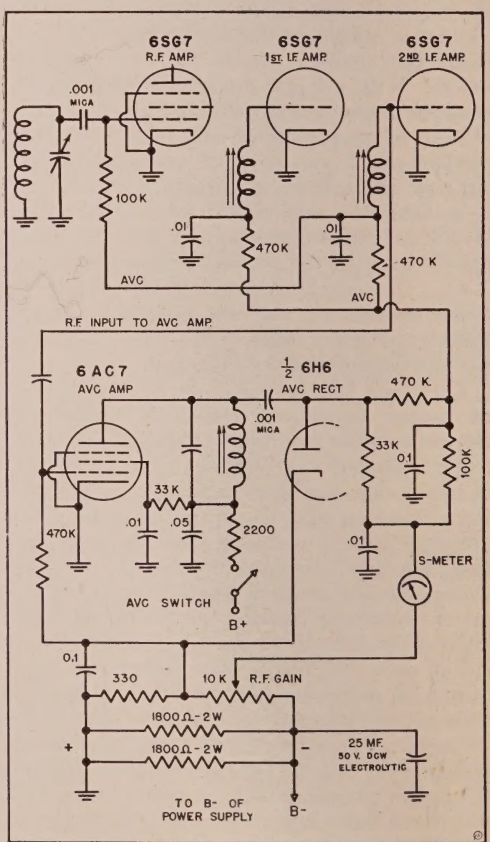


Fig. 2. A-V-C system, S-meter and r-f gain control.

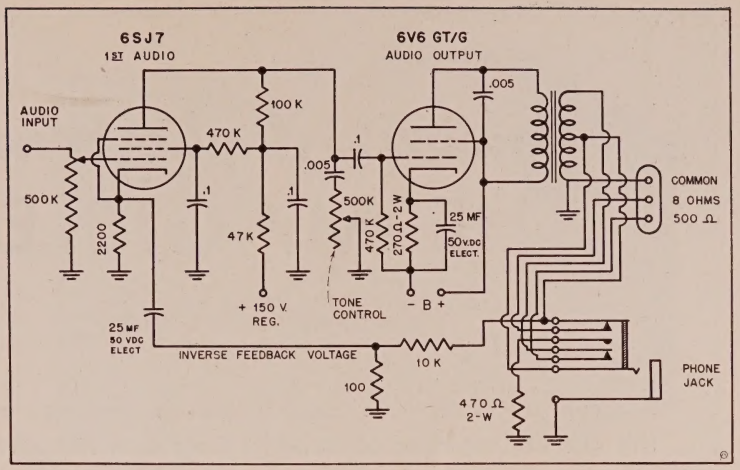


Fig. 3. Audio amplifier circuit. For maximum output, the full power supply voltage is applied to the 6V6GT. Inserting phone plug in the jack removes audio voltage from the output terminal strip and shunts a protective load across the 500-ohm secondary winding.

is retarded, and meter sensitivity is reduced. Meter calibration is off under these circumstances, of course, but it is a handy method for comparing strong signals which would otherwise pin the meter.

Figure 2 gives details of the a-v-c, "S-meter" and r-f gain control circuits. The preselector stage is shunt fed as far as a-v-c voltage is concerned, to simplify front-end design, but the i-f amplifiers are series fed in the usual manner; shunt feed in these stages would be of no advantage, and can lead to blocking on strong signals, and inability to work satisfactory push-to-talk or c-w break-in.

Even the power supply contains a few tricks. Since a VR-150 is used to stabilize the high-frequency oscillator, advantage is taken of the filtering action of the VR tube and its dropping resistor to eliminate the usual second filter choke and condenser. The first audio stage, preselector screen grid and mixer screen are fed from the regulated line, as these circuits are most susceptible to hum modulation, and further reduction of the fundamental ripple frequency is obtained by parallel resonating the filter choke with a 0.1-μf condenser.

To improve audio quality, inverse feedback is applied from the secondary of the output transformer back to the cathode of the 6SJ7 first audio stage. The circuit is interesting in that it combines both current feedback and voltage feedback, thus avoiding the reduction of speaker damping which results when current feedback alone is used. Another feature we like is that the same relative audio level holds when going from 'phones to speaker; maybe it just works out that way with our high impedance 'phones and our particular set of tin ears, but at any rate it's no longer necessary to cut the audio gain before pulling out the 'phone plug, and then cautiously run it up again.

You might sum it up by saying that the post-war receivers incorporate a lot of advances not readily apparent from a quick inspection. But once you use them you'll notice the difference.

Postscripts

Entire 420-450 Mc Band Now Open

Effective June 12th, the F.C.C. released for immediate use by amateurs the frequencies from 430 to 450 mc with types A0, A1, A2, A3, A4 and A5 emissions, and special emissions for frequency modulation (radiotelephone and radiotelegraph transmissions employing carrier shift or other FM techniques), all with peak antenna power limitation of 50 watts. This now makes available to amateurs the entire 420-450 mc band.

Ham Spirit

True ham spirit was demonstrated strikingly to George Bowen, W7JGW, ex-W8VLT. George, who went West for his health, had a setback and the work around the QTH piled up. Most of all, the house needed painting badly. Bright and early one Saturday morning there appeared on the scene five ambitious gentlemen armed with ladders, brushes, and paint. They were W7OMH, W7JNE, W7KKX, W7TSZ, W7JQO and W7TSZ's brother, all of whom painted the place from top to bottom and wouldn't accept a dime. That *is* Ham Spirit.

Ham Radio Goes Golfing

A new role in communications assistance was offered by amateur radio during the playing of the sixth annual All-American golf tournaments at the Tam O'Shanter Country Club in Chicago. To facilitate coverage by the eight movie trucks, when a player suddenly became "hot" at any particular hole the news was sent to headquarters by walkie-talkies furnished and operated by members of the Northwest Amateur Radio Club. The motion picture men were then directed over the shortest route to the center of action.

Amateur Applications of THE MAGIC EYE

RICHARD H. DORF, W2QMI*

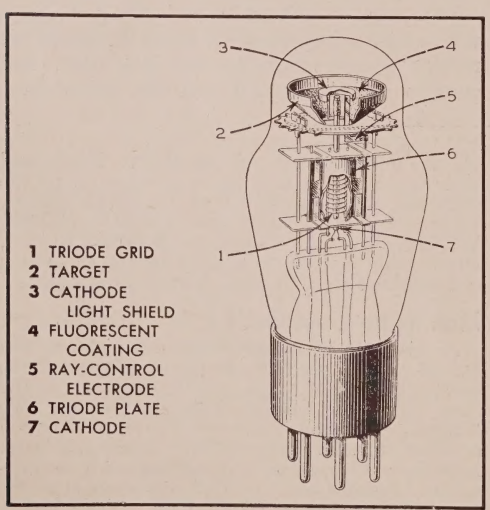
Electron-ray tubes have many uses in the average amateur station. This class of tube and some of its more common uses are discussed.

SOME YEARS AGO RCA developed a vacuum tube whose sole purpose in life was to provide a visual indication of changes in voltage. This tube soon became known as the "Magic eye." While the green glaring "eye" looks out from the panel of many of our commercial broadcast receivers the ham fraternity does not seem to be making as much use of these tubes as is possible. This appears strange because its simplicity and low cost coupled with an unbelievable versatility should make the electron-ray tube an invaluable piece of test equipment.

Magic Eye Design

The more often used electron-ray tubes, such as the 6U5, 6N5 and 6E5, contain within one glass envelope a voltage amplifier, a cathode ray target and a target control electrode. *Fig. 1* shows the elements in a cut-away drawing. In the center is the emitting cathode, surrounded by the triode grid and then the triode plate. The ray-control electrode is a narrow strip of metal attached to one end of the plate support and electrically connected to the plate. This electrode extends upward through the center hole of the target ring and its upper portion is between the upper part of the cathode and one side of the target. The target is coated with a material that when under the bombardment of electrons from the cathode will fluoresce.

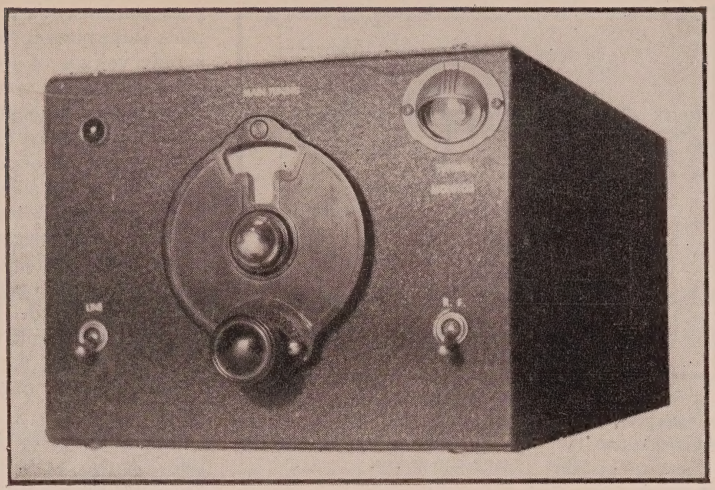
*160 West 77th Street, New York 24, N. Y.



Structure of electron-ray tube (magic eye) 6E5. (*Courtesy RCA*)

A face on the view of the "eye" is shown in *Fig. 2*. It will be noted that the target control electrode is in such a location that a negative field surrounding the electrode will tend to keep the electrons from reaching the area directly below the control electrode. It is obvious that the more negative the control electrode (not the grid) becomes the wider the darkened area will become; therefore, the shadow or the darkened area will be proportional to the negative potential of the control electrode with respect to the target.

In the 6E5 and similar types, the control electrode is connected to the plate of a voltage amplifier triode within the same envelope. Now consider the schematic drawing in *Fig. 3*. *K*, *G*, and *P* are the cathode, grid and plate of the voltage amplifier. *R* is the ray-control electrode and *T* the target. In this case the plate supply voltage of 250 volts is applied directly to the target and through a one-megohm resistor to the triode plate. A grid leak is provided, but there is no grid bias. Under these conditions the triode plate will draw about 0.24 ma. This current when passing through a one-megohm resistor will cause a voltage drop of about 240 volts.



The magic eye lends itself to many applications where space is at a premium, since the panel-type mounting requires no chassis space. This eye is shown installed to indicate band-edge limits in a v.f.o.

Hence the plate end of the resistor will be negative with respect to the target and correspondingly the control electrode. This produces the maximum normal shadow angle of about 90°.

If we apply a negative voltage to the triode grid, we will decrease the triode plate current and the voltage drop across the resistor. In that case the control electrode will become less negative with respect to the target and more electrons will strike the area below the electrode and the shadow angle will decrease. In the 6E5, a negative grid voltage of 8 volts will just suffice to close the shadow to 0°. In other words, we have a device that will indicate changes in voltages of 8 volts or less. *Fig. 3* shows the method of using the electron-ray tube for this purpose. If the voltage changes to be observed are considerably less than 8 volts, a separate d-c amplifier may be used, if desired, ahead of the triode grid of the ray tube. If the voltages are high, it may be necessary to use a series multiplier or a potentiometer, with the grid connected to the moving arm to select the optimum value for observation.

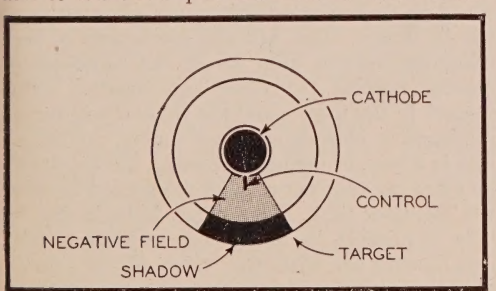


Fig. 2. The magic eye obtains its name from the appearance when viewed from the cathode ray end. The control electrode is attached to the plate of the voltage amplifier in the same glass envelope. Variations in the plate current cause the electrode to become more or less negative with respect to the target. (*Courtesy RCA*)

There are at least two simple ways of using the ray tube for tuning up the transmitter. The method shown in *Fig. 4* uses the triode section as a plate detector. The target and plate are supplied as usual, but the cathode is attached to the center arm of a 10,000-ohm potentiometer which is in series with a 10,000-ohm resistor across the power supply. The potentiometer adjusts the negative bias and is rotated until the grid is sufficiently negative, with no r-f signal applied to cause the zero shadow angle on the target. The grid is then coupled to a source of r.f., where the positive peaks cause an increase in the average plate current which widens the shadow angle. Modulation may be observed by keeping the by-pass condenser to a fairly low value. In the experimental models built by the writer, it was found that a free lead from the grid may simply be placed in the vicinity of the r-f circuit to be measured.

A somewhat more practical approach to the problem is to use the ray tube to detect resonance, the increased r-f voltage will cause the "eye" to widen to its maximum angle. In some

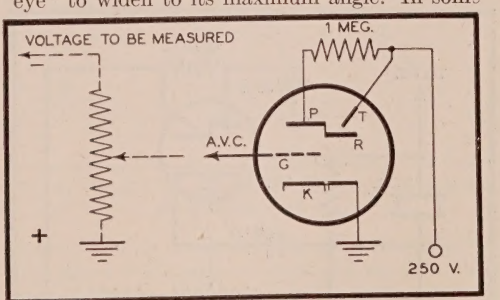


Fig. 3. The most simple application of the magic eye is to just tie the grid into the receiver's a-v-c line. However, the magic eye measures variations in voltages and may be used for this purpose by attaching a potentiometer to the voltage with the variable arm to the electron ray tube grid.

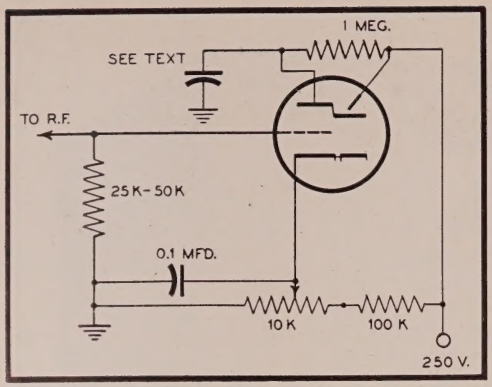


Fig. 4. Many r-f and a-f measurements may be made by using the triode section of the magic eye as a plate detector. See the text for the correct values of the plate by-pass condenser.

cases, it may be necessary to over-bias the ray tube, which is indicated by an overlapping of the lighted areas. This does not harm the tube, but will permit the shadow to be set at less than 90° so the true peaks may be noted.

A second method of observing tuning suggests itself when the magnitude of the grid current of the following stage is considered. In this instance, it is only necessary to couple the ray tube grid through a suitable isolating resistor to some point on the grid-leak. In this way, the maximum d-c voltage induced from the preceding stage will cause the "eye" to close. Some care will be necessary in order that the grid voltage does not exceed the value necessary to close the "eye".

Audio Volume Indication

The ray tube makes an excellent volume indicator in all types of speech equipment. Most of the indication circuits are equivalent to that shown in *Fig. 4*. In the case of audio work, however, the plate by-pass should be fairly large—from one to five microfarads. The cathode by-pass condenser is a standard electrolytic. The plate target resistor should be one megohm for a supply voltage of 150 volts or more, or 500,000 ohms for supply voltages of less than 150 volts. As a volume indicator, the triode is again employed as a plate detector or simple rectifier. Average values of a-f voltage are indicated by the width of the shadow.

While in the above discussions the ray tube has been biased negative to obtain a zero shadow angle, it will be found that in certain applications the triode may be left unbiased and the cathode directly grounded. If the amplitude of the a-f voltage is sufficient, the negative peaks will close the "eye" since the plate current-grid voltage characteristic is more nearly linear in the upper section.

One very interesting use for the electron-ray tube is as a transmitter control oscillator. *Fig. 5* shows the tube used in the simple crystal oscillator circuit. The plate is shunt-fed through the target-plate resistor. The tank is connected, through a capacitor, to the triode plate as in conventional practice. When the final tank is tuned to resonance a minimum of plate current will be drawn. This will also correspond to the minimum voltage drop across the target-plate resistor making the plate less negative with respect to the target, and the shadow will reach minimum to indicate oscillator tuning. Actually, this is a case of doubled economy, since neither an extra ray tube nor a meter are needed to tune the oscillator tank. The circuit is basic and is only applicable in low power oscillators, but experimentation with the value of the plate-target resistor should provide optimum results.

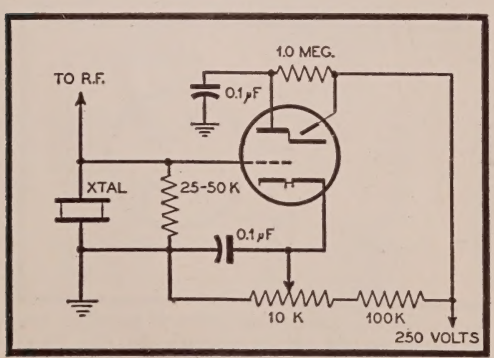


Fig. 5. The magic eye may also be used as a low power crystal controlled oscillator. The width of the shadow will indicate tuning in plate tank circuit.

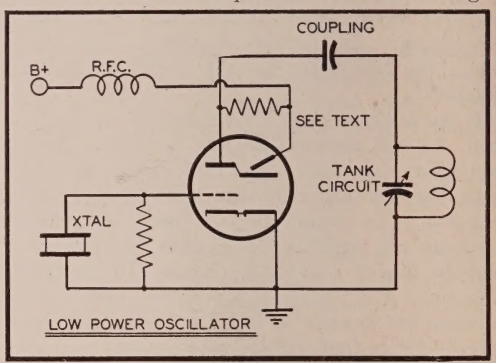


Fig. 6. An important addition to any ham shack should be this circuit of a band edge marker. The crystal does not oscillate until excited by an r-f carrier. If the crystals are ground for frequencies near the edge of the band, the eye will close if your carrier wanders toward that edge.

Calibrating The V.F.O.

The circuit shown in *Fig. 6* has the advantage of providing a visual marker for those who oper-

[*Continued on page 79*]

The Cardioid Beam Antenna

EDWARD F. HARRIS, W9KNK*

By looking for minimum QRM instead of maximum gain, W9KNK has produced a simple beam offering an interesting and novel approach to the QRM problem.

EACH DAY EVIDENCE is piling up to confirm the fact that amateur radio is entering into a new and most difficult phase of operation. The characteristics of the narrow amateur bands have actually been altered in this postwar era of operation. 75 and 20, definitely crowded to capacity in 1941 when we left the air, are today infinitely worse. Yet we are just beginning to feel the tremendous expansion of the ham fraternity. We are up against it and it is going to be up to the individual to do something about it.

A half-wave doublet had been employed with phenomenal success while overseas in Tokyo both for receiving and transmitting. About a week after settling down at the home QTH the old 20-meter rig was fired up and coupled into a half-wave doublet. After a few hours of listening and several attempts at QSO it was apparent that something more than the doublet was in order. No sooner would a station be called and contact established than the good old QRM would set in and that was that. The only alternative to pulling the big switch permanently was to figure out some means of licking this terrific QRM.

Since the receiver used combined all the latest advantages of selectivity afforded by variable crystal and i-f band pass it was decided that there was nothing more to be gained in this direction. Also the radiated power from the doublet should have been more than sufficient to produce good signals at the DX location. The trouble lay in the fact that there was almost always more than one R9 signal on a particular frequency at any specific time. The exceptions were rare indeed. The one possible avenue of escape was by means of the antenna system and the following represents at least a beginning in this direction. It is hoped that enough interest may be aroused to encourage future development along these lines with resulting benefit to all.

All work has been done on 20 keeping in mind that any developments are even more easily adaptable to 10 and 15-meter operation. Until the present time the accepted beam antenna for these frequencies has been the parasitic array, usually close spaced. It has proved to be a very practical antenna in that is it easily adjusted and will produce an appreciable amount of gain both for receiving and transmitting as well as a good front-to-back ratio. In fact it is the latter feature of this beam which makes it more valuable to the amateur's application than its ability to produce a gain in the desired direction. However, its one failing is that in no direction does it produce an absolute null, particularly in the case of only a 2 or 3-element beam.

The Problem

Consider the terrific advantages to be gained from an absolute null in the pattern of the rotary beam antenna. In transmitting there will be some direction in which there will be no interfering signal radiated but most important is that during reception it will be possible to discriminate against an unwanted signal to the point of complete elimination. In fact, if the null is quite sharp, say ten to twenty degrees, it is conceivable that we could work either of two R9 signals on the same frequency as long as the signals are arriving

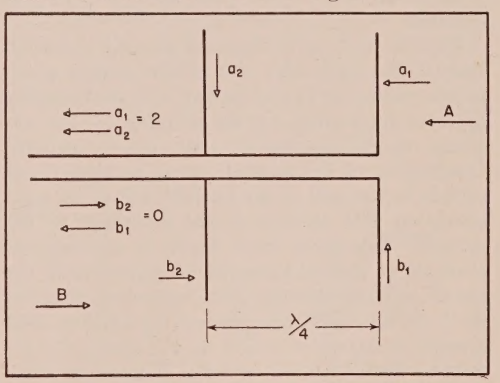


Fig. 1. Theory of operation of cardioid beam in use at W9KNK (see text)

*6748 N. Ashland Ave., Chicago 26, Ill.

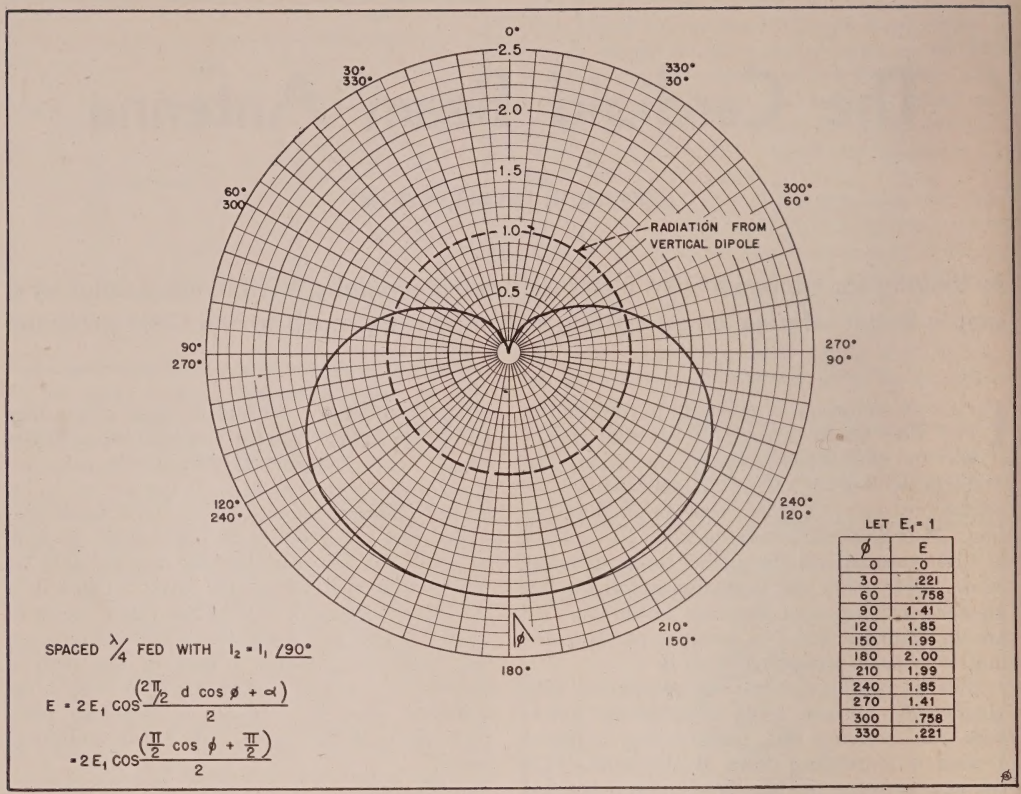


Fig. 2. Horizontal radiation pattern from two vertical half-wave elements quarter-wavelength spaced and fed 90° in phase as compared to radiation pattern of vertical dipole.

with an azimuth differential of more than twenty degrees.

Besides these advantages of general operation there is the particular case of the station which is located near or in a large city with the majority of local interfering signals arriving at the antenna on approximately the same azimuth. Orientation of the antenna so as to place these signals in the null of the pattern will allow good operation with stations in the remainder of the pattern. Operation from Japan is an excellent example of just what might be gained from the use of such an antenna. It so happens that about 90 % of the QRM encountered by stations that operate in Japan is caused by the stations transmitting from Okinawa and the Phillipines which must aim through Japan on the way to the states. A null in the pattern of the receiving antenna of a station in Tokyo, for example, would completely eliminate this trouble with much increased success in stateside contacts; at the same time lending a hand to the boys in the islands by the lack of radiation in their direction. Of course the boys in Japan have the edge in that they can discriminate against unwanted signals from the islands whereas the reverse is not true since the boys on Okinawa and the Phillipines must favor Japan in listening to signals from the states. If one is located within a ring of interfering signals the problem becomes more acute and it is a matter of eliminating a particular station on the listening frequency at any one time.

A Proposed Solution

After weighing the various factors of size, ease of adjustment, and simplicity of construction of the several types of arrays which produce a radiation pattern containing a null, as well as careful consideration of the general pattern which exists in addition to the null, the cardioid antenna was decided upon. The results produced are very gratifying.

The array consists of two half waves spaced a quarter wave and fed 90 degrees in phase. Refering to *Fig. 1*, the theory of the array is shown. A signal arriving from direction *A* will induce voltages *a1* and *a2* in the elements 1 and 2. In traveling the quarter wave from element 1 to element 2, *a1* suffers a 90 degree rotation so that when it arrives at element 2 it is in phase with *a2* and the two voltages add. A signal arriving from direction *B* will induce voltages *b1* and *b2*

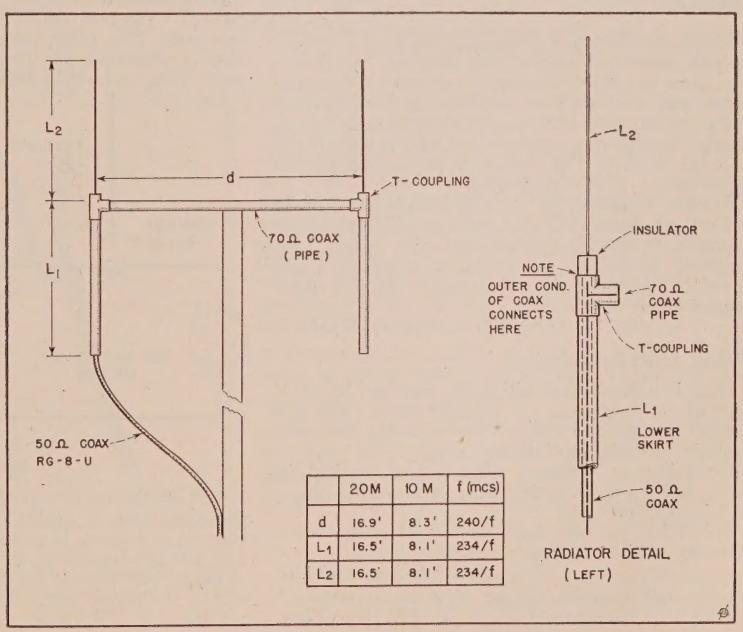
in the respective elements but when *b1* has traveled along the transmission line to combine with voltage *b2* the 90 degree phase rotation places it 180 degrees out of phase with *b2* and the voltages cancel, thus producing a null in this direction. Waves arriving from intermediate angles suffer different phase differentials in the two elements but there is always the 90 degree rotation of the vector from element 1 to 2 where the voltages combine. The resultant pattern is the well known cardioid and is the same on transmitting and receiving. *Fig. 2* shows the development for obtaining the pattern in mathematical terms showing also the relationship between the pattern of the beam and that of a simple vertical dipole radiator.

At first glance the relatively broad radiation pattern of the antenna may seem to be a disadvantage but it must be remembered that this development was undertaken for a specific purpose, to combat QRM in a crowded amateur band. The extreme value of the null in the pattern was previously discussed and this factor alone, more than any possible attainable front-to-back ratio of a parasitic array, is responsible for the successful operation in our application where strong signals may be expected from any direction.

Consider the case of two signals arriving from opposite directions on the same frequency, both of them having approximately the same signal strength. With a parasitic array having a front-to-back ratio of twenty or so, either signal could be received and copied satisfactorily at the discretion of the operator. But if one of the signals were twenty times as strong as the other (a common occurrence if one is a local) it would be impractical to work the weaker signal. In fact it is difficult to work the weaker signal with such a beam if the weaker has much less than half the signal strength of the stronger since the heterodyne is bad enough to make the desired signal hard too read. Now consider for a moment what an absolute null means in terms of a front-to-back ratio. It means that we have at our disposal a ratio of infinity; furthermore this ratio need not be applied to signals arriving from opposite directions only. With proper use of the null the infinite ratio exists between directions separated by much less than 180 degrees. In fact, it is possible to realize an infinite ratio between signals arriving from directions separated by only 20 degrees or more. This characteristic immediately opens a whole new field of possibilities and extends realization of contact into regions of signal ratios heretofore considered entirely unsatisfactory for communication. Since there is a theoretical gain in the foreward direction of two, it is most satisfactory to receive the desired signal on the front end of the beam, but in combating QRM it is not so important to raise the signal strength of the received signal as it is to eliminate the unwanted signal. Suppose there is an R9 and an R6 signal on the same frequency but arriving from opposite directions. In this case the R9 signal can be zeroed into the null of the pattern and the weaker signal favored and possibly received with

[*Continued on page 75*]

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	20M	10 M	f (mcs)
d	16.9'	8.3'	240/f
L_1	16.5'	8.1'	234/f
L_2	16.5'	8.1'	234/f

Fig. 3. Design data for the cardioid beam.

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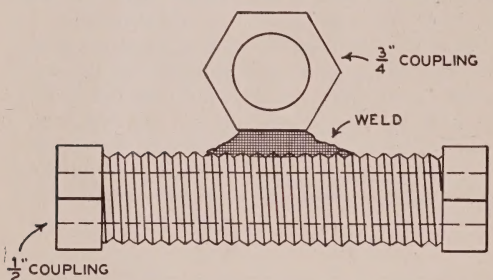
Inside the SHACK AND WORKSHOP

Conducted by A. DAVID MIDDELTON, W1CA*

Versatile "Plumber's Delight"

It was desired to construct a "Plumber's Delight" beam that would require no cutting or welding of any of the elements, could be easily assembled or disassembled, and would be fully adjustable.

These three features were accomplished at WØIWT by having the local welding shop weld conduit couplings together at *right-angles* to each other, as shown in the drawing. One coupling had a ¾-inch hole (to accommodate the main boom of the beam which was ¾-inch tubing), and the other coupling accepted the ½-inch tubing, used for the beam elements. The small ridges inside the couplings were filed out, thus permitting the tubing to slide through. Holes were drilled thru the couplings and elements to take metal pins, holding the elements in place after the proper spacing was determined.



In constructing this beam, one ten-foot length of ¾-inch aluminum tubing was used for the boom. The three welded double-couplings were slid on the boom and the beam elements (reflector, radiator and director) were slid into their respective collars. Shorter lengths of a smaller sized tubing were fitted into the ends of the elements, permitting proper adjustments of element length.

Another coupling, having a ¾-inch hole, could be welded onto another fitting, say one of 1-inch inside diameter, to provide a mounting for the beam. This coupling, placed at the center of gravity of the assembled boom, could be fitted onto a pipe or other supporting medium.

E. V. Stolberg, WØIWT

Water-Cooled Soldering

Here is a stunt that will save countless hours of grief when working on polystyrene sockets and coil forms. Usually the heat of the soldering iron will melt the material and loosen the pins.

By using an ordinary *pipe cleaner*, soaked in water and wrapped several times around the pin, a neat job can be done.

This trick can also be used to advantage when soldering a 1N34 crystal.

Frank B. Lee, VE3AOZ

**Address all contributions to: S. & W Department % CQ, 242 Madison Ave., N. Y. 17, New York.*

Reactance Chart Provides Values for R-C Networks

Frequency-selective resistance-capacitance networks are finding increasing application in amateur and experimental apparatus. Some of the present common uses include Wien bridge circuits and parallel-T networks in low-distortion oscillators, similar networks in wave analyzers and distortion meters, Wien bridges for heterodyne elimination in amateur 'phone receivers, and series or parallel R-C circuits in tuned a-f amplifiers.

Experimenters who have assembled these networks and rebelled against the reciprocal-type calculations required to figure capacitance, frequency, and resistance values, will be glad to know that the ordinary "reactance chart" printed in so many radio textbooks can be used to determine all of the values.

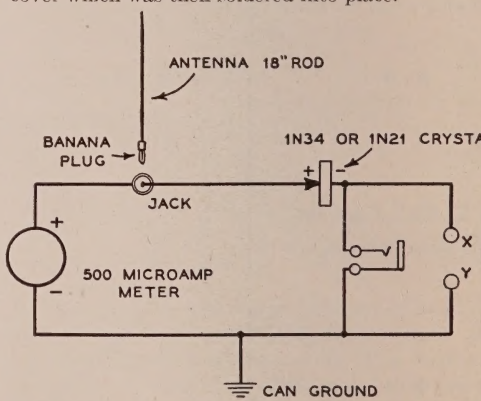
The scheme is simple: Resistance values are found on the *reactance* scale of the chart, capacitance values on the *capacitance* scale, and frequency values on the frequency scale. Use of this familiar chart will eliminate much arithmetical drudgery in the design of all R-C networks in which $f = \frac{1}{2\pi RC}$.

Rufus. P. Turner, W1AY

"Coffee Can" Field Strength Meter

A simple field strength meter and a 'phone monitor that I built into a metal coffee can is shown in the illustration. I used a surplus 1N21 crystal and a 500-microampere meter and obtain good sensitivity with elaborate construction work.

The antenna is made from an 18-inch piece of ¼-inch copper tubing with a banana plug soldered to one end. This plugs into an insulated jack in the can. I mounted all the parts right on the can's cover which was then soldered into place.



For maximum sensitivity, short the two binding posts marked *X* and *Y*. For a lower sensitivity, place a resistance between the binding posts, with just enough resistance to keep the meter on scale. A phone jack across *X* and *Y* makes a 'phone monitor of the meter unit.

Milt Kalashian, W1NXT

More on Super-Refraction

OLIVER PERRY FERRELL*
and
ALAN WILSON**

It would appear that the day when we can predict our best DX conditions to the hour and minute is steadily drawing near. Each day, not only do we add to the store of our knowledge of the ionosphere, but of even more importance to the v-h-f ham, we learn more concerning tropospheric super-refraction, that is, trapping or bending of 2 and 6-meter waves. An introduction to this subject appeared in the October, 1946, issue of *CQ* on page 14. Since that time a considerable quantity of war research has been released. From these reports we have been able to draw the following comprehensive study.

Cause of Super-Refraction

Super-refraction below one meter, the atmospheric bending of two meters and the extension of the six-meter ground wave are all caused by the rapid decrease in the tropospheric index of refraction. Generally this important variation occurs within 5000 feet of the surface of the earth. The refractive index of the atmosphere depends upon the distribution of specific humidity—or moisture—and temperature. Within the troposphere it is common to expect the temperature of the surrounding air to drop when unsaturated at the rate of about one degree centigrade for every 100 meters of ascent. Normally, we may also expect the humidity to decrease with height. During these standard conditions, the transmission of 6 and 2-meter signals is confined to the theoretical 4/3 radius expansion of the earth's surface. That is, while some refraction in the atmosphere is always present, it can be taken into account by assuming that the radius of the earth is 4/3 x 3959 miles, thereby extending the points of optical tangency.

During certain weather conditions, however, the lapse-rate of the normal atmosphere is not maintained. This may manifest itself by the actual increase in temperature during ascent or more commonly it may be a function where the actual air temperature decrease is less than the normal lapse-rate. In either case, this variation is called a *temperature inversion*. The part played by the moisture content variation in the atmos-

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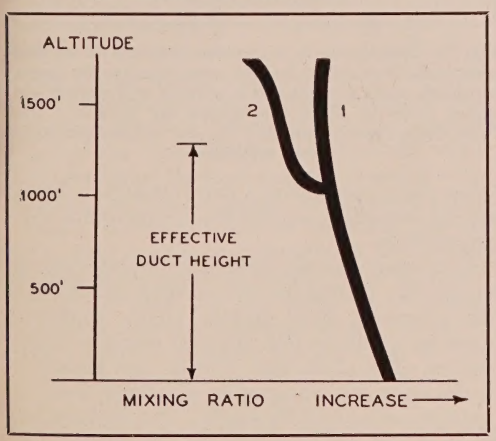
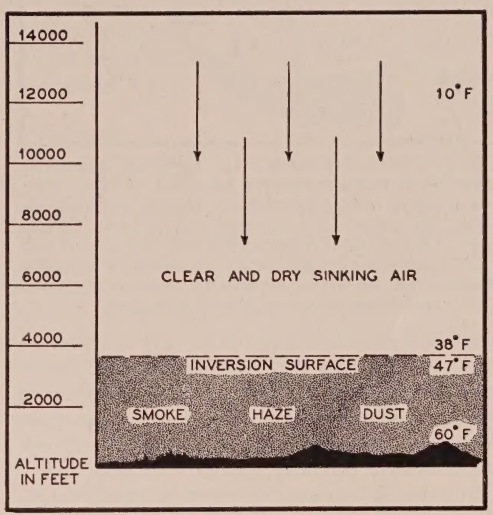


Fig. 1. Moisture variation aloft in terms of the mixing ratio. Line 1 represents the normal atmosphere distribution. In the lower atmosphere cross-section illustrated by line 2 a layer of dry air is over-lying a layer of moist air.



Another type of subsidence occurs very frequently in many different parts of the world. This type is not confined to high pressure areas. The lower atmosphere may be hazy with considerable smoke and dust but above the inversion boundary the air is brilliantly clear. The comparative temperature scale is on the right-hand side. See Fig. 3.

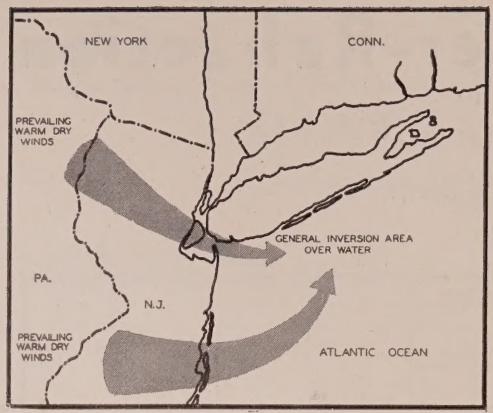


Fig. 2. During the summer and early fall months an inversion is formed over the coastline of New York, New Jersey and Connecticut. During the daylight hours the inland air is warmed and is comparatively dry. After sunset it is forced out over the cool ocean. The rapid surface evaporation produces a humidity deficit aloft while the air near the surface is cooled and the inversion boundary is formed.

phere is somewhat subtle. While the temperature inversion will not produce suitable bending on its own part, except at very low temperatures, the intrinsic part played by the moisture-lapse is the factor enabling even the most amateurish DX predictions of bending. In *Fig. 1* the heavy line *1* represents the normal decrease in moisture per unit weight of dry air expressed as grams of water per kilogram of dry air (mixing ratio). Line *2* represents a moisture lapse beginning at about 1000 feet in height. As the mixing ratio decreases rapidly above this height we may assume that a layer of very dry air overlies a layer of moist surface air. This condition coupled with a temperature inversion at the same height would produce exceptionally strong trapping or super-refraction.

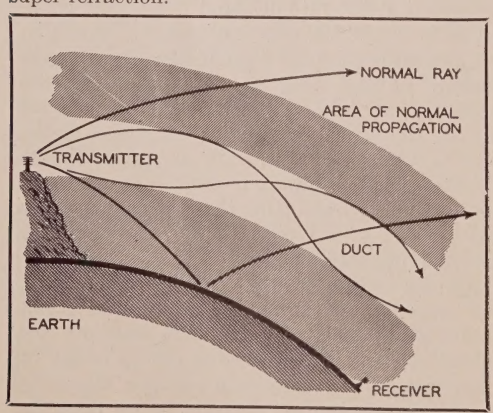


Fig. 4. Atmospheric ducts are not limited to the surface type. Subsidence will often form ducts above the surface where normal propagation (shaded areas) exists above and below the duct.

Research in the theory of super-refraction during the war brought out that certain areas of the world produce almost constantly conditions that are suitable for good v-h-f bending. Many of these locations are scattered in out of the way corners of the globe. However, during the summer and early fall months a moderate condition particularly favorable to bending exists almost nightly between the Middle Atlantic States and the New England areas. This condition is illustrated in the composite picture *Fig. 2*. It will be noted that as the warm dry air blows from the land masses to sea it cools in the lower levels—producing a temperature inversion. Also in the lower levels considerable sea water evaporation

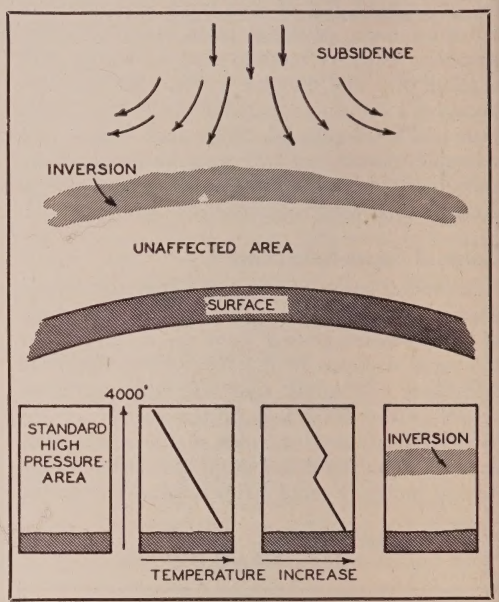


Fig. 3. Subsidence is a common method of forming super-refraction ducts. In high pressure areas the upper air slowly sinks at night and is warmed and spreads out about 1500 to 4000 feet above the surface. This forms the inversion boundary by the temperature lapse rate method.

takes place—producing a moisture-lapse. These are the important ingredients in super-refraction propagation.

Conversely, the sea breeze also produces strong inversions. During the late morning and through the afternoon until shortly before sundown, warm air builds up over the land area due to the heating effect of the sun. The air over the sea is cooler since the temperature of a large body of water is comparatively stable. The cool sea air, being denser, tends to displace the warmer, less dense land air, and an on-shore flow of air, or sea breeze is produced. The warm air from the land, upon being displaced, flows out over the sea atop the cool surface air. This warm air overrunning

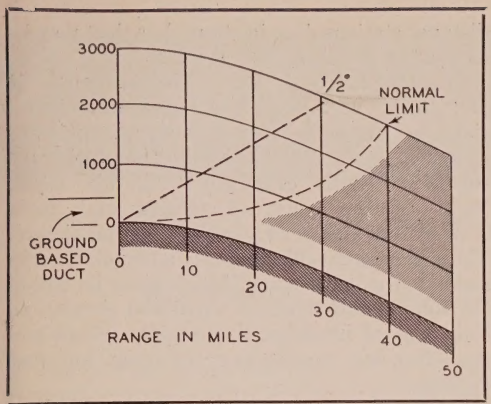


Fig. 5. A normal surface type super-refraction duct. The normal limit line indicates the maximum range. The lightly shaded area represents the cross-section where no signals could be heard or worked. The white channel along the surface is the atmospheric duct. Range is given in nautical miles and is approximate only.

the cool, moist surface air constitutes a strong inversion.

This type of activity is purely coastal in effect, extending not more than thirty miles out to sea and only a few miles inland. Local topography may interfere, and the regular wind systems, if sufficiently strong may mask or obliterate it entirely. Cloud cover obscuring the sun is also a deterring factor. However, the sea breeze seems to occur with some degree of consistency during the summer months along the east coast of the United States.

The opposite of the sea breeze is the land breeze, built up at night by the radiational cooling of land areas to a temperature cooler than that of the sea. This is observed mostly after midnight as shown in *Fig. 2*. The land breeze, if undisturbed will produce super-refraction, but is easily overwhelmed by regular circulation.

Two-meter stations near the eastern coast plains should be able to correlate good bending or super-refracting conditions with certain easily observed weather phenomena. Along the east coast of the United States and especially within 5 to 10 miles of the shorelines the direction of the wind in the late afternoon and evenings should indicate the possibilities of favorable bending. This effect should be noticeable in the summer months as the warm air formed in the daytime is forced out over the cool water of the ocean. Amateurs near the shorelines should institute a trial period of recording the direction of wind flow during the afternoons and evenings. Signals from known active areas, signal strengths and 2-meter openings should be compared with this data to indicate the relative possibilities of DX during the late evening.

Over land areas a somewhat different construction of the lower atmosphere is necessary. Temperature inversions are confined mostly to pure nocturnal cooling of the air nearest the surface. The vertical moisture distribution should be such as to aid, or at least not to counteract the effects of the inversion. Assuming a small increase in the normal humidity deficit, the most prevalent nocturnal cooling will occur on very clear nights. Even a very light cloud cover will reduce the total amount of surface cooling.

This type of inversion is not found over bodies of water since the surface air temperature does not vary sufficiently from daytime to night time to produce extensive nocturnal cooling. On the other hand, in very dry areas this inversion is very common.

Subsidence

The meteorological term *subsidence* is something new in the v-h-f propagation vocabulary. Specifically, it refers to the slow, downward motion of air over a large area. This occurs in a high pressure system due to the outward flow of air at the surface. As the mass of air sinks it is warmed by the increasing pressure at the rate of about 5.5° F. per 1000 feet of descent. It also spreads out and becomes more compact in vertical cross-section. The relative humidity of the

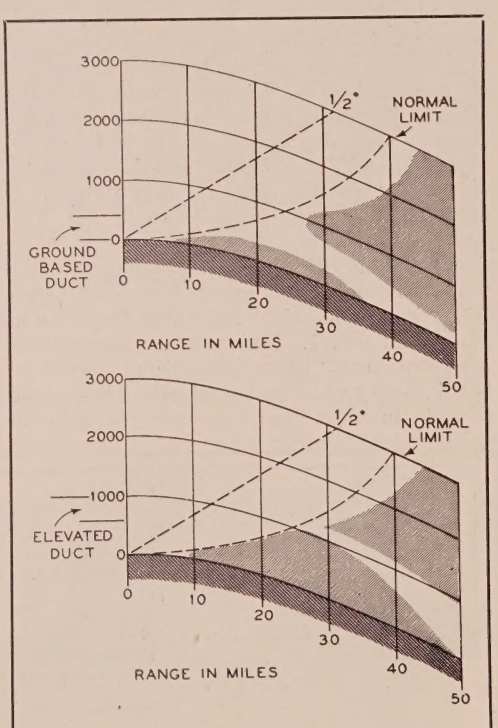


Fig. 6 (top), Fig. 7 (bottom). Two examples of an atmospheric duct distorted in the vertical plane. The shaded area indicates sections where v.h.f. can not be heard or worked. Range is in nautical miles.

subsiding air becomes low, occasionally falling below 10% at 4000-6000 feet, after prolonged subsidence. Some of this warm air may reach the surface if there is no turblence to cause mixing in the lower regions. On other occasions, the warm layer persists as such and we have an inversion covering a wide area overlying the surface air.

The effects upon v-h-f communication appear to be confined to high pressure areas. Wartime research indicates that this is the principal reason for the exceptional v-h-f DX in the southwest portion of the United States. A pictorial representation of this condition is illustrated in *Fig. 3*. It is noted that the sinking in a high pressure area is slowly warming the air mass; at certain heights (generally below 4000 feet) a spreading out of the air produces a sharp temperature inversion. This permits excellent DX on 6 and 2 meters.

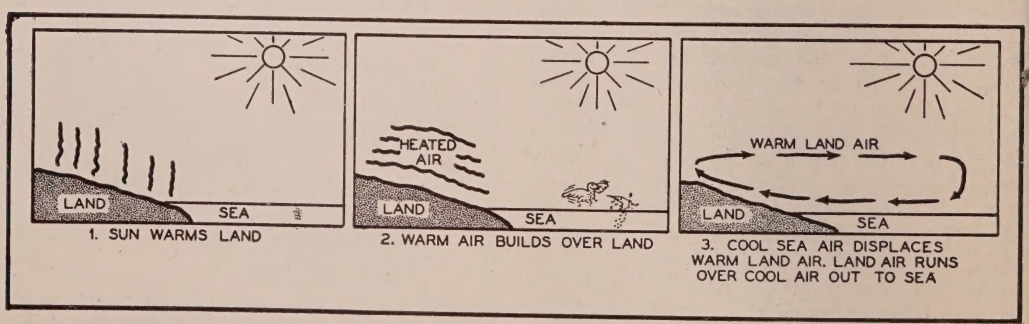
Super-refraction ducts need not be confined to the surface cross-section especially when considering subsidence ducts or inversion boundaries may occur as high as 2000 to 4000 feet above the surface. This is illustrated in *Fig. 4* where an area of normal propagation exists both above and below the duct. Radio waves passing upward into the duct or at an angle of incidence of more than one degree are not affected, while a transmitter within the duct may be able to work real DX whereas locals near the horizon are weak or are not heard at all. In some cases a duct may actually shorten or otherwise confuse the v-h-f range by appearing to skip over certain stations. *Figs. 5, 6* and *7* were taken from data obtained on radar equipment operating near 200 mc. A normal surface type duct shown in *Fig. 5* is really an extension of the lowest angle of radiation, confining the v-h-f ray and attenuating the field strength by distance *vs.* free space value. Distortions in the height of the duct are shown in *Fig. 6* and *Fig. 7*. Under these circumstances v-h-f stations 20 to 40 miles distant would be heard very weakly or not at all. Thus, quite possibly in some locations, when the medium distance stations drop in strength, a duct may be forming to permit some real DX.

Large sections of the West Coast between 20° N and 40° N latitude possess temperature inversions that are more or less permanent. An inversion at comparatively low levels exists during the summer months over the California coast. Parts of the coast of Oregon and parts of Washington also frequently enter the picture. These inversions will persist for a period of weeks and often months, since these regions lie within the zone of subsidence of equatorial circulation. This type of inversion rises rapidly inland and dissipates, but persists over the ocean for great distances.

Barometric Indications

As a general rule the most elaborate piece of meteorological equipment that the average amateur has around the shack is a barometer. Many amateurs, especially those using the v.h.f. have already formed pet ideas of DX and barometric correlations. Many of these when re-examined in the light of our new knowledge of v-h-f propagation will be surprisingly close to present day theoretical considerations.

The barometric correlation should include the factor of surface wind direction and velocity. A barometric low is usually accompanied by moderate to heavy overcast skies. Over land areas this destroys nocturnal subsidence and inversion. When also accompanied by moderate winds the mixing ratio is generally uniform and in this instance even coastline inversions will not be formed. Conversely, weather conditions in the barometric high tend to favor various forms of super-refraction, although in the case of winter it does not necessarily form large cross-section ducts. This is because of the decrease of insolation in the mid-winter. In the barometric high the air is usually calm and without an overcast. This is also the region of the nocturnal subsidence type which accounts for a large part of our v-h-f DX.



At certain times of the year the sea breeze is an indication of an inversion boundary over the coastal sections of the country. The warm air above the ocean or large body of water is often much higher in temperature than the air near the surface.

The Amateur Newcomer

HOWARD A. BOWMAN, W6QIR, and WILLIAM A. GODDARD, W6AKQ

Construction and theory of operation of a power supply.

A POWER SUPPLY was selected for the second constructional project in this series both because it illustrates many important principles of electricity as applied to radio and because the finished product will be used in later projects. The power supply suggested for construction is really quite ordinary in itself, but it is arranged in such a way as to increase its general utility around the radio shack.

The parts listed do not have to be duplicated; other parts of approximately the same values may be substituted without greatly altering the final result. The builder might do well to investigate what parts may be available as war surplus and use the listed values as a guide. The general layout of the parts should be followed.

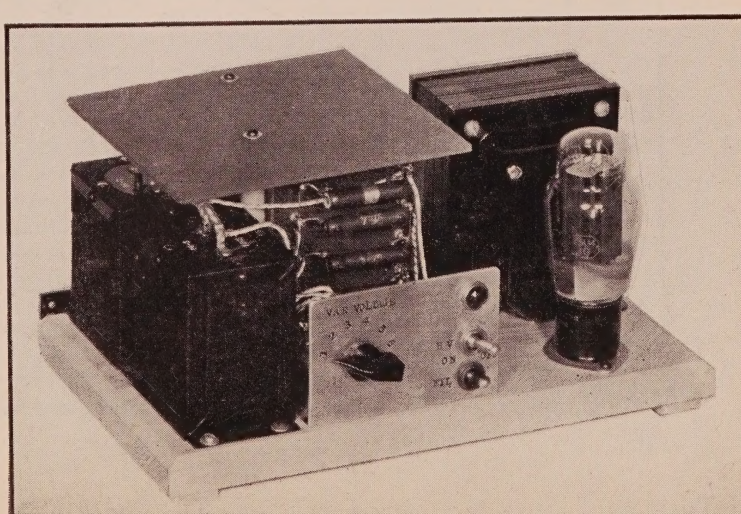
In the construction and operation of the power supply the embryonic ham will become conscious of several basic principles which he would do well to study carefully. These are: (1) the principle of the transformer, (2) the principle of rectification, and (3) filter action provided by inductance and capacity. It is desirable at this point to give some exposition on these principles as they apply here.

The Transformer

It will be noted from the circuit diagram (*Fig. 1*) and from an examination of the transformer itself that there are four separate windings on the transformer used, and that these are not connected to each other except by the coupling provided magnetically by the iron core. Each of these windings has a different number of turns, depending upon the voltage which is to be applied or delivered. In use, an alternating voltage is applied to the proper coil, causing an alternating current to flow in that winding, which produces an alternating magnetic flux. All other coils wound on the same core enclose the same magnetic flux and therefore have induced in them a voltage which will depend upon the number of turns of wire in the particular coil. An as example, suppose that the primary of our transformer has 880 turns and we apply 110 volts across it; this means that for every 8 turns on that coil we are applying one volt and that for every 8 turns on every other coil in the transformer we would have induced one volt. On the 5-volt winding there would be 5 x 8 or 40 turns. The high-voltage winding of all radio transformers is generally rated in terms of the voltage on either side of the center-tap, and a 400-volt transformer would mean a transformer providing 400 volts on each side of the tap, or 800 volts total across the entire winding.

Rectification

For the operation of various kinds of radio equipment it is necessary to have direct current



❖ ❖

Power supply, front view, with Masonite safety top in position. Power transformer at right rear, chokes along left edge. Some of the voltage-divider resistors may be seen mounted on the vertical terminal board immediately behind the panel. Panel legend indicates purposes of controls. Rectifier tube at right front.

❖ ❖

at fairly high voltage. This can be provided by a battery source, but not economically. The most satisfactory source is the high-voltage rectifier.

The flow of any electric current is a flow of electrons. In a direct-current flow they are flowing in one direction only, and in alternating current they reverse their direction of flow many times each second (cycles per second). The function of the rectifier is to permit the flow in one direction and to prevent flow in the other direction. Many different devices are used to perform this function; the vacuum tube is the most suitable for providing the highest direct voltage required for raido work.

The rectifier tube consists of two electrodes, the cathode and the plate, or anode, enclosed in a fairly good vacuum. In its simplest form the cathode is a filament of metal which has the property of giving up or emitting copious quantities of electrons when heated. The cathode may be heated directly by passing current through it, and this is the case in our power-supply-to-be. The 5-volt winding on the transformer serves no purpose other than to heat the cathode of the rectifier tube. The plate of the rectifier receives electrons from the cathode, but does not emit them. This provides the rectifier action: current flows in one direction only.

If the rectifier contained only one plate and one cathode, direct current could be obtained from it, but it would flow in pulses during only one-half of the cycle and not at all during the other half cycle. For this reason "full-wave" rectification is generally employed. Reference to the diagram (*Fig. 1*) will show that a dual-diode rectifier tube is used and that one side of the high-voltage winding is connected to one plate and the other side is connected to the second plate. When plate No. 1 is positive it will permit current flow across to the cathode, through the filter into the load, and back through the center-tap, as shown by the arrows. This makes the center-tap negative and the cathode of the rectifier positive. During the time that plate No. 1 is positive and is conducting, plate No. 2 is negative and will not conduct. When the second half cycle comes along the process is reversed and plate No. 1 is negative and not conducting; conduction is through plate No. 2, but in the same direction so far as the load is concerned. This system uses both halves of the wave cycle and is therefore called "full-wave" rectification.

The Filter

The rectifier delivers direct current, but this current is still not suitable for use in radio circuits because it is flowing in pulses. To smooth the flow it is necessary to pass it through the *filter*, which consists of inductors in series with the rectifier and its load and capacitors in parallel with the load and the output of the rectifier. The filter used here is sometimes known as *condenser-*

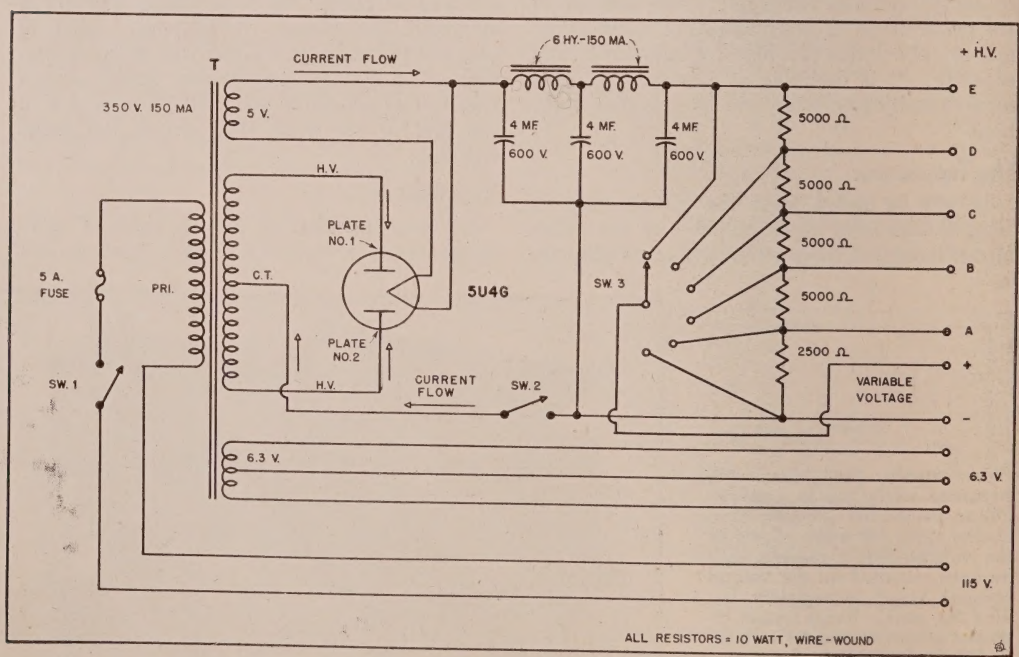


Fig. 1. Circuit diagram of the power supply.

input filter because of the capacitor directly across the input to the filter. If the first capacitor in the filter were omitted, the filter would be known as *choke input* because the first circuit element encountered by the current on entering the filter would be the choke coil (first inductor in *Fig. 1.*) With condenser input the output voltage of the power supply would be somewhat higher than that obtainable with the choke-input filter, but the *regulation* would be better with choke input. By "regulation" is meant the variation in the output voltage of the supply with an increase in load current; the output voltage of a well-regulated supply will vary only a small amount as the output current is increased. As a matter of reference, the RCA Tube Manual gives typical data for choke-input and condenser-input filters as used with the 5Z4 rectifier tube.

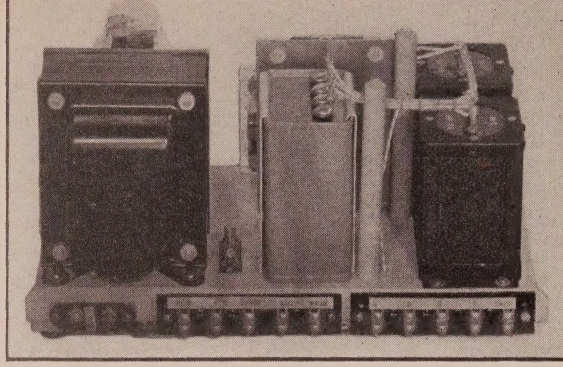
As was explained in Chapter II, inductors have the property of resisting any change in the value of the current through them, while capacitors or condensers have the property of storing electrical charge and tending to maintaining the voltage across them constant. The inductors therefore act in such a way as to keep the current flowing during the time when the output from the rectifier is low. The capacitors store electric charge during the time when the output from the rectifier is high, and they release the electric charge during the time when the output from the rectifier is low. The combination of inductors and capacitors provides smoothly flowing current.

Bleeder and Voltage Divider

If the power supply is operated without load the output voltage would rise to a peak value approximately 1.4 times the rated average secondary voltage of the transformer. When the load is applied the voltage would drop greatly, producing poor regulation. A small amount of current is generally drawn by a resistor placed directly across the output of the filter so that the voltage of the supply remains more nearly constant when the load is applied. This resistor is called the *bleeder* resistor. It often serves another purpose, namely, that of providing from taps voltages lower than the maximum represented by the full output of the supply. When the resistor is used in this way it is called a "voltage divider."

The voltage divider used here consists of five separate resistors, four of 5000 ohms and one of 2500 ohms, connected in series, giving a total of 22,500 ohms across the output of the filter. These resistors must be capable of dissipating a certain amount of electrical power and we must be certain that the rating of the resistors in watts is sufficient for our purpose.

It should be noted at this point that the unit of electrical power is the watt, and that the electrical energy unit is the *joule*. If an electrical pressure of one volt causes one *coulomb* of electricity to pass through an electrical circuit, the amount of energy dissipated is one joule. If the energy is dissipated in one second, the power dissipation is one watt. The joule is said to be one *watt-second*.

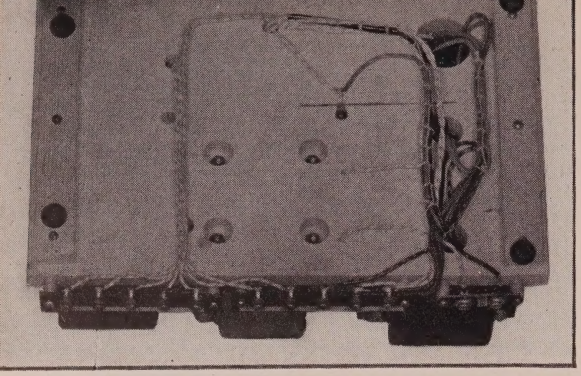


Power supply, rear view, transformer at left, filter condenser, chokes at right. Note dowels for mounting safety cover and fuse in clip between transformer and filter condenser. Terminal strips at rear provide, left to right, 115-volt a.c. input, filament terminals, high-voltage negative and high-voltage positive variable; five high-voltage fixed taps.

To determine the power (P) dissipated in one of the resistors we make use of the Ohm's Law formula $P = I^2R$, where I is the current in amperes, R is the resistance in ohms, and the result is in watts. Thus, before we can calculate the wattage we must first find the amount of current flowing in the resistor. This also is found from Ohm's Law, which states that $I = E/R$. Under load the voltage of our supply will probably not be greater than 350 volts, and since this will be applied to the entire bleeder resistor of 22,500 ohms, our bleeder current will be 350/22,500 or about 0.016 ampere. The power dissipated in the 2500-ohm resistor therefore will be $(0.016)^2$ x 2500 or about 0.64 watt. The power dissipated in one of the 5000-ohm resistors will be double this value or about 1.28 watts. If resistors of 10 watts rating are used for the divider, not more than 25 to 30 milliamperes (0.025 to 0.030 ampere) should be drawn from taps on the bleeder. The use of 25-watt resistors would enable us to draw a total of 60 milliamperes, but this will not be necessary for any of the equipment to be described.

Selection of Parts

A wise selection of parts is a prerequisite of a satisfactory final product. All of the parts shown in the power supply were purchased as war surplus, except the resistors. The transformer used has a high-voltage secondary giving 350 volts each side of the center-tap at a total current of 200 milliamperes, in addition to the 5.0-volt



Power supply, bottom view, showing cleats and rubber feet, holes drilled for component mounting and lead cabling and connection.

and 6.3-volt windings. The builder will probably find that transformers of lower current ratings are more readily available, and these may be used if they will deliver at least 150 milliamperes at about 300 to 350 volts and have 5-volt and 6.3-volt windings. The chokes used here are as low in inductance values as it will be permissible to use; receiver-type replacement chokes of 150-milliampere rating will be entirely satisfactory. Although the 4-μf capacitors shown are of the oil-filled type, with all three enclosed in one case, three separate 8-μf electrolytic capacitors with 450-working-volt ratings may be substituted. The voltage divider is made of up five 10-watt wire-wound resistors; 25-watt resistors of the same resistance values given may be used, or, if a 75-watt 20,000- to 25,000-ohm bleeder resistor with taps is available, this substitution may be made. A 5U4-G rectifier tube is shown; however, any of the following tubes may be used, provided that the proper socket and connections are employed: 5X4-G, 5Z3, 5R4-GY, 5T4.

Screw-type terminal strips were used because they were available, but the builder may wish to use Fahnestock clips mounted directly on the board; these will serve the purpose equally well.

Construction

Component parts are placed as shown in *Fig. 1* on a one-inch pine board measuring 8″ x 12″ with cross pieces underneath and with rubber feet. Several large holes will have to be bored with the auger-bit: one of 1⅜″ diameter for mounting the tube socket, two of ¾″ diameter for the leads from the transformer, and one or two of ½″ diameter for leads from the chokes and capacitors, as required. If can-type electrolytic capacitors are used, ¾″ holes will have to be bored for them; otherwise the capacitors may be mounted in any way found expedient. The bleeder/voltage-divider resistors are mounted on a terminal board held in a vertical position by means of a ½″ x ½″ aluminum angle bracket at the base. The resistor at the top of the board is the 2500-ohm resistor in the negative end of the bleeder network. The small panel at the front of the supply contains the tap switch for obtaining variable voltage output, the primary switch, the switch in the center-tap of the transformer for turning the high voltage on and off, and the pilot lamp, which is connected across the 6-volt winding of the transformer. This panel measures approximately 3″ x 4″ and is mounted by means of a ½″ right angle bent at its base. The 5-ampere primary fuse is mounted between the transformer and the filter-condenser can in a standard fuse holder.

The wiring is done with a good grade of "push-back" hook-up wire. The filter is all wired above the board, as is the bleeder and voltage-divider system. Taps from the divider are wired directly to the tap switch adjacent to it, and then individual taps on the bleeder are brought out to terminals at the rear of the supply. This provides one tap on the supply which may be varied by the switch and other taps which may be varied by connection on the terminal strip at the rear of the chassis. These terminals are all marked for indentification by typing the required symbols on paper and attaching it to the strip with airplane "dope."

Occasionally it may be necessary to extend a lead of the transformer for connection to some other part. If this is done, a piece of spaghetti should be slid over the connection before the wiring is completed by cabling together.

For the sake of safety no high-voltage terminals should be left exposed and for this reason a piece of masonite approximately 6″ x 6″ is mounted to cover all of the high-voltage connections. This cover is mounted by means of two 5-inch lengths of birch dowel rod which are fastened to the base by wood screws from the bottom; the cover is mounted on top of the dowel rods, also by wood screws. If chokes and capacitors are available which can be mounted in an inverted position, so that the high-voltage connections can be made on the bottom of the chassis, the necessity for the cover as a protective measure will be eliminated.

Testing and Operating the Power Supply

In testing and operating the supply, proceed with extreme caution. The maximum voltage available without load from the supply will be about 425 volts. Remember that this can cause discomfort, if not painful injury. Do not make any changes or adjustments unless the unit is turned completely off.

Connect a 0 to 500 voltmeter across the high-voltage terminals of the supply. Plug the supply

[*Continued on page 73*]

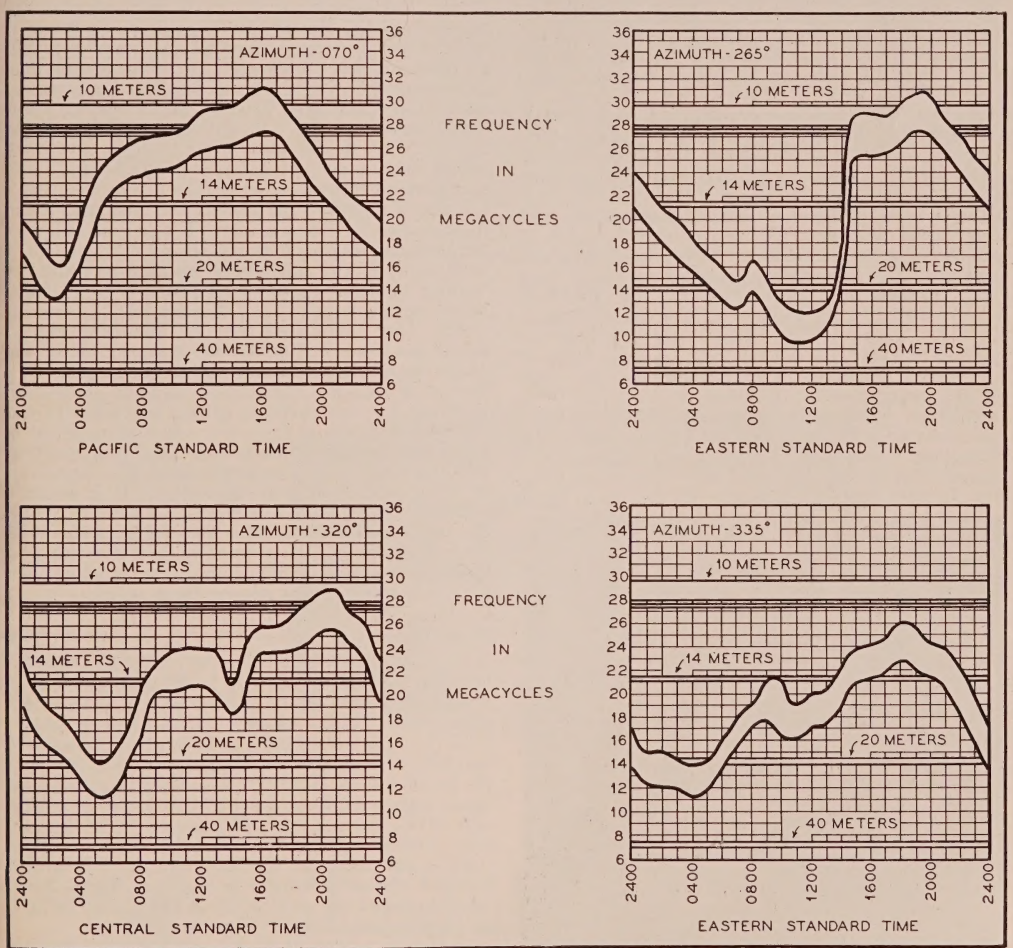
Monthly DX Predictions - - - August

OLIVER PERRY FERRELL

DISTINCTLY DIFFERENT and unusual conditions are expected for August, 1947, in comparison with the late summer of 1946. The average maximum usable frequencies are about 15 to 20% higher, meaning that the 20 and 10-meter bands will become active with good DX by the early part of September. Very wide day-to-day variations are expected and the noise level and absorption level will still be rather high, although an overall improvement will be noticeable at the end of this month.

The graph in *Fig. 1* illustrates the predicted average conditions over a path from W6 and W7 to east, central and south Africa. The upper variable line denotes the maximum usable frequency (MUF) over this path for the time in PST indicated along the bottom scale of the graph. Directly below but separated by about three megacycles is the variable line indicating the optimum working frequencies (OWF). The space between these two lines indicates the approximate limits of normal day-to-day variations. Thus, *Fig. 1* shows that the MUF is dropping after midnight and reaches a minimum about 0230 hours PST. After this there is a sharp rise in the MUF, followed by a gradual sloping off until the MUF falls in the 10-meter band at about 1130 hours PST. 10-meter conditions will be best on good days around 1600 hours PST. After 1700 hours there will be a sharp decline in the MUF to its midnight value of 20 mc. On the 20-meter band it

[*Continued on page 70*]



August 1947 average propagation conditions. Fig. 1 (top left). West Coast of United States to east, central and south Africa. Fig. 2 (top right). East Coast of United States to eastern Australia and New Zealand. Fig. 3 (bottom left). Midwest United States to the Philippines, coastal areas of China and the East Indies. Fig. 4 (bottom right). Eastern United States to Japan. Alternate paths covered by the graphs are outlined in the text.



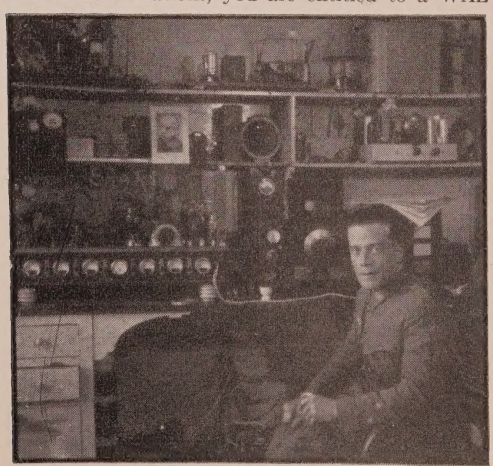
CQ DX

By HERB BECKER, W6QD

[Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles 15, Calif.]

LAST WEEK while chasing around the Northern part of the State trying to make an honest living, I was invited to attend a meeting of the Northern California DX Club. Since it appears that I have more than a mild interest in this DX business, I attended. This club has been under way just a year; as a matter of fact, it was election night, but being a DX club, they spent as little time as possible electing new officers. The retiring president, incidentally, was W6PB, and the new head man is W6IKQ. These gatherings are dinner meetings, and in between courses is the usual DX bull session. At the conclusion of these meetings, you really have DX coming out of your ears. The main reason for dwelling on the above is to point out that I think these DX clubs are pretty good things. They all speak the same language, although some of it *is* unprintable, and they are striving to better the DX bands, at the same time, of course, grabbing off as much DX as they can. The meeting got off to a good start, because one of their members, W6MHB, was one of the lucky ones to snag AC4YN that very morning. Oddly enough, W6MHB wasn't at the meeting; everyone presuming he was either having a one-man celebration or hadn't regained enough strength to get out of the shack. I might as well say, right here and now, that the same morning, four others were lucky in hooking good old Reg Fox; the other four are W6CIS of San Francisco, W6PCS of Fresno, W6GHU, and VE7ZM. Reg is still running low power, 10 watts into a 6L6.

It seems that a few of the boys are not quite sure of what is required for the Honor Roll and the WAZ certificate. Here's what we require. When you work all zones, we hold your total at 39Z in the Honor Roll listing until such a time as you furnish proof of working all 40 zones. At the same time, upon submitting the 40 confirmations, you are entitled to a WAZ certificate; thus, no one will be listed with 40 zones in the Honor Roll until the confirmations have been received and passed by our committee. Many of you fellows have, no doubt, worked 40 zones, and, brother, one of these days, all of you will probably toss the proof at us about the same time.



The station of Dr. Angel Mora Garcio, EA9AI, in Spanish Morocco. Operation is on phone and c.w., generally 14,160 kc.

1948 DX Marathon

We have had quite a few requests from the boys to run another DX Marathon such as the magazine *Radio* sponsored in 1939. The principal reason for this year-long contest is to establish yearly DX Kings. For example, it is entirely probable that the top part of the Honor Roll is going to be jammed with the boys working 39 or 40 zones, and over 140 or 150 countries. When they get away up the line, new countries are going to be few and far between, and, as we discovered in 1939, the Marathon stimulated new interest. It not only will stimulate interest, but it will also bring to light any dark horses that have just entered the DX game, and will allow them to show what they can do in a year's time, as compared with some of the boys who broke loose just as the war was over. If this type of a contest appeals to you, it is my thought to sponsor it each year, at the same time, keeping in print the various winners. Then, over a period of time, it will be interesting to note the DX Kings for the various years. Our committee has not definitely pinned down the rules, but unless circumstances alter the plans, we will begin the contest on January 1, 1948. To the W stations, this may seem a bit premature, but it is not too early to spread the word to our overseas DX men, as they, too, will want to get in it

I would greatly appreciate getting your reaction as to whether or not you would like a DX Marathon in 1948, and each year thereafter. If it doesn't appeal to enough of you, there's no point in going through with it. We had good response in the 1939 Marathon, the U.S.A. winners were W9TB for c-w phone, and W3LE on phone only. Please let us hear from you PDQ. What do you think of it?

Phone Gossip

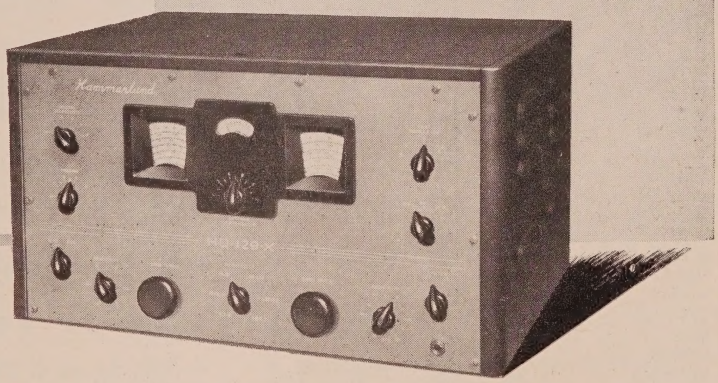
W1HKK has worked *ZD6DT*, *HZ1AB*, *OE9AG*, bringing him up to 37Z and 112C, and his all time total to 38Z and 124C. G3DO is still going after them, his latest being *UR2KAA*, *MD5AA*, *OY3IGO*, and *UAØKQA*. This gives Doug 36Z and 97C with an all time of 36Z and 113C; two-way phone, of course. W1JCX is another one complaining of bad conditions, but happens to be up to 36Z and 117C, nevertheless. Remember, he is the guy who worked *C8YR* in Zone 23. Herb worked *GD6IA* just after he was assigned the GD prefix. He also worked *MD5PC* in the Suez Canal Zone, who happens to be ex-YI2XG, XAFH, and G2FON, and is figuring a trip to Cyprus Island.

W5LWV worked *HH5PA* and *CT1UU*, making him 31Z and 72C. W6PCS does all his work on 10-meter phone, and has a swell total of 35Z and 82C. W2NSD picks up a couple in *YS1NK* and *CP5EA*, making 29Z and 78C.

H IGH SCORER

HQ·129·X

In any contest, Sweepstakes or DX, you will find HQ owners way up among the High Scorers. Why? Because the HQ-129-X has what it takes—plenty of selectivity to dig out those "down under" stations that you have to work if you want to be **HIGH SCORER.**



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MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT

W4HA is the new call of W4GVP. Anyway, he operates mostly phone, and has 29Z and 57C. W2NXZ worked *VQ4DES* on 10-meter phone, making him 32Z and 57C. W9QMS, formerly of Denver, prewar, is now located in Wheaton, Illinois, and is operating phone exclusively. Incidentally, this is actually the call of his XYL, Alice, as Bill's call is W9QOE. We'll hear more from Bill, as he is just getting set up.

[*Continued on page 52*]

W.A.Z. HONOR ROLL

	POST WAR [C.W.& PHONE]		ALL TIME	
W2GWE	39	168		
W2BXA	39	160	39	173
W6VFR	39	157		
W8RDZ	39	153		
W6ITA	39	151	39	159
W8BKP	39	149		
W8HYC	39	145	39	154
W6ENV	39	142	39	160
W8LEC	39	134	39	164
W6ADP	39	133	39	162
W6MJB	39	133		
W6SA	39	130		
W9NRB	39	127	39	136
W6SN	39	125	39	148
WØYXO	39	122	39	132
W6SAI	39	121		
WØGKS	39	109	39	136
W6LER	39	99	39	115
W2CYS	38	145		
W9IU	38	130		
W3GHD	38	126	39	167
G3DO	38	123	38	139
W2PEO	38	120		
W2IOP	38	120		
W6WKU	38	112		
W8CVU	38	112		
W9RBI	38	112	39	140
W7FZA	38	110		
OK1AW	38	94	38	119
W6UZX	38	91		
W6LEV	38	79		
W3JNN	37	143		
W3EPV	37	137	39	167
W4OM	37	126		
W4BRB	37	120		
W8FJN	37	116	37	128
W3EVW	37	111	39	146
W3IYE	37	104		
W6TI	37	103		
W6ANN	37	95		
W4FPK	36	101		
W9YNB	36	88	36	91
W6QD	36	85	39	150
W4ML	36	83		
W5ASG	35	122	37	145
W8NBK	35	111		
PY1DH	35	104		
W1BIH	35	103	35	109
W6AM	35	87	36	104
VK2ACX	35	85		
W9VND	34	90		
W7FNK	34	54	36	64
W8LO	33	111		
W3JTC	33	91		
W4DIA	33	77		
W3KDP	33	75		
CM2SW	32	100	34	107

	POST WAR [C.W.& PHONE]		ALL TIME	
W2JA	32	67		
W6ZZ	31	76		
WØAZT	31	75		
W6MI	31	73		
W6LRU	31	71		
W4HA	31	69		
W2TJF	30	74		
WØLAW	30	67		
W2NSD	29	78		
W6PBV	29	61	30	66
W9WEN	29	61	29	70
W6LN	29	47		
W2PUD	28	68		
W6JFJ	28	53		
W4HXO	28	53		
W6YYW	27	59		
W5EWZ	27	45	30	57
W8PCS	26	48	27	57
W9ACU	25	48	26	51
W9KMN	25	45		
W1LQQ	24	51		
W2GVZ	23	53		
W8QUS	22	43		
W3KCI	20	37		
W6BIL	17	31		
W6UWL	13	19		
	[PHONE]			
W1HKK	37	112	38	124
W1JCX	36	116		
W6DI	36	113	37	130
W8BKP	36	106		
W2BXA	36	103		
G3DO	36	97	36	113
W3DHM	36	96		
W4CYU	35	115	36	131
W1MCW	35	105		
W9HB	35	89		
W1NWO	35	85		
W1FJN	35	84		
W6PCS	35	82		
W6SA	34	69		
W8LO	33	109		
W2DYR	33	82		
GM2UU	33	77	36	104
W9RBI	32	80		
W8BIQ	32	79		
W5ASG	32	77	32	95
W2NXZ	32	57		
W6PXH	31	74		
W5LWV	31	72		
W2NSD	29	72		
W9FNR	29	65		
W4HA	29	57		
W6ITA	26	66		
W6ZZ	25	45		
W4HKJ	12	22		

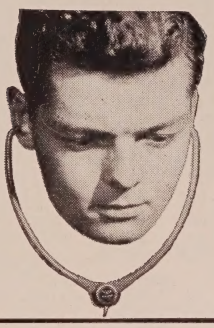
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EASY CONTEST!

RADIO AMATEURS

Just write 50 words or less telling us why you like the TELEX MONOSET *better than old style earphones.*



WIN:

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$50 and a Monoset

$25 and a Monoset

PLUS TELEX MONOSETS to 22 Runner-ups!

HERE'S ALL YOU DO:

1. Go to your *parts jobber* and ask him to let you try out the revolutionary under-the-chin TELEX MONOSET.
2. In 5 minutes you'll get at least half a dozen good, WINNING ideas. Be sure to get *all* the facts and an OFFICIAL ENTRY BLANK.
3. Then write 50 words or less telling us "Why the TELEX MONOSET is Better than Old-Style Earphones." Clearness and sincerity will count most.
4. Print or type your answer on the OFFICIAL ENTRY BLANK your jobber will give you.

Mail direct to: TELEX, INC., Telex Park, Minneapolis 1, Minnesota, before Midnight October 15, 1947.

FIRST PRIZE: $100.00 cash and a TELEX MONOSET
SECOND PRIZE: $ 50.00 cash and a TELEX MONOSET
THIRD PRIZE: $ 25.00 cash and a TELEX MONOSET

TELEX MONOSETS to the 22 next best opinions. In case of a tie, *duplicate* prizes will be awarded.

Employees of Telex, Inc. and their advertising agency not eligible to enter this contest.

NO BOX TOPS! NO JINGLES! Get Entry Blank From Your Parts Jobber

CONTEST CLOSES MIDNIGHT OCTOBER 15, 1947!

TIPS TO GET STARTED WITH:

1. TELEX MONOSET is quickly replacing old-style, cumbersome headsets because you wear it under-the-chin instead of over-the-head.
2. Featherweight: Only 1.2 oz. No ear fatigue.
3. Excellent fidelity. Clear, natural reception of sound.
4. Reliable performance assured by TELEX precision engineering.
5. Exclusive, TELEX designed, volume control—permits individual adjustment of volume.

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TELEX INC.
ELECTRO-ACOUSTIC DIVISION
TELEX PARK
Minneapolis, Minn.

Decision of impartial judges will be final. All entries become property of Telex, Inc. Winners will be notified by mail approximately November 1, 1947. Contest subject to all state and federal regulations.

Remember, wherever a headset is used— TELEX MONOSET will do the job better.

V.H.F.-U.H.F.

by Vince Dawson, Jr., WØZJB

[Send all contributions to Vince Dawson Jr., Box 837, Gashland, Mo.]

THOSE WHO HAD occasion to listen on 6 meters during May and June, while short skip was coming in on 28 mc, can vouch that 50 mc was really open. On more than one opening, crystal-filters came in mighty handy. A little spreading out would have relieved this. A few of the gang are commencing to be found above 51 mc and have named themselves the, "Fifty-oners." Let's see more stations join them when the band is hot.

Reports last month covered to the 21st of May and showed several dead days. However from May 22 to June 24th reports show that only May 9th and 10th were dead for 50-mc skip DX. Double hop skip (over 1300 miles) has been more prevalent than in the past and good days were; May 23, 26, 27, June 1, 5, 6, 8, 16 and 20. One well-known W1 was heard to remark that "we W1s listen twice before calling a W6 as we might have worked him!"

Reports for the period above have been so outstanding that we are going to feature an article in next month's issue, giving the complete story of the Summer's DX. Watch for it.

With the showing 50 mc has made on Es skip of late, quite a number of the gang have remarked that more DX could have been worked, especially on double hop, if c.w. had been used and those just ragchewing moved to the higher part of the band.

Your conductor and participant in the DX has observed during double hop openings, that both Coasts have trouble with the W9s and WØs QRMing the DX, although both sides were trying to use c.w. Perhaps a solution for double hop and F2 skip would be to move the 50-mc phone band 100 kc higher, say from 50.1 mc to 54 mc. Those looking for DX could have the first 100 kc of the band for c.w.

There are several things to consider about this move before making a decision. First, the MUF can be very critical and 100 kc can make or wipe out a contact. This was demonstrated when W1HDQ worked into UK. Although there were others on, higher in frequency, they did not make the hop. Second, would 100 kc be enough? If foreign phones started using this 100 kc then things might be just as bad during an F2 opening

Another problem is NBFM, which could help to increase activity among those who are in apartments or heavily populated residential districts. We have had letters from fellows saying that they would like to work the very highs but BCI is bad and with the present regulations putting FM on 52.5 mc and above, they can't make a contact, when skip is in. Now the question is where to start the NBFM? Should it be the same as the AM phone band or commence at 51 mc to 54 mc? Remember the ability of others being able to work the band is at stake.

Look over the above ideas and let us have your suggestions and reactions. At the same time let your ARRL director know your sentiments.

While we here in the States are enjoying our full of Es skip on 50 mc, let's take a look at Es around the world.

From G6FO's *Short Wave Magazine*, we find the Gs had a flurry of excitement on May 24th, when from 1800-2100 DST the 50-60 mc spectrum opened wide for harmonics and an unidentified foreign phone calling "CQ north five," in English, on 59.5 mc, came through.

6-meter sporadic-E layer short skip is being worked in the far Pacific. On June 2nd, W2CDJ/J2 in Yokohoma, Japan worked W5DIV/J9 on Iwo Jima with signals S9 plus on both ends. On June 22nd J2AAO worked into Okinawa for over two hours. On the same day J9ACS heard various Tokyo stations on 6-meters for nearly six hours. J2AAO is now using a BC-640 transmitter with about 100 watts input and a three element beam.

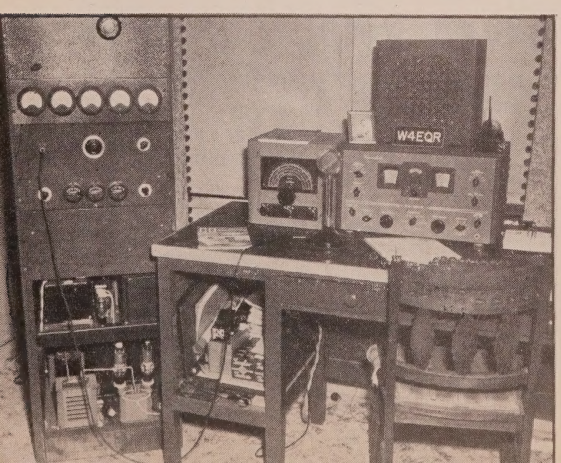
Es made its appearance in the European area on May 14th when I1DA came through calling GM2TW and GM3OL, signals reaching S-9 peaks.

WØTKX/MM on the S/S Ft. Winnebago is an ardent listener on 50-60 mc during his excursions around the world. Bob has a 7C5 with 10 watts to a horizontal half-wave, 85′ high. Receiver is two 956s in the r.f. May 22 in position 30.5 N and 78 W with no xmitter working, from 0150 GMT to 0230 GMT, he heard W9QCY, W9RGH, W9QMC?, W9DVI, WØKYF, W8QYD, W9ZHL, W8GZB, W9JMS, W9UNS, W9ANH, W9IKI all working locally or calling] W4GIY] and W4DRZ. Signals were S-9 and just right for a good QSO. This location appears to be about 300 miles east of Jacksonville, Fla., in the Atlantic Ocean. During a return trip from Covenas, Columbia, Bob listened intently but heard only a fading carrier on 50.8 mc, June 8th. On June 10th he heard W9JMS call CQ and answered him but to no avail, this location was 400 miles east of Orlando, Fla.

On June 24th while 150 mi NW of Havana Cuba WØTKX/MM worked W8KZT, WØINI and WØZJB from 1100-1300 CST, June 24th. Signals from the Ws were S-9, with WØTKX riding S-7. Bob's new frequency is 50125 kc, so watch for him when the band is open to Ala., Ga., and Texas. QSL to his callbook QTH.

G5BY sends us reports on his v-h-f activity and new set up. Hilton worked FA8IH on May 26th at at 1730 GMT with strong signals. May 30th at 1910 GMT I1XW came through for a QSO; two other Italians also were heard at G5BY. June 4th F3JB, F9AQ and F9CV were worked, with FA8IH pounding in S-8 at the same time, 1900 GMT. June 1st was good for bending when G5GX at 285 miles was worked for a new GDX record. All these contacts above were worked on an 8-element stacked ar-

W4EQR, Pensacola, Fla., 35Ts, 150 watts on 50 mc.





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- 11 tube (plus voltage regulator) superheterodyne.
- Frequency Range of 50 to 430 and 480 to 30,000 KC.
- AM phone and code reception.
- Accessory Connector Socket makes possible use of wide variety of accessories, such as narrow band FM discriminator, crystal calibrator, etc.
- New double action noise limiter effectively reduces interference caused by external noise pulses.
- A 6 position switch for crystal filter operation.
- Maximum bandspreading of the Amateur bands.
- Streamlined cabinet with attractive grey finish.

Known and used by hams the world over for 13 years, the old HRO now has a new successor — the HRO-7 — incorporating every one of its strong points and adding a number of modern refinements.

To begin with, the HRO-7 is housed in a streamlined grey cabinet that will enable you to meet the XYL's former objections to bringing your rig into the main part of the house. The whole family can listen when you pick up a French OP talking about the latest UN news.

Two new miniature tubes have been added to further stabilize the receiver. This will enable you to turn the rig off and on again with an absolute minimum of retuning.

As you turn the RF gain control, there'll be no appreciable change in the pitch of code signals and the HRO-7 remains unaffected by normal fluctuations in the voltage sent in by the power company.

We could go on endlessly like this — but why not go down to your nearest National dealer *today* and ask to see and hear the new National HRO-7 for yourself.

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MAKERS OF LIFETIME RADIO EQUIPMENT

ray, and a new Rhombic, 134′ on a leg, beamed on Italy. Hilton asks the Ws to watch 58.5-60 mc if they hear conditions across the North Atlantic right. His frequency is 58.632 mc.

XE1KE in Mexico City has been providing the W5s in Texas, Ark., and La., with some 50-mc DX. BJ finally made the grade on May 29th when from 1450-1615 CST he worked W5VY, W5GVZ, and W5FRD. May 31st was a better day when between 1220-1657 CST he got W5FSC, EEX, VY, IOP, LBG, LCZ, ML with duplicate QSOs from more of the gang. June 1st from 1925-2050 CST W5ZS, ML, VV and W5FSC were heard calling W7s. All these contacts check out at 1750 to 2100 miles. The contact with W5LCZ in Benton, Ark., being the furthest north. BJ was heard by W6PUZ and W6ANN at 0740 June 2nd, while the Minnesota gang were reported to have heard and called him on June 15th. XE1KE runs 80 watts to a 4-element wide-spaced beam 90′ high, and a Gonsett converter ahead of an HQ-129X. His frequency is 50,024 kc.

VE2KH in Montreal has looked high and low for 50-mc DX; May 23rd brought John some nice contacts. At 2235 EST first DX heard was W8RBI calling CQ. A call brought no results, but at 2245 things started happening when he raised WØYAQ, TQK, QVZ, USI, NQF, CHI, TIO, URQ, QIQ, JHS, hearing W8RBI, WØQTR, BJV, IFB, CJS, DZM, W6UXN, all from 2245-0220 EST. May 27th, from 1840 EST to 1930 John got W4HVT and WØTQK for a quickie. May 28, he worked W4QN and heard on May 29th, W4GIY, CJO, W9DVI, WØDZM and WØTQK. Another station in the Montreal area VE2GT was in on the same DX, giving the Ws their VE2 QSO..

The Totem Amateur Radio Club of Vancouver, B.C., is conducting a DX test on 50-mc during August. The station call is VE7BQ, on 50,800 kc. Replies will be listened for on 20, 10, 6, and 2½ meters. All transmissions will be in English, on Aug. 9-10 from 1200 to 2359 and Aug. 17-19 same time. Calls will be made on the hour every hour, and will last 10 minutes. The station answering will call after the 10-minute period on any of the bands mentioned. Anyone receiving these transmissions is urged to notify the club.

In Bradnon, Manitoba, VE4YW found 50 mc open for Es on June 16th and worked W9ZHL, and WØZJB for his first contacts. Sy's frequency is 50,189 kc and he is looking for more fun on 50 mc.

June 1st, VE3AZV in Oshawa, Ont., signed with a station in Iowa and stood by on the band to find at least 6 stations calling him. W6ANN was contacted, then W6GGM, then W6UXN for nice QSOs. Even though the W6s mentioned California more than their calls, Eddie never gave it a thought. What with California just another advertisement in the newspapers, along with Florida, as nice places to bask in the sun the year around, and with a Florida contact already under his belt, the numeral 6 just didn't click. Finally Eddies' XYL, not wanting to disturb the OM's DXing, whispered; "Dear, isn't California rather a long way away for six meters?" With the dawning Eddie's heart started beating at a sixty-cycle rate, for its *double hop!* Other stations worked that night were, W6GZZ, W6NAW, W6LSN, W6OVK all round 2300 miles. Things like that, says VE3AZV, keep our interest high in 50 mc.

VE3BKS/VE5 at Moose Jaw, Sask., has been listening to some skip DX while waiting for his VE5 call. May 28th at 2155 MST he heard W6EUL,

[*Continued on page 62*]

50-MC DX HONOR ROLL

Calls	States	Districts	Other
WØDZM	43	10	VE1-2-3-7
WØTQK	42	10	VE2-3-4-7
W9ZHB	42	10	VE3-4-7
WØZJB	42	10	VE2-3-4-7
WØDWU	39	10	VE1-2-3-7
WØYUQ	39	10	VE3
W3CIR/1	38	10	VE1
WØQIN	38	10	VE3-7
W6UXN	38	9	VE3-7
W1CLS	36	10	VE1
WØBJV	35	10	VE2-3
W5VY	35	8	VE7
W2BYM	34	10	VE1-VP7
WØDKS	34	10	VE3
W1LLL	34	10	VE1
W5FRD	34	10	VE7-XE1
WØJHS	34	10	VE1-2
W1HDQ	33	10	VE1
W9UNS	33	10	VE4
W4DRZ	33	10	VE1-2-3
WØINI	33	10	VE2-3-4
W7KAD	33	10	VE7
W5VV	32	8	VE7
W9PK	32	10	VE3-7
WØSV	31	10	VE7
W5LCZ	31	10	VE3-XE1
W3OMY	31	10	VE1-VP7
W8QYD	31	10	VE1-4
W5RSC	30	9	VE7-XE1
W6WNN	30	10	VE7
W5HF	30	8	VE7
W4EQM	29	10	
W4GJO	29	10	VE1-3-OA4
W1CGY	28	8	VE1
W4EQR	28	10	
W6ANN	28	9	VE3-7
W9ALU	28	10	VE2-3-4
WØYSJ	27	9	VE3
W7FDJ	27	9	VE7
W7HEA	27	9	
W5WX	27	8	VE7
W7FFE	26	9	VE7
W5LBG	26	8	VE7-XE1
W4WMI	26	9	VE3-1
W8NSS	26	9	VE1-4-VP7
W3RUE	26	10	
WØDNW	26	10	
W2RLV	26	8	VE1-2-3
WØYKX	26	10	VE2-3
W6NAW	25	9	VE7
W1JLK	25	8	VE1
W4FBH	25	8	VE1-2-3
W7BQX	25	7	VE7
W5AOT	23	9	VE7
W5EEX	23	8	VE7
WØKQO	22	10	VE2-3-7
W9AB	22	9	VE3
W3RUE	22	9	
W7ERA	21	7	VE7
W5BUV	21	8	VE7
W6PUZ	20	8	VE3-7
WØPKD	20	10	VE2-3-4
W7JPA	20	7	VE7

**Cross-band 50-28 mc.*



Here's a new way to read meters ...in the dark!

How often have you wished for a meter you could see *clearly*—the whole scale of it, wherever you were using it—in the dark, under low lights, or even in the kind of glare that causes reflections on the glass—a really illuminated meter for your transmitter? Well, here it is—the result of a new Simpson patented method of illumination.

On these new Simpson Illuminated Meters (A.C. and D.C. voltmeters; D.C. milliammeters; and Radio Frequency ammeters), every fraction of the dial face is flooded with a full and even radiance—there isn't a spot of shadow.

An ingeniously shaped Lucite cone carries the light from a recessed bulb in the back of the instrument through the front edge that surrounds the entire dial. This makes possible the use of the standard Simpson metal dial. Unlike translucent dials, it cannot fade or discolor so that reading becomes difficult. It cannot warp or buckle, causing the pointer to stick, or distorting readings. The bulb recess is neoprene sealed.

Behind this refinement to the basic reason for preferring Simpson instruments—their in-built accuracy. That high quality which is the indispensable component of every Simpson instrument makes sure that the accuracy will *stay* there, year after year.

ASK YOUR JOBBER

3" Rectangular Case. Width, 3"; height, 3-1/8". Mounts in round hole. Body diam. 2¾".

2" Rectangular Case. 2-3/8" square. Mounts in round hole. Body diameter, 2-3/16".

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THE NEW SIMPSON MODEL 240
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1946 version of the first self-contained pocket portable instrument built expressly to check high voltage and component parts of transmitters and receivers.

Ranges: 0-15, 150, 750, 3000 A.C. volts; 0-15, 75, 300, 750, 3000 D.C. volts; 0-15, 75, 300, 750 D.C. milliamperes; 0-3000 ohms (center scale 30). 0-300,000 ohms (center scale 3000); 1000 ohms per volt A.C. and D.C.



The YL's Frequency



by Louisa Dresser, W1OOH

BOTH COASTS of W land during the past weeks have been the scene of much YLRL activity. In New York City twenty-eight gals assisted in operating station W2CPX during the Centennial Philatelic Exhibition from May 17-25. Then on June 14th the New York City Club of YLRL held its third annual luncheon with a record attendance of forty-three members and their guests. At the same time the YLs initiated a YLRL Club in San Diego, Calif.

Before telling you any more about the above goings-on, we'll give W2QQH the floor. W2QQH is Josephine Opacity, corresponding secretary of the Monmouth County (N.J.) Amateur Radio Assn., and she has news of particular interest:

"The Monmouth County Amateur Radio Assn., Inc., in conjunction with the Jersey Shore Amateur Radio Club, is sponsoring the 1947 Hudson Division ARRL Convention at Asbury Park, N. J., on September 26, 27 and 28. The gala No. 1 prize, which is to be given *only* to a YL or XYL—and she must *be present* to receive the prize—is an automatic home laundry. The general No. 1 prize, which either an OM or YL can win, will be a deluxe post-war-design ham shack *complete* with accessories, and that includes crystals, mike, etc. Then our special features for the gals will include a fashion show at the Berkeley-Cateret Hotel, an afternoon tea, swimming, dancing, movie parties, and shopping tours. It will certainly be a very eventful three-day affair. Of course, the gals are cordially invited to attend all the technical discussions if they so desire."



The gal ham sitting on a very small western mountain is your former YL column editor, W2OLB, who, no longer harried by publication deadlines, can take life easy.

That is something to look forward to, YLs. Better start now talking it up to the OM so he'll be sure to go and take you with him, or if you don't have to worry about an OM, then put the dates on your own calendar.

Getting back to past events rather than future, the operation of W2CPX at Grand Central Palace in N. Y. C. was a most successful affair (see "Postscripts" in the July issue of *CQ*), and the YLs deserve much of the credit for its being so. They acted as hostesses, accepting and filing messages from visitors attending the stamp show, and answering the interested queries of these same visitors regarding ham radio in general. They assisted in operating both the c.w. and phone rigs during the day shifts, and generally made themselves useful. Vi Grossman, W2JZX, was especially helpful in lining up and arranging schedules for those operating W2CPX and was in almost constant attendance at the station during the show.

The other gals who assisted were Bea Austrian, W2QVF; Dot Hall, W2IXY; Sophie Lash, W2QGK; Dot Miller, W2SPI; Helen Morse, W2NFR; Anita McKee, W2NGO; Hope Plummer, W2RTZ; Lillian Ruocco, W2PMA; Mignon Rosenfeld, W2QWL; Ruth Siegelman, W2OWL; Selma Tracer, W2PUY; Violet Villar, W2NQC; Jerry Weinberg, W2PBI; and the following XYLs or LSPHs awaiting calls: Hilda Brown, Helen Chamine, Beatrice Guest, Marion Gubitz, Grace Halligan, Bertha Lesnow, Myrtle Midgette, Lillian Smith, Ruey Schmidt, Laura Schroeder, Ruth Schlitt, Emma Trontman, and Helen Zuparn.

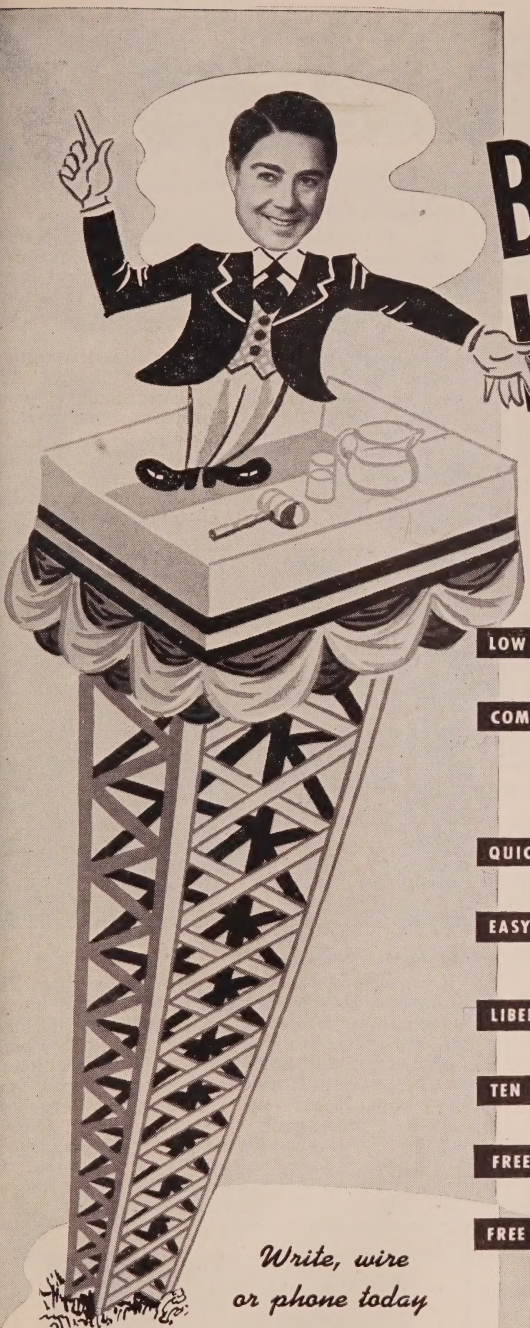
For your new column editor it was a special occasion for it was our first introduction to the W2 YLs, hailing as we do from W1 country.

The New York City YLRL Club's third annual luncheon was also most pleasant for there we met many more of the YLs and XYLs. The affair lasted throughout the afternoon and you can well imagine the ragchewing that took place. Subjects ranged from discussing the newer dark shades of nylons to expressions of admiration for Lucille Sweet, W2SCI, of Rochester, N. Y., the only sightless YL operator in the U. S., a gal of whom we may all be proud. There were door prizes for everyone, from crystals to plate transformers—yes, and even some of the aforesaid nylons! Dot Hall, W2IXY, was presented with luggage to take on her trip to Europe next month. Dot, incidentally, reports under date of June 10th: "This morning, 12:15 a.m., I had the first W contact with VR6AA, 14,345 kc. phone. Nelson Dyath, ZL2AR, is the operator." Chalk up another first for the YLs!

From the West Coast, W6YYM, Ellen White, sends news of the forming of a YLRL Club in San Diego, with meetings to be held once a month and code and theory classes scheduled for every Thursday night. FB!

Ellen belongs to two other radio clubs (she's secretary of one of them with an active membership of 120), holds down a full-time job in the blueprint

[*Continued on page 70*]



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LOW PRICES

I guarantee to sell to you as cheap as you can buy anywhere.

COMPLETE STOCKS

Hallicrafters, National, Hammarlund, Collins, Millen, RME, Pierson, Temco, Meissner, Supreme Transmitters, Meck, Gordon, Amphenol-Mims, RCA, Vibroplexs, Sonar, all other amateur receivers, transmitters, beams, parts, etc. If it is amateur or communications equipment—I can supply it.

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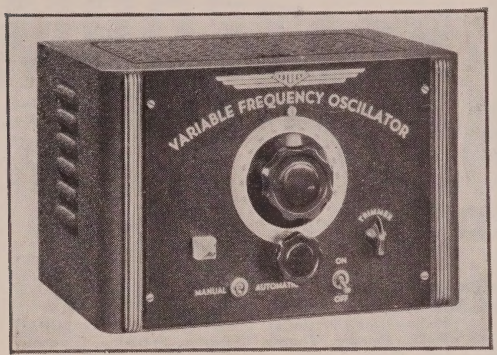


parts & products



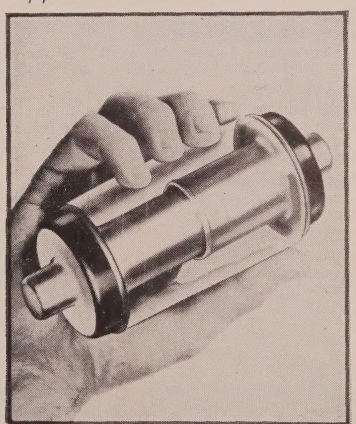
V. F. O.

Bud Radio, Inc., is manufacturing a new variable frequency oscillator unit designated as the VFO-21. This unit offers the following important features: Plug-in coils for flexibility of use and higher efficiency; entirely self contained; high stability. The VFO-21 is a dual purpose unit having v-f-o operation and with provision for switching to crystal operation. For literature write to Bud Radio, Inc., 2118 East 55th St., Cleveland, Ohio.



Vacuum Capacitor

United Electronics Co., Newark, N. J., is manufacturing the first of a new series of vacuum capacitors. Type CAP 50/-60/-30 indicates its electrical characteristics. The first numeral designates the capacitance in $\mu\mu f$; the second numeral safe current capacity in amperes, and the last figure designates the peak potential in kilovolts. The capacitance of 50 $\mu\mu f$ is held within a tolerance of +/–2% or +/–2 $\mu\mu f$.



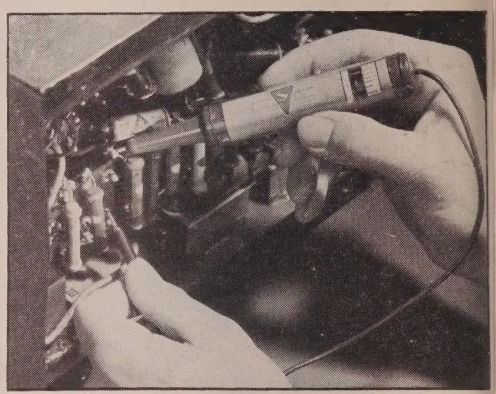
Outstanding features of CAP 50/-60/30 are the employment of large elements and large periphery glass-to-copper seals resulting in a low temperature coefficient. End caps are gold plated to minimize oxidation and maintain low contact resistance.

Pocket-Size Ohmmeter

An attractive, compact, inexpensive pocket-sized ohmmeter for spot checking radio and electronic circuit components and other electrical equipment has been announced by the Radio Tube Division of Sylvania Electric Products Inc., 500 Fifth Avenue, New York 18, N.Y.

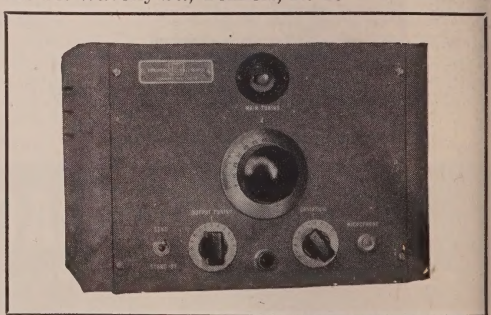
The ohmmeter is enclosed in an attractive tubular plastic case $\frac{7}{8}$" in diameter and $5\frac{3}{4}$" overall. The prod tip base and top cap, constructed of green molded bakelite, are mounted in a transparent cellulose acetate tube housing the meter.

Direct readings between 0 and 10,000 ohms are given on a 1.5 milliampere full scale sensitivity Weston meter in series with a 1000 ohm molded carbon resistor and a standard penlight dry cell.



FM Modulator Exciter

Columbus Electronics, Inc., announces a new FM Modulator Exciter, Model FMO-428. This unit is an excellent v-f-o exciter for any amateur transmitter. Reactance modulation is used for narrow band FM. Output is available on 80, 40, 20 and 10 meters. Visual indication of frequency deviation and a regulated power supply are self-contained. Provision for c-w keying is made. A new bulletin, C7, describing the FM Modulator Exciter, and also high gain 6, 10, and 11-meter frequency converters will be mailed upon request to Columbus Electronics, Inc., 229 So. Waverly St., Yonkers, N. Y.



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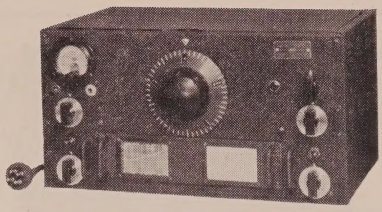
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Yes, rush FREE COPY of the comprehensive new Concord Radio Catalog.

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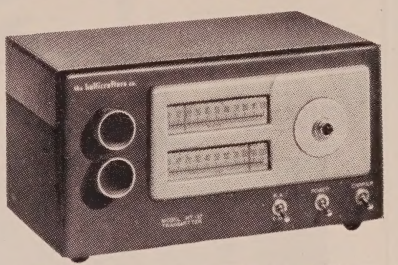
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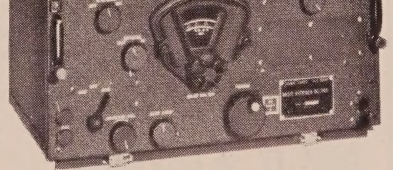
Famous National HRO-5TA-1
AT SPECIAL BARGAIN PRICE
. . . you save $81.71 !!

Here's the famed HRO at a remarkable saving. While very limited quantities last you receive the rugged, top performing nine tube table model HRO receiver, complete with 4 sets of coils, providing bandspread on Ham bands as well as general coverage (1.74.0, 3.5-7.3, 7.-14.4, 14.4-30.0 mc) . . . regular price $274.35 . . . PLUS the No. 697 Power Supply, 115 or 230 v. 60 cy. input . . . regular price $20.36 . . . PLUS the MCS table model 8" PM dynamic speaker . . . regular price $12.00 . . . ALL for $225.00! You save $81.71 by acting now! While Quantities Last, Complete **$225.00**



NEW! HALLICRAFTERS HT-17
. . . Low Price, Top Quality Xmitter

Now available . . . a brand new low power, high quality, low priced C W transmitter. 10 watts output on all bands—3.5 to 30 megacycles. Pi section network matches any antenna. Ideal exciter for high powered rig. Connections provided for key and external modulator. Uses 6V6GT xtal oscillator; 807 amplifier; 5U4G rectifier. 110 v. 60 cy. AC operation—or external auxiliary power supply.
HT-17, complete with tubes, meter and 7 Mc coil..... **$79.50**

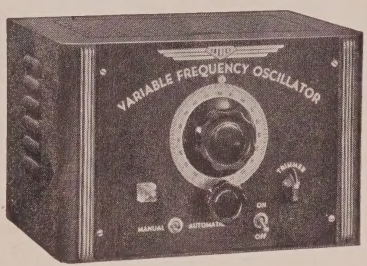


BC-348--6-Band Reciever

BC-348 Communication Receiver 6 bands—200-500 KC, and 1.5-18 MC in 5 bands. High sensitivity, 2 stages RF, crystal IF filter, beat frequency oscillator, high-ratio non-backlash geared dial, and output for phones or 500 ohm speaker. Has combined audio and sensitivity control, variable frequency BFO control. IF crystal off-on control, and BFO off-on switch. Built-in 24 volt DC input dynamotor power supply. Complete with tubes and instructions for converting to 110 VAC 60 cyc. operation. Size: 18" x 8⅝" x 10½". XC21005—Your Cost..... **$49.50**



Built to the BUD
High Standard of Quality



1. **Compact and entirely self-contained.**
2. **Stability comparable to crystal.**
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4. **A dual purpose unit having V-F-O operation, with provision for switching to crystal operation.**

SEE IT AT YOUR
LOCAL DISTRIBUTORS

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BUD RADIO, INC.
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CQ DX

[*from page 42*]

A line from D4AVC, ex-D4OOU, and W6OOU, says that W6WUI, W7HRV and W6FTU come through very consistently and loud. Al says he has a 450TH and a 304TH which he can use over there, but can't seem to get a decent exciter or antenna. He has been transferred from Lechfeld, where he had 8 half-waves in phase 75′ in the air. W1KKT sticks with low power and has a lot of fun out of it. He runs 50 watts into an 809 and has worked such stations as *ZC6FP*, *YI2AT*, *VS9AR*, *ZS5BZ*, *PY2CK*, *ZB2A*, etc. He has worked 22Z and 46C.

W3LE has been trying to get back on the air, but on the first attempt to get his beam off the ground, the rope broke, and down came the works. This, of course, took a little more time in getting new elements. Lou has an all time total of 169C, and right now, we are waiting for his new list of zones and countries.

W6DI still manages to get a few now and then, and his latest are *KG6AV/VK9*, *VP5PL*, and *ZS4P*. This gives Guy 36Z and 113C, and 37Z and 130C. He also relates that *C8AC* is also in Zone 23. This is in addition to *C8KY* and *C8YR*.

More C-W Chatter

The other night, G6ZO told me our old pal *F8EX* was operating on Corsica, for a short time, signing *F8EX/FC*, approximately 14,050 kc. By the time you read this, F8EX will probably be back in France, but let's keep our fingers crossed and see if he can't stick around there for a while. G6ZO also mentioned another pip in *FQ3AT* . . . 14,105. (You see, QD does slip out of the 9th district).

It is good to hear from W1APA again. He has been out of the Army now for two or three months, and is just getting his old prewar rig going again. W1EKU says that W5IFM/MM told him he will QSL all contacts made while he is at sea.

Christmas Island and Christmas Island

I had a hunch this would happen, but didn't know just when. Anyway, *KH6KL* was on one of the Christmas Islands signing *KH6KL/ZC3*. Now then, in order to clarify this thing for all concerned, the Christmas Island we believe he is on is in the Jarvis and Palmyra group, and if this is true, should be signing KP6. This same island, since it is jointly controlled by the United States and England, is also listed in conjunction with Fanning Island, a British possession, in the Country List. This means, that should a British station get on the air on this same island, he should sign VR3, but certainly not ZC3. This Christmas Island is in Zone 31, and if you would like to pin it down, briefly, it is located at latitude 1° 57′ N., longitude 157° 28′ W.

The other Christmas Island is ZC3, and is located in the Indian Ocean, 250 miles southwest of Java, latitude 11° S., and 105° 30′ E. This slides it just over the wire into Zone 29. Right now, our faces are a little red, because, in our Country List, we show this Christmas Island, ZC3, as being in Zone 31. Obviously, this added to the confusion between the two islands. So, before you go any further, will you guys please change your records of Christmas Island, ZC3, to read Zone 29.

By looking at the Honor Roll, you will see W2GWE is still at the top of the list with 39Z and 168C, closely followed by W2BXA, W6VFR, and W8RDZ. In the phone section, W1HKK is still up there, thanks to his 37 zones; his countries stand at 112. Close behind him, however is W1JCX with 36Z and 116C, and then W6DI with 36Z and 113C.

HERSHEL'S SPECIAL SUMMER VALUES!

MINE DETECTOR

SCR 625 used..... $49.95
Brand new.....69.00

Ass't mica condensers, Cat. No. C-12—per 100.....$ 1.95

Wafer Sockets, 4-5-6-7 and 8 prong. Cat. No. WF-4—Per 100.....$ 2.95

12" Utah P. M. Speaker, Alnico No. 5 with 6F6 output transformer. Cat. No. ST-100 $ 6.95

Ass't knobs push on wood and plastic. Cat. No. KP-100—per 100.....$ 1.95

Johnson sockets No. 210-25W. Cat. No. JS-210..... 49c

Sockets for acorn tubes. Cat No. AT-10... 19c

Jacks PL 55, PL 68..... 15c

Powdered iron slug with Isolantite coil form to match, ideal for broad tuning. E. C. O. 25c

Powdered ¾ slug..... 10c

1 Meg. Shallcross Acra—Ohm wire wound resistors ±1W..... 89c

FILAMENT TRANSFORMER

110-V, 60 cy. Pri. sec.—5V—3A. Shelled Case..... $1.49

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110-V, 60 cy.; Sec.: 1, 5V at 10 amps.; Sec.: 2, 5V at 10 amps.; Connected in series will give 10 V at 10 amps. Shelled Case..... $3.95

NEW BC 223 AX TRANSMITTER

801 Oscillator and 801 Power Amplifiers, 2-46 Modulators and 1-46 Speech Amplifier 4 Xtal Frequencies and Master Oscillator on selector switch. 10 to 30 watts output. Tone Voice or C.W. Mod. Ideal for 80 meter band. Comes with 3 coils TU 17A 2000-3000 Kc. TU 18 3000-4500 Kc. TU 25 3500-5250 Kc. Black wrinkle case. Includes 2 separate cases to store extra coils. Frequencies chart and tubes included, packed in original cases, less crystals at this low price.

Shipping weight 125 lbs. $29.95

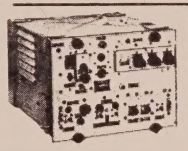
BRAND NEW SCR-269-F AUTOMATIC DIRECTION FINDER RADIO COMPASS

COMPLETE WITH COMPONENT PARTS $75.00

The radio compass SCR-269-F was designed to be the primary radio navigation compass for the United States Army and Navy Air Forces. Constant reception is possible day or night so that fixes can always be made to establish the plane's or ship's location.

Plotting fixes is accomplished by selecting two or more stations and plotting these on the navigation map. The point of intersection of these lines indicates the location of the craft.

This equipment comes complete with 17 tubes superheterodyne receiver which is tunable from 200-1750 KC in three bands less invertor. A complete instruction book for operation and maintenance accompanies this equipment.



Transmitter & Receiver

The famous boat anchor, widely used on the 144 MC band. Complete power supply 110V—AC. Less power transformer and tubes. $14.95

Shipping weight 100 lbs.

CONDENSERS

Cat. No.	Cap. MFD.	Working Volts	Your Cost
C110	1	5000 Oil	$ 3.95
C111	3	4000 Oil	$ 4.95
C112	1	1000 Oil	44c
C114	.8	600 Oil	95c
C115	.2	600 Oil	49c

Westinghouse 1 MFD 6000 volts WVDC $7.95

Westinghouse 1 MFD 10,000 volts WVDC $12.95

General Electric 25 MFD photo flash pyranol capacitator. 2000 VDC—INT. 14.95

IRC type HE resistor 200 wt. taped at 3000, 7500, 23, 750 ohms. Brand new 49c

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Shipping weight 52 lbs. $14.95



RCA modulation transformer is conservatively rated at 550 Watt audio to modulate that new KW rig. Really rugged construction with protective flashover gaps, which are adjustable. Terminals and gaps are mounted on a "Mycalex" terminal board. The laminations that make up this transformer are of high audio quality and are extremely thin, making it impossible for the core to "chatter or talk".

Audio Watts—550 Sec. #1-450 Mils Sec. #2-80 Mils Turns Ratio—Pri: Sec. #1-1:1 Pri: Sec. #2-5:1 Pri: Sec. #2 Tap-25:1

Impedance Ratio—Pri: #1-1:1 Sec. Pri: Sec. #2-25:1 Pri: Sec. #2 Tap-625:1

DC Resistance—Pri: 135 ohms; Sec. #1, 112 ohms; Sec. #2, 99 ohms.

Transformers insulation tested: Pri. 8000V.; Sec. #2-2000V. to the rest of the coils and core. Primary center tapped for Class "B" modulators. Secondary #2 will carry 80 Mils to modulate screens of beam power or screen grid tubes. Primary will match any Class "B" tubes up to 10,000 ohms plate to plate, such as 810's, 75T's, 800S's, ZB120's, 203's, HY51Z's, 211's, 813's, 828's, 805's, 2037's. Size 9½" wide, 7½" deep, 7¼" high. Heavy channel iron mounting brackets. Weight approx. 40 lbs.

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Oscillator butterfly assembly condenser 76 to 300 megacycles with acorn tube socket. Mounted on condenser. Catalog No. BC 3. $1.95

Type B — frequency range 300 to 1000 megacycles to be used with 368 AS doorknob tube. Cat No. BC2.

95c

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Pri. 115-V, 60 cy.; Sec. 1, 255/255 80ma.; Sec. 2, 63V 3.8A.; Sec. 3, 5V 4A.; Cat. No. H.P 15..... $1.29

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SUPPLY TRANSFORMER

Pri. 110-V AC 60 cy.; Sec. 4000-V VAC 10MA; Weight 8¾ lbs. $3.95

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RK60...	1.25	9004.....	.65	5CP1.....	.3.45
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829.....	2.45	3AP1.....	2.45	9LP7...	.5.45
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1T4 - 1S5 - 3S4 - 1R5
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30 MC IF Transformer In square aluminum can, silver slug tuned 29c

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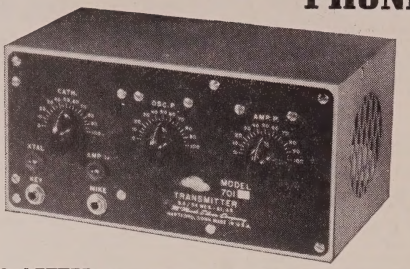
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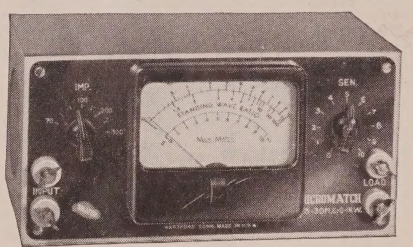
SILVER

75 WATTS CW
30 WATTS AM PHONE



A LETTER from W2RNB tells the story of Model 701 Transmitter: "I work for Electronic Marketers, Inc., and when the 701s came in I immediately took one home to test. The results were as follows: With a 40-meter Zepp antenna I worked F8SF, 559; ON4SU, 589; UA3AF, 579; PZ1AL, 599X. Power input was approximately 45w with 500v on the 807. Freq. 14138."
Only 5" x 5¼" x 10", MODEL 701 covers 80, 40, 20, 16, 11, 10 *and 6 meter bands* . . . hardly drops output at all even when quadrupling xtal frequency. 6AQ5 Tritet oscillator drives one 807 at anything up to 75 watts CW input. Push-pull 14-watt 6AQ5 modulator gives 100% phone modulation of 28 to 30 watts phone input.
Ideal for your main station, literally perfect for portable, mobile and emergency work, price of this little demon is only $36.95 less power supply, tubes, xtal . . . with plug-in coils only 50c each. We know its DX will thrill you, too, exactly as it does hundreds of users every day.

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APRIL, 1946 QST told the story of MICROMATCH in two words — "simply astonishing." It's a new meter which, connected in your feeders . . . in any link coupling line . . . measures standing-wave ratio directly. At long last MICROMATCH lets you determine what happens to the power your transmitter generates. It will surprise you by proving how *little* really gets into your antenna. With MICROMATCH you can probably double, triple, possibly quadruple the power going into your antenna . . . where it alone does you good. In "ATOM-X" construction, same size as 701 Transmitter, with big 4⅝" meter, fully tested, range 1 through 1,000 watts, 3 through 30 mc., 50 through 300 ohms impedance, it's the biggest insurance of transmitter efficiency money can buy. Only $29.90 net.

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There are a lot of W6s who have not, as yet, submitted their Zone and Country lists, who are way up the ladder, and I presume this is true of every other district also. Take for example, W6GAL, W6QJU, W6LEE, W6GHU, W6PCS, W6TT, W6MEK, etc. We know it takes a lot of time to compile the list, and many of you fellows like to use what spare time you have punching the key or warbling into the mike. Some of the fellows have been sending in their Country lists on the little booklet which G.E. put out as the special DX log issue of their "Ham News." This, at least, gets the countries in alphabetical order, and provides enough columns in which to put all the information we need.

I bumped into ex-W3EMM not long ago, and most of you will remember the DX this fellow piled up before the war. He is now W4KWY, still in Norfolk, however, and is in the radio jobbing business. Fenton says he is getting the DX fever again.

OE Prefixes Changed To MB

OE9AA is now MB9AA according to W2BRV. Any OEs heard now, apparently, will be phonies.

W5CPI believes the boys are not zero beating the DX station as much as they used to, but what gets him is some of the impatient fellows chirping in with such interruptions as "hurry up," "get wise," "me next," etc. This same thought is echoed by many others I am sure.

We have already mentioned about W6PCS working *AC4YN*, but he works other DX, too, for example, *ET1IR*, *XZ2KM*, *VS4VRA*, *TF3EA*, *VQ5JTW*, *FK8NQ*, *CT1DD*, and *VK9BI*. Even his recent marriage hasn't stopped the DX. What a guy!

By the way, I guess most of you have discovered the VK4s in Papua are VK9s. Yes, it's still a different country from the VK9s in the Territory of New Guinea. . . . at least, at this moment . . .

Speaking of VK9s, a couple of months ago, we said something about they were going to do away with all VK9s. Another VK told us . . . and what happens? Instead of getting rid of what VK9s we had, we get more of them. Confusing, eh what?

The Liberian APO has, apparently, been discontinued, so there's no point in sending EL cards via the APO any more. They are closing down, but *EL3A* probably will carry on for a while on c.w.

Speaking of Liberia, if any of you fellows have worked *EL5B* and would like a card, send yours in care of Hank Greenberg, W2LTP, 401 Rahway Avenue, Elizabeth, New Jersey. EL5B will stop at W2LTP's place when he arrives in the U.S. W6MLY is another one who believes he has just worked his 40th zone. Again, I say, a flock of you fellows will be dumping the necessary 40 cards into my lap any day now. A couple of nice ones for W6MLY are *YI7BZ*, 14,073 kc, worked at about 1400 GMT, and *ET1IR*, 14,134 kc.

Before I forget it, thanks to all of you fellows for sending in the QTHs from which we compile our list. We have received some very favorable comment, and as long as necessary, we will continue to compile a list for you. Of course, you will probably find some of them in the Call Book, as we don't have time to check every QTH sent in, and then, too, you will find many of them of no interest to you, but if you can grab two or three out of the whole works, I think it will be worth our while to continue.

KS4AC on Swan Island says he has ordered his cards and is trying to have them rushed. After he receives them, Grif goes on to say, he will probably have to lay off a week to catch up. There is also another station down there; *KS4AD*, he is formerly W5LFC of Lacombe, La. He will be there for at

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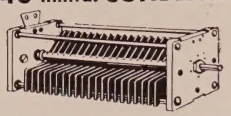
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3EP1	3.00	931A	1.88
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3GP1	3.75	956	.75
5AP1	4.50	957	.75
5BP1	3.75	958A	.75
5BP4	3.75	959	.75
5CP1	3.75	1616	3.00
5LP1	9.00	1619	.75
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6AK5	.90	1625	.53
9JP1	6.00	1626	.60
9GP7/9MP7	12.00	1629	.27
10y	.75	1851	.95
12DP7	6.00	2051	.53
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NC-240D W/Speaker	241.44	48.36	17.06
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least six months. They have just received a new transmitter that probably can be put on 40 meters, so, by the time you read this stuff, you will probably hear KS4AC and KS4AD on 7 mc. There is another guy there, too, KS4AE whose name is Bill Wayne. Bill is now active on 14 mc. Then, as Grif puts it, his other two ops are thinking of taking their exams, so it looks as though there will really be a KS4 convention underway in the near future. He also says that Wayne and Mac, KS4AD, are sore at him, because they say he has used up all the good DX, and now they have to take the left overs. Ho hum . . . sure tough "ain't" it?

W2SKV has a little info from SM6NZ who says they have a ham club with about 20 members located in the vicinity of Gothanburg. The equipment owned by SM6UA was donated to the club by his son, SM6UB. Many of you will recall, SM6UA was the pioneer Swedish ham and was 74 years of age when he died in 1941. This donation was a fine gesture on the part of SM6UB.

Here's one for the book. You may not even have to work *ZM6AC* to get a card. At least, W6LWP has a card from ZM6AC, and yet he hasn't even called him. So, quoting W6LWP, "If anyone with a call confusable with mine claims the card, I will send it to him, if he can tell me the date and time of the QSO." QTH, W6LWP, 2857 Gainsborough Drive, San Marino, Calif. 6LWP does work a little DX but specializes on 40 with stuff like *VS1AF, XU6GRL, ZK1AH, CR9AG*, etc.

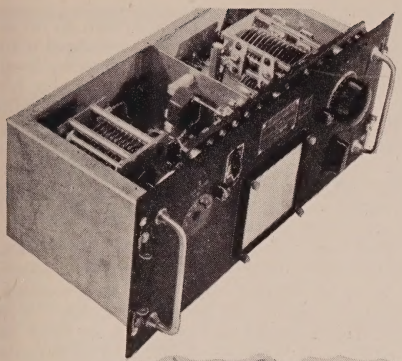
W3DPA has received a letter from *OY3IGO* who says he always tries to QSL 100%, and in case any of you fellows feel that some of his cards have gone astray, please drop him another line, and he will be sure to QSL again. OY3IGO says it is nearly impossible for him to get a good receiver to operate on 220-volt d-c lines, thus, making receiving conditions none too good.

W6CIS, another one of those lucky guys to work *AC4YN*, actually works other things too, for example, *HS1LN, VK9BI, VS7NX, LZ3ZA, FK8NQ*, and *UR2KAA*.

If any of you boys have worked *ZD8A* or *ZC1AN* and have counted them in your Zone and Country Lists, you had better start "un-counting." It seems that no one on Ascension Island has ever heard of the guy. I understand, however, there is a British ham there, and when he gets equipment will probably fire it up and get on the air. The story on ZC1AN was covered in last month's column, but briefly, he was found to be in England.

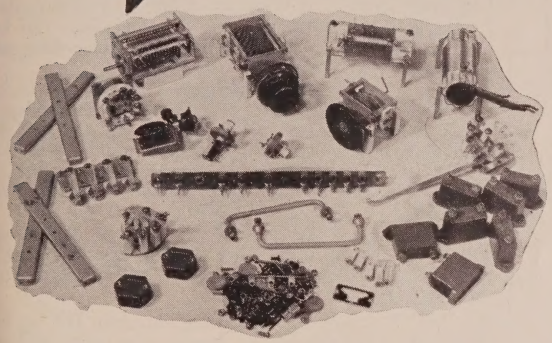
W8ZY was up to see W8HYC, recently, and had some fun kidding him about "wrestling" the ropes to make his rotary go around. 8ZY is still using a 40-meter half-wave center-fed, and, of course, on 20 it's 2 half-waves in phase. He has worked *XU6GRL*, a few times on 40, so he is quite sure the antenna is okay. Karl has a quick change transmitter using three finals for 10, 20, and 40. A 250TH is used on 10, another one on 20, and a 304TH on 40. All he does is throw a switch, and everything cuts over to the proper rig. He admits he is getting lazy. Why not?

W2IOP says that the Chinese Amateur Radio League has officially divided China into nine districts. C8 is in Zone 23, and C9 is Manchuria. *W2WMV/C9* says there is only one other active station, and that is C9YC on phone. W2IOP also says that *VR5PL* has received his 500 cards from New Zealand, so you boys should be receiving yours any day now. If you want to work VR5PL, and/or *VR5IP*, here's the new deal. Each of them is devoting a night every week for strictly DX contacts



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3—100 MMFD Transmitting mica cond. 3000 WVDC
1—60 MMFD Transmitting mica cond. 2000 WVDC
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Specially designed Television Antenna . . . A $30.00 Brilliant Lectrovision seven-inch Picture Tube, plus ALL other tubes . . . Pre-tuned R-F unit . . . Finished front panel . . . All solder, wire, and 60 ft. of low loss lead-in cable.

Operates on 110V.; 50-60 cycles A. C. Complete with ALL tubes, Net $159.50 (fair traded)

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We believe that the comparative quality of this set is superior to other available sets. It has been acclaimed by major television schools.



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Made of selected grain wood with beautiful hand-rubbed walnut finish. Accessory Kit for Mounting Included at No Extra Charge. Overall size: 17⅛" deep; 19¼" wide; 15⅛" high. **Net $29.95**

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TRANSVISION, INC. Dept. C.Q.

385 North Ave. New Rochelle, N. Y.

where they will exchange reports and then go on to the next guy. Each QSO will be acknowledged with a QSL card. VR5IP will be on every Tuesday from 0700 to 0900 GMT. VR5PL picks Thursday for his night to howl and will be on from 0700 to 0900 GMT. These fellows are doing this because they also like to chew the rag other times and they don't, want to be called a lot of dirty names for taking too much time. Of course, they will work you fellows on other nights than Tuesday and Thursday, but if they happen to feel like rag-chewing, they want the gang to understand about it. Both will be putting in time on 40 as they say 7 mc is best for the midwest.

W6TI worked *PZ1OY* for his 103rd country. W6VFR is up to 157C, the latest two being *PX2B* and *ZS3F*. W9RBI grabbed *UAØKQA* for Zone 19, *ZD6DT*, *FI8J*, and *W6NQG/KM6*, four new countries, giving him 38 and 112. Incidentally, *FI8J* is in Burma, not in French Indochina, according to RBI.

W2JA adds a few, such as *VP3JN*, *OE9AA*, *I6USA*, and *KV4AA*. W6MI, down San Diego way, sends in a nice list of 31Z and 73C. W6ZZ is up to 31Z and 76C, a new zone being UAØKQA. W6ITA is still working them, and now has 151C. New ones are *UO5AC*, *VP2LA*, *ZS3D*, *VR6AA*, and *FT4AN*.

KP4KD now has 29Z and 81C with an all time of 32Z and 109C. Late ones for Ev are *UH8AF*, *KA6FA*, *FT4AN*, *HA1KK*, *W3EKK/VK6*, *VK6FL*, and *EA1D*.

WØYXO does a little beefing about no DX up in his neck of the woods, but, somehow or other, he has managed to get 39Z and 122C with an all time of 39Z and 132C. Although, as he puts it, he can't seem to work anything, his latest include *UB5KAE*, *UH8AF*, *FT4AN*, *CT1DD*, *W6RWQ/VR6*, *W2WMV/C9*, *W7KLQ/J9*, and *W3EKK/VK6*.

OK1AW is heard from again, and he now has 38Z and 94C with an all time total of 38Z and 119C. W1BIH worked *PX2B*, *EP1AL*, and *EK1AZ*, bringing him up to 35Z and 103C. W6SN hops up to 39Z and 125C by working *UG6AB*, all time 39Z and 148C. W6ADP adds *GC4LI* and *ZS3D* making him 39Z and 133C, with all time of 39Z and 162C.

I guess I don't live right. Today, for some unaccountable reason ol' QD again passed up the 9th district and hooked a guy signing W6YAW/J8. First thing I thought about was . . . what about the new prefix, AK? So in order to find out I asked him . . . quote, I heard from W6MLY the new official prefix for Korea is AK. Do you know anything about it . . . unquote. Said W6YAW . . . quote, Haven't heard about it yet but it's OK with me . . . unquote. He then proceeds to sign off going into CQ, CQ de W6YAW/AK, etc., etc. Now let's hope the prefix is right . . or my face will take on a nice scarlet hue.

DX conditions still seem to be holding up quite well on 20, and a few of us have got a kick out of hearing *UA3AG/Ø* tell everyone he works that he is in Zone 19.

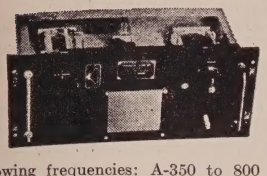
I'll see you fellows next month, and to you East Coast boys, please give us poor W6s a crack at all those elusive Russians. 73.

QTH'S

C1AN	Box 409, Shanghai.
C1KC	Box 77, Shanghai, China.
C1MG	P. O. Box 409, Shanghai, China.
CN8BK	P. O. Box 50, Casablanca, French Morocco, North Africa.

[*Continued on page 60*]

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For that portable summer rig

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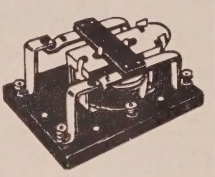
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1 mf 1000 vdc.....	.75
.1 mf 1000 vdc.....	.25
2 mf 1000 vdc.....	.89
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1 mf 1500 vdc.....	.95
.4 mf 1500 vdc.....	.15
2 mf 660 ac/1000.....	.85
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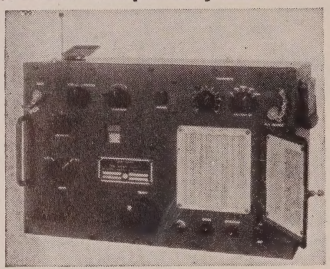
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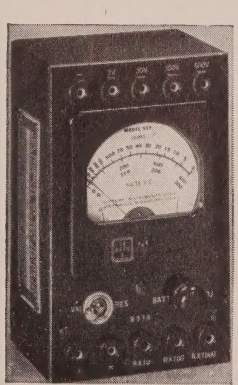
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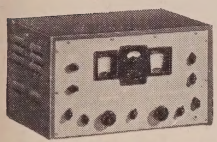
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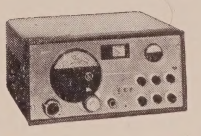
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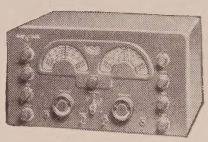
EA7A	Pedro Franco, Box 101, Cabo Yubi, Rio de Oro (Under cover—no mention of radio)
FI8J	Box 22, Hanoi.
FK8NQ	Via NZART, Wellington, N. Z.
FQ3AT	Ivan Pastre, Base Aviation, Fort Lamy, Tchad (Chad) French Equatorial Africa.
HK3DW	Guillermo Madrid, P. O. Box 584, Botota, Columbia, S. A.
HS1SS	U. S. Military Attache, American Embassy, Bangkok, Siam.
J4AAQ	Andy O'Neill, Australian Army Signals, Kure, Japan.
K7IUI/KL7	Box 84, Anchorage, Alaska.
KA1ABT	50 Park Avenue, Manilla, P. I.
KA1HR	503rd Sig. Serv. Det., APO 613, % P. M. San Francisco, Calif.
KB6AA	CAA, Canton Island, Phoenix Group, South Pacific.
KG6AM	1 CA, Navy, 296 % FPO San Francisco, California.
KG6AV/VK9	APO 246-2, % P. M. San Francisco, California.
KH6GF	P. O. 1285, Kailuo, Oohu, T. H.
KZ5GD	George Dunlap, Box 28, Balboa, C. Z.
MB9AG	Number 3 Squadron, 8th Army, Signals Regiment, Central Mediterranean Forces.
MB9AJ	% B7, Forces Broadcasting Station, Graz, Austria.
MD5PC	Forces Broadcasting Station, Kabrit, Suez Canal Zone.
NY4FB	Box 35Q, Naval Air Station, Navy 115, FPO New York, New York.
OA4AR	Richard E. Brown, Box 511, Panagra Airway, Lima, Peru.
OX3GE	APO 55, % P. M. New York, N. Y.
OZ7X	Olaf Rasmussen, 43 Vestergode, Kerteminde, Denmark.
PK1RI	Box 190, Batavia.
TG9BA	Al Broll, % P.A.A., Guatamala City, Guatamala, C. A.
VO2RF	S/Sgt. Donald B. Roger 11041570, 66th AACS Group, APO 863 % P. M. New York, New York.
VP4TAB	110 Ninth St., Barataria, Trinidad, B. W. I.
VP5PU	APO 845, % Miami, Florida.
VP8AD	Via RSGB
VS1BY	Singapore Dist. Sig. Rgt., Singapore.
VS2BG	Capt. F. W. Ford, R. Sigs., Malaya Command Signals, H. Q. Malaya Command, S. E. A. C. (Kuala Lumpur).
VS2BR	104 Wing Sig. Troop, R.A.F.S.H.Q. Kuala Lumpur, % G.P.O., Kuala Lumpur, Malaya.
VS4JH	John A. Hunt, via R. S. G. B.
WØTKK/VK9	338th Photo Recon. Sqdn., APO 246 Unit Two, P. M. San Francisco.
W2WMV/C9	Box 2497, Shanghai, China.
W8LXN/KG6	APO 234, % P. M. San Francisco, California.
YI2AM	Via A.R.R.L.
YI6C	Basra, British Forces in Iraq.
YS1MK	Ernesto Mejia Klein, P. O. Box 58, San Salvador, Republic El Salvador, C. A.
YU7LX	Via A.R.R.L.
YV5ACA	Alberto Humpierres, Radio Club Venozolano, Caracas.
ZB2B	Rock Radio Station, Gibraltar.
ZC6AA	Via R.S.G.B.
ZC6SX	Via BRS 14415, R.S.G.B.
ZD6DT	Royal Signals, Zomba, Nyassaland.



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Hallicrafters SX-42


National NC-173

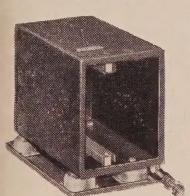

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Hammarlund HQ-129X, with speaker	173.25
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Cuts through the **QRM**

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MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT

WRITE FOR DESCRIPTIVE BOOKLET

V.H.F.-U.H.F.

[*from page 46*]

hearing him again on the 29th along with W7ERA. June 1st was better as Basil from 2012-2300 MST heard W9OMR, JMS, ZHL, WØDYG, TQK, NFM, IFB, TIO, ZJB.

Last winter we received many reports of beacon stations in the range of 30-40 mc, giving call signs in m.c.w. with a thousand-cycle tone on the carrier. G6FO has come through with a list of them, as well as F. Menzi in Switzerland. Actually these signals are not beacons, but are part of the European system for aircraft blind landing, which is called the S.B.A. systems, (Standard Beam Approach). These systems are based on the old "Lorenz." The transmitters work on frequencies between 30 and 40 mc, with a special antenna consisting of some keyed dipoles and reflectors, so producing a narrow beam, where the aircraft receives a constant amplitude and two sectors to fit close to this beam.

ACROSS THE PACIFIC ON 6!
W6UXN copied J9AAO for 2 hours from 1200 to 1400 PST on July 3rd, signals rising to S3 and falling below the noise level. Two-way contact was not made. Full details next month.

J2JCQ, ex-WØJCQ near Tokyo, Japan, advises the 50-mc band was open on June 17th nearly all day. Many radio teletype stations were heard in the 50-54 mc region; no amateurs came through. The band also had a very high hiss level, which would rise and fall. This would indicate Es skip rather than F-2, although keep a sharp look for J2JCQ on 50 mc. His rig is a BC-610 driving a pair of 250-THs to a kw. A 16-element beam aimed on the Eager Beaver Net in the Middle-West is under construction.

Via Paul Howard, W2HEU, comes the story of new 144-mc record of 425 miles, between W1MNF, of E. Orleans, Cape Cod. Mass., and W3KUX of Washington, D. C.

On May 16th, around 0130 EDT, while W1MNF was in QSO with some New York City stations, W1SF of Branford, Conn., worked W3KUX in Wash. D. C., and was told by W3KUX that W1MNF was coming through. W1SF shifted his frequency near one of the NYC stations and told him that W1MNF was being heard by W3KUX. At 0210 EDT W1MNF and W3KUX made a successful contact to establish a new 144-mc DX record.

W3KUX was using an SCR-522 with 30 watts input to a 4-element beam. His receiver was a superhet and he was able to copy W1MNF solid at all times. W1MNF runs 450 watts xtal controlled to a beam, with a superregen receiver. W1SF has shown that chivalry is not dead even with the advent of the v.f.o., at least on 144 mc.

D. L. Thompson, W6IFE, co-holder of the DX record on 10,000 mc, now has established some new ones on 2300 mc and 3300 mc.

On June 5, 1947, W6IFE worked W6IFE/6 on 2300 mc, W6IFE being operated by D. B. Harris, with W6IMZ at Reedley, Calif. W6IFE/6 was operating from a peak between Sequoia and Grants Park, the distance covered was 24.6 miles, with very strong signals each way.

Using the same rig as on 2300 mc, W6IFE/6 with W6IMZ operating W6IFE, a new record was established on 24th of May, from Grants Park to a location between Orange Cove and Reedley, Calif. This distance was 20.23 miles. See 2300-3300 mc

"TAB"

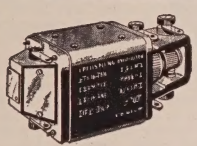
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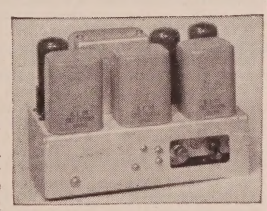
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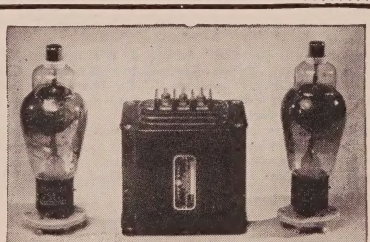
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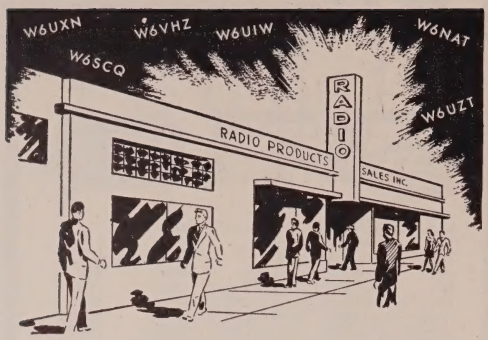
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sections next month for descriptions of the set-ups.

50-Mc Gang

Now that we have been working stations all around the country on 50 mc, let's take a look at their gear and comments.

The ARRL field day, June 14-15th, produced some good portable operation, as the band broke open from the middle-west to allow contacts with those in the east and south.

Charley Wright, W4HVV/4 gave a new state to the boys in Mo. and Kansas by working WØVAV, KYF, TQK, INI, CXB, ZJB in Mo. and WØDKS in Kansas from 1800 to 1900 CST. The rig was an 829B with 75 watts and the location was Bennettsville, S. C. Perhaps this will encourage some S. Carolinian to try 50 mc, now that the ice has been broken.

An unusual contact was made between two field day stations when W8JM/8 in Grafton, W. Va., worked W3EIS/3, 14 miles W. of Frederick, Md., a distance of 125 miles. Both stations were on top of high hills, ranging from 2000′ at W8JM/8 to 1900′ at W3EIS/3. This contact was made at 1230 EDT, without benefit of bending, QSB was fast and fluttery.

The Kilocycle Club of Ft. Worth, Texas, had W5AA/5, with W5LIU as operator on 50 mc during the field day. The rig was 8 watts to an 807, and a 3-tube converter ahead of an HQ-129X. The antenna was a half-wave doublet, 10′ high, later changed to a 138′ long wire, 15′ high. Ground wave contacts from the field position in Ft. Worth were to W5GVZ a local, W5AJG, Dallas and W6UVM/5. Sunday morning things started happening and before Herb knew it he worked 25 stations in 16 states and 8 call areas. Right in the middle of the DX the 7½ kw-generator ran out of gas and then some one dropped the magneto, adding to the fun so they say.

W5LCZ, in Benton, Ark, worked XE1KE at 1445 CST on May 31st just after getting his new 3-element wide spaced beam up. Paul is the only Ark. station on 50 mc and has 31 states, 10 districts and VE3 in less than 3 months operation on 50 mc.

W6WNN, in La Mesa, Calif., says that on May 20 at 2115 PST a KH6 on 50,700 was heard to call, "CQ 6 meters, state side." QSB was bad, but the signal was also heard by W6LKC and W6BOS, besides Poncho. W7ERA says that during a contact with XE1KE on 28 mc, BJ said he had heard some W4s in contact on 50 mc, but the call signs were given sloppily so that he was unable to identify them. Just a clue fellows, even if it is a local rag chew, give the call sign in phonetics, ti may pay off for you. Walt, W7ERA, goes on to say that W7FDJ with his 3-3 element beams, stacked, has really been working out. W7FFE has 2-3 element beams, stacked, and promises us a picture of the all metal array, which is really getting out over a 4-element array.

While on the stacked antennas, W3CIR/1 ran a check with us during a contact and his 2-4 element beams stacked was 4-5 S units stronger than a 3-element horizontal. The hop from us to Boston is about 1230 miles, just on the far edge of 1 hop.

Near Chicago, at Rantoul, Ill., W9FKI has been enjoying the skip, using an 815 in the final with 30 watts, feeding a long wire and 4-element horizontal beam. The receiver is an ARR-5, which has a scanning motor for sweeping the band. Sure saves dial twisting, Ken says.

Down Florida way, we find W4DRZ busily tuning his converter up and trying to locate 50-54 mc. While lining it up with a bakelite shaft near the oscillator coil, he suddenly freezes in his tracks, as the speaker emits a nice CQ "6-meter DX," from OA4AE in Lima, Peru. Well the next scene finds Bud trying not to move his hand near the osc. coil, and trying to build a 50-mc rig with just one hand, for, it seems the 6-meter rig wasn't even started. This got Bud on the ball and the next day he did have a rig on, althouth not a peep was heard from ØA4AE again. On May 27th in the morning W4DRZ completed his WACA with contacts to W6NAW, ANN, PUZ and W7TXM, making the first WACA from the state of Florida, and a hard one at that. The rig is a pair of PP-24s with 125 watts, into a 3-element wide-spaced beam, with FD radiator and 72-ohm coax feed. Another good contact for Bud the same night was, when he hooked W7FFE in Oregon for a 2400 mile hop. 33 states, and WACA all in 11 days operating on 50 mc, yet activity is still low in Florida!

In Shelley, Idaho, W7ACD has been giving the gang their Idaho contact. Louie really has a potent signal and all it comes from is a converted SCR-522 with 15 watts, a 4-element beam and V-beam. In three days, May 26, 27, 28th, W7ACD worked 63 stations in 14 states and 5 districts, with only 15 watts. Surely more of the Idaho gang and Wyoming lads would like to join Louie in the fun.

Out California way we have the W6 lads screaming for more c.w. on the band, especially during indicated double-hop. W6PUZ and W6ANN, DX men from way back, both point out that they could have worked twice as many stations on the double-hop openings if c.w. had been used more often.

W6ANN emphasizes that the opening on June 1st was peculiar in that only he and W6LSN were able to hear the W1s and W2s. The signals from the east would be in for 5 mins. then out for 5 mins, and contacts had to be made on the swing. Bill has also heard XE1KE twice, but with very weak signals.

In Benton, Ark., W5LCZ says that he thought he had finally gone loco, when on May 26th, just before the ham stations

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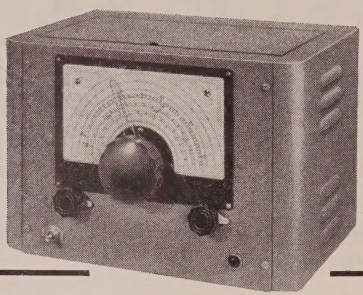
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started to come in he heard a fairly strong carrier just above 54 mc. The modulation was a jungle drum, being used to send some sort of a code. A visitor dropped in the shack and finally convinced Paul that the situation was normal and that he was really hearing the drums. Whether the visitor had a long spear or not, Paul didn't mention.

One of the most consistent signals coming from W6 land these days is W6UXN, Roy Brady, ex-W8WLG from Pittsburgh, Pa. Roy's 81'-high 5-element beam is pictured elsewhere in the column. The rig is 6C4s into an 832, which drives a pair of 4-250s in the final, with a W6-kw input, naturally. The beam is unique in that the reflectors are .2-wave spaced, the first director is .2, while the next two directors are .25-wave spaced. The receiver has two stages of grounded-grid amplifiers ahead of it which gives a low sig-noise ratio. In 3 days with this set-up, Roy worked 31 states in 9 districts and VE7, lacking only that elusive W1.

W8TOB, Chuck Wyatt, in Lorain, Ohio, has been working some nice bending to W8KQC, CEQ, OPO and W3OMY in Pittsburgh. Looks like a revision of the ole days on 5 meters. Let's see more of it for that 6-meter net to the East Coast.

The Sad Sack Net boys, in and around Yakima, Wash., are now fairly well pleased with the way the band has been opening for them. Nice contacts have been made on double-hop, and they are now hearing the Hawaiian Island Inter-Island Phone come in with very loud signals. W7HEA found out that a closed-spaced beam with dipole radiator is too sharp for the band because of the frequency discrimination. He now has a 3-element wide-spaced beam with folded-dipole radiator and finds it to be much better for skip DX.

W8AZZ in Detroit has been keeping schedules with W8QQS in Saginaw, Mich. a distance of 80 miles nightly. The rig is an 812 with 100 watts, for a receiver an R9'er ahead of an Ultra-Skyrider does the job.

At Rhombic-Acres, we find W7QAP very much confused over why his 2-element beam is working out better than the H with reflectors. After looking at the thermometer and looking at his coax matching transformer, he found that it was shorted out—just when double-hop was on too.

W9LMX and W9AB are using a pair of dipoles, crossed, mounted in the tops of their highest trees. The feeders are switched in the station with both tied in parallel to monitor the band, it works fb so they say.

W6IWS, in Brookdale, Calif., says that 6-meter schedules just don't hold for him. His location is 60 miles south of San Francisco, on the coast and down in a Canyon. High ranges of mountains block him off to the west, which messes him up for skip that way. To the north and W7s he gets out well. Tilting the beam might help. His antenna now is a 6 half-waves, and reflectors are being added. The rig runs 75 watts, and the receiver is a homemade superhet with converter.

W5ELL in Albuquerque, N. Mexico, says that activity is really picking up there with W5LHF and W5MLE in Los Alamos. Good contacts have been had except to the W1-2s.

In Marshall, Ind., W9UNS, says that Perry Ferrell's predictions are working out about 90% correct, and helps to stimulate interest among the gang.

WØUSI, Bill Mattison of Brookings, S. Dak., is among the leaders in the Honor Roll. Bill has 750 watts to a pair of 250ths, and a 4-element wide spaced beam. His ground wave extends to the Twin-Cities, and the other night he had his first QSO with WØYSJ in N. Dak. on ground wave, his other contacts with YSJ being on aurora.

Western Florida is now represented by W4EQR at Pensacola, who has 125 watts to a pair of 35Ts into a 3-element closed spaced rotary, with T match. The receiver is a VHF-152 ahead of a HQ-129X. W4CNK is also on in Pensacola and runs 100 watts to a pair of 807s, and a 3-element beam, with a band-pass converter ahead of a 348Q.

W5AJG has a 4-element beam. He also wants to know who gets W9ZJB, now that we are WØs. All we can say Leroy is "poor feller."

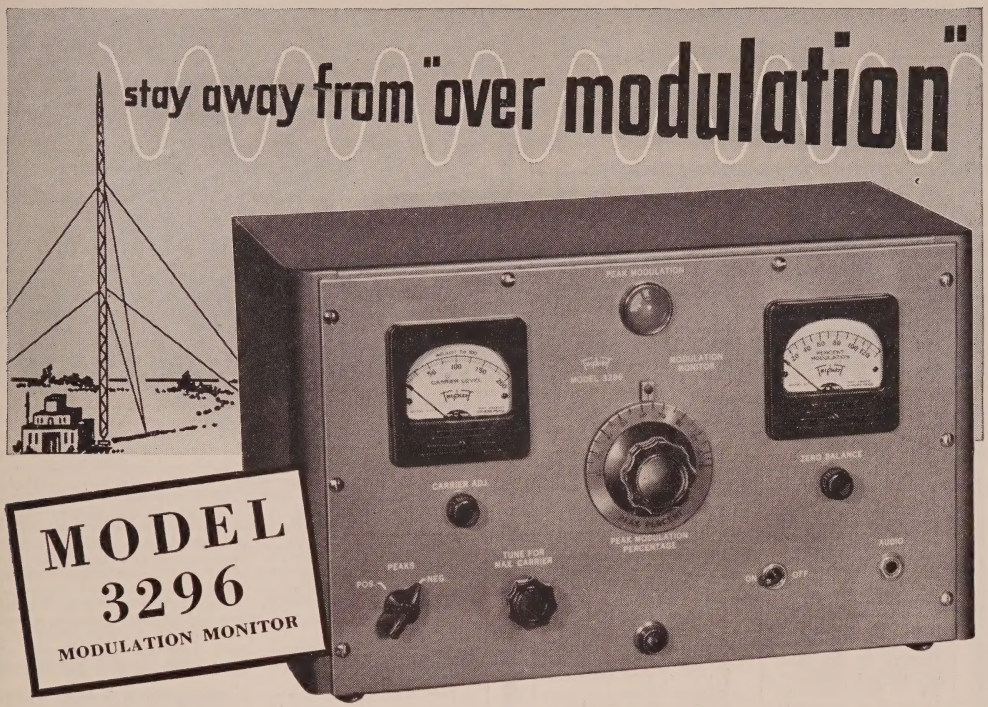
The thrill of the year for W1HDQ was his contact with W7QLZ/7 Mobile. Clyde was running 10 watts and thats on double-hop. It was nice to hear from the ole Hermit of Buckhorn Canyon says Ed. Ed also got Ark. and Okla. for a total of 33 states from W1.

From Houston we hear from our ole Army buddie, W5EEX. George and your compiler of this column spent a lot of time on radio and other interesting things that Army buddies look for. Geo. has an 811 final with 75 watts and a 3-element wide spaced beam 18' off the ground. The receiver is a converter ahead of a HQ-129X. With this he was able to contact XE1KE for a nice QSO.

Here is a report different from the rest. W7NIV in Hawthorne, Nevada, has yet to hear a 50-mc signal, either skip or by bending. Mels antennas are a ground-plane, a 3-element rotary. and a FD 35-45' off the ground. The receiver is a S-27 and a S-36, the rig runs 100 watts to a pair of 807s. A whing-ding is planned the day that Mel hears his first 50-mc signal.

W6BPT in Santa Clara, has 120 watts to a 6-element sterba curtain and already has 10 states with it. Pinky will be in there for the F2 hop to KH6 this fall and winter.

While at the Chicago Parts Show we had occasion to chat



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with W5HHT of New Orleans. Aside from listening to the wonderful food and living in New Orleans we found out that the guy worked 6 meters. Well Irv is New Orleans' only station on, and has 150 watts on 50,550 kc. During a recent contact Irv told us he was taking a cruise to SA on his Yacht and that he would be W5HHT/MM on 6 and 10 meters, so watch for him about this time.

In the old days on 5 meters, Kansas was represented by W9UIZ. Well W6TXM, in Tuscon, is none other than ex-W9UIZ. Charlie has a pair of 2E26s with 37 watts to a 3-element beam on 50.5 mc and already has worked the W1-2s with nice contacts.

From Amarillo, we find that W5HFs YL is going Mobile with an 807 and Gonsett converter.

144-Mc Gang

Pres. Yeomans, W2OHE, in Brooklyn, says that activity is perking up and that contacts nightly up to 100 miles are common. Others that join Pres in the fun are from Conn. to D. C. and contact has been made to W4FJ in Richmond. Most of the rigs in the Brooklyn area are xtal controlled and use superhets for receivers.

Activity in the Sharon, Pa., and Youngstown, Ohio, area is picking up, and since some xtal xmtrs and good antennas have been put up. It has made quite a difference in the results. The rig at W3KQA is an 832A and a VHF-152 converter, the antenna is a horizontal 3-element wide spaced. So far his contacts have been with W8LIO at 26 miles, W8PMJ at 48 mi, W8WJC at 56 mi, and W8WXV at 103 mi. Others in the area are W3NCD, and W3KWL. Activity usually starts around 2100 EST and they would like skeds with anyone interested.

W8UKS says his tower grew a bit since the new installation next door, and is now 80′ to the double square-corner. Now that Sam is rebuilding he vows that all connections will be soldered, instead of using slip-leads. An excursion was taken to Angola, Ind., and W8WJC was worked S-9. W3QKI's XYL now has her call, W3NIX! Sam queries the form letter sent out by W3QKI asking for 144 mc checks in the wee hours of 0545 and 0600 EST. W3QKI points out that v-h-f signals are steady and bending is really pronounced at this time. Well we know that the taxi service operating on 152 mc in the Kansas City area is interfering with Topeka at 65 mi., Springfield, Mo., at 185 mi. and occasionally at St. Louis, 250 mi., from 0200-0600 CST. A lot might come from these checks at that time, so give her a try fellows.

Out West Coast way we find from W6OVK, that W6TFZ made an unconfirmed contact with W6SLL, Englewood, about 330 miles. Also W6LSX, is working 93 mi. nightly into the Bay area.

W5ELL says that there is some 144-mc activity there, and reports that W5LFH has a heard card from one of the New England states on 144 mc?

Activity in the San Joaquin Valley is down although W6JPU and W6PSQ has succeeded in pushing a signal in to Bakersfield, working W6DYG and W6RJE. 522 transmitters are used with VHF-152s. W6DYG has a concentric line superhet that is plenty hot according to W6PSQ. W6PSQ and W6JPU are usually on Tues., Thurs., after 2000 PST, and on Sundays in the mornings, both with 16-element beams, and urge others in that area to join them.

During the Chicago Parts Show, W4BYR had a Trans-scvr, with which he contacted quite a few of the Chicago gang. Upon his return to Tampa he found that 144-mc activity had picked up with W4ALP and W4DES new additions. W4BYR has worked across the Bay into St. Pete. with W4FPC, and now W4AQ and W4HNT have joined the round-table. A net into Orlando is under way as W4IMF is moving to Plant City, a good in-between location.

VE3ANY sends in a report that VE3AID and VE3ZE at 2030 EDT on May 14th heard W1NBV calling W2BAG for about 10 minutes, the same time 50 mc was open from VE3 to W5 and WØ. This looks like a good haul if confirmed.

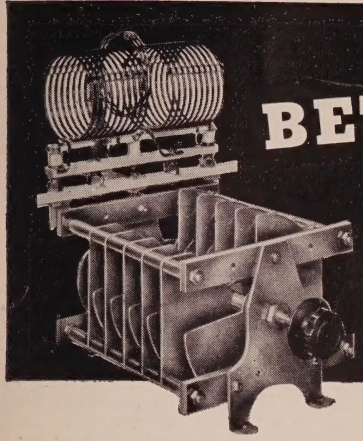
W9IPO, in Chicago, says that the controversy there is over antenna polarization, and with the gang liking mobile it puts vertical in first place. He would like to see such fellows as WØNFM, DDX, YUQ, W9ZHB and W8UKS give the verticals a try, with similar horizontal ones for a comparative check. For instance Ed has a 6-element vertical beam, coaxial fed, ½-wave spaced, 70′ high, and with carefully measured field patterns found that it had 67 degrees width in the vertical position and a 64-degree beam width in the horizontal. The gain of the beam in both positions was so close as to be impossible to detect the difference on the sensitive FS meter used. Checking against a ground plane at 55′ found the beam had a little over 8 db gain or about 6½ to 1 gain in comparison. Yes, fellows, the field is still open for arguments on antenna ploarization.

SK

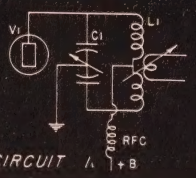
Hectic has been your scribe's problem, what with trying to keep in the "states worked running," the baby knocks out a couple teeth, floods and we do mean water, it's been ruff, but still fun trying to present to you the v-h-f story. If you like it, leave us know; sometimes we wonder!!

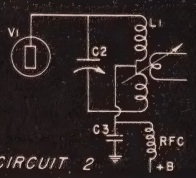
Key Clicks

July *CQ*, Modification of the SCR-522 for 2-Meters, contains an error under the heading "Additional Receiver Improvements." Step *f* on p 29 calls for the addition of a 150-ohm control. This should be 150,000 ohms.



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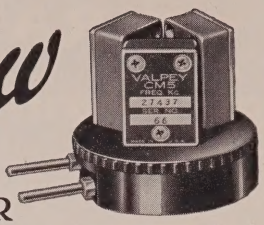
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YL FREQUENCY

[*from page 48*]

department of Consolidated Vultee Aircraft, and still finds time for plenty of hamming. She was on 10 phone during field day with OM Bob on 2 meters. They're also active on 6 meters with a 4-element rotary and a dozen states to their credit, and have a 16-element beam under construction. W6YYM admits it is a rugged schedule but says, "I'm getting lots of fun out of it all and that's the main thing."

Personal Mention

Various news items came to light during the YLRL Club luncheon in N.Y.C., and at the Club meeting on June 20 (after which the N.Y.C. meetings QRT for the summer.)

Lillian Ruocco, W2PMA, and her OM had as a visitor WØOP, John O'Hara, sport's announcer for the St. Louis athletic activities. By the way, the attraction to the Abbey's Service Station which the Ruoccos operate on the Boston Post Road in Mamaroneck, N. Y., is that it is the only gasoline station with an amateur station having a 3-element beam and an XYL as chief op.

Rose, W2TU, will be operating on 10 phone from Hurleyville, N. Y., for the summer. Ruth, W2OWL, is also leaving the city for country air. Jerry, W2PBI, is spending the summer as a counselor at a camp near New London, Conn., where her 5-year old son will be a camper. She plans to build him a small receiver in her spare time at camp.

The only YL on 2 meters on Long Island is Barbara Lakey, W2TWJ. She says her HT-4 puts out a terrific growl but the OMs put up with it because she's the only YL on there. W2PVS, Betty Stratten, in Lodi, N. J., is active on 2 and 10, but complains that during the day when she has time to get on 2 there just isn't any one else on the band. By the time you read this we hope to be joining the W2s on 2 with the FB rig described by W1CA in July *CQ*.

W2MEG, Willy Grabner, is anxious to get signal reports on the new Supreme transmitter she and the OM are sporting.

QRU?

What's happening, gals? Won't you write and tell us what is going on, what you are doing, where you are operating, YLRL activities, etc.? Address your YL column editor at *CQ*, 342 Madison Ave., N.Y.C. We'll be looking forward to hearing from all of you, and we'll do our best to carry on the great job done by W2OLB.

DX PREDICTIONS

[*from page 39*]

is expected that fair conditions will exist between 0400 and 0600 hours, while good conditions are predicted after 1700 hours PST. Between 0800 and 1600 hours there should be considerable absorption over this path and few signals are expected to be heard or worked in this period.

Amateurs in the W6 and W7 call areas also may use the graph in *Fig. 1* as an indication of the transcontinental MUF and OWF. This is due to the extremely high densities of the F2-layer over the eastern control points of this path, thereupon placing the entire controlling factor on the western control points which fall about the center of the United States. East Coast stations and Midwest stations attempting to work this path will find somewhat

similar conditions as shown in *Fig. 1*, with a peak MUF of 32.0 mc at 1430 hours EST.

In *Fig. 2* the average conditions for August are shown for a path from the W1-W2-W3 call areas to eastern Australia and New Zealand. A gradual decline in the MUF is noted after midnight, with a slight increase in MUF about 0800 hours EST corresponding to a short 20-meter opening usually noted about this hour. A minimum in the MUF is noted about 1200 hours with a very sharp increase in the MUF after 1330 hours. There are possibilities of a 10-meter opening of erratic proportions between 1500 and 2000 hours EST. Peak conditions on 10 meters are to be expected at about 1900 hours EST. West Coast amateurs should find this path very active with an MUF exceeding 40.0 mc from 1500 to 2100 hours PST. During the last week of August and early September it is expected that the MUF from southern California to New Zealand will be about 47.0 to 48.0 mc at 1530 hours PST.

The graph in *Fig. 3* illustrates the average predicted conditions from the Midwest areas of the United States to the Philippines, coastal areas of China and the East Indies. A minimum in the MUF is predicted around 0500 hours CST. A sharp rise in MUF should be observed after 0600 hours with a a fair to good 20-meter band opening around 0800 hours to 1000 hours CST. Considerable absorption should be experienced on this path after 1200 hours CST. Therr may be scattered 10-meter signals between 1930 and 2130 hours CST, although this opening during August will not be very dependable. Fair 20-meter conditions may be found after 2300 hours until 0300 hours CST the following day. Somewhat similar conditions are expected from the East Coast to these areas in Asia, although the West Coast stations may have a fair to good 10-meter opening between 1800 and 2000 hours PST.

The graph in *Fig. 4* illustrates the average conditions for a path from the W1-W2-W3-W4 and W8 call areas to Japan. Since this path crosses the auroral zone on a normal azimuth, considerable day-to-day variation is expected. In general, after a 14-mc minimum MUF during the night a 20-meter opening is expected about 0700 hours EST. This opening may last until 1000 EST on very good days. Considerable absorption is expected between 1100 and 1800 hours EST. 20-meter conditions may be fair after 2200 hours EST until approximately 2330 hours EST. West Coast stations may be able to work 10 meters into this area around 1900 to 2030 PST when an opening of fair proportions is expected.

The average MUF to South America from the east coast of the United States should be about 36.0 to 38.0 mc at 1600 hours EST. The southern United States single hop MUF to Peru and Ecuador may reach 46.0 mc at about 1615 hours EST. From the West Coast to South America the MUF will probably be about 34.0 mc at 1430 hours PST. 10 meters is not expected to open before 0830 hours and will probably close around 1800 hours PST. The path from the United States to North Africa may produce some scattered 10-meter signals around August 15th, although this path will not be fully open until September 10th or 15th. The path to England on 10 meters should open around Sept. 15th.

The data for the prediction graphs is drawn from the *Basic Radio Propagation Predictions . . . Three Months in Advance* as issued by the Central Radio Propagation Laboratory of the National Burreau of Standards. These booklets are available on a subscription basis from the Superintendent of Documents, Washington 25, D. C.

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LETTERS

[*Continued from page 6*]

DX and traffic handling. Of these, traffic handling is the least important and definitely does not warrant voluntary clear channels.

I have been an active ham since 1915 and at one time due to misguided zeal was even an Official Relay Station. Such messages! "How are Aunt Ella's kittens question mark," "Greetings from Bedford," "It's thrilling to send a message on the wireless." If 99 44/100% of the so-called messages handled by the traffic nets were dumped in the wastebasket, ham radio would be vastly improved. Back in 1933 the C. O. of a reserve air station received a dispatch via the amateur station operated by radio personnel: "105 NY will arrive tomorrow." The training planes in use were designated NY and plans were made to receive them. Came tomorrow and a friend of the skipper's, but no planes. The dispatch as filed had read: "Johnny will arrive tomorrow." "... useful and favorable services to the armed forces and the general public!"

Traffic handling not involving emergencies does have its place in amateur activities, but it is not the organized net traffic. It is the "CQ Denver" variety, with a request that the Denver station phone the addressee and deliver a message of some degree of importance while you QRX. That kind of QSP is worth while. I have no argument against legitimate emergency traffic handling and have participated on more than one occasion.

The fact that amateurs handle unimportant traffic with mediocre accuracy and a vague possibility of eventual delivery has no bearing on the international situation as far as amateur radio is concerned. In fact, message handling for third parties is prohibited in most foreign contacts and this prohibition is expected to be continued in the forthcoming ITC and Cairo revisions. In the past certain commercial interests have fought amateur proposals only because of third party traffic handling.

W8RN asks amateurs to refrain from transmitting on the net frequencies. It would be as logical for me to ask him to QRT if his traffic breaks up my rag chew or DX contact. I make no such request. Ham frequencies are open to all amateurs regardless of the phase of activity in which they are interested. Let's keep them that way. Developments such as crystal filters and improvements in operating technique have come about only because of the QRM on the ham bands. Let the traffic men have their fun and the rest of us have ours, and if the QRM gets too bad plug in another crystal or twist the v.f.o.

Gilbert L. Countryman, W3HH

We don't agree with W3HH, but he has a point. Better use of amateur traffic handling facilities would probably increase interest in this important phase of amateur radio.—Ed.

PHONE & C-W MONITOR

[*from page 16*]

After an audio tone is present, when adjusting for c-w operation, the 1-meg pot should be varied to make sure that an ample range of audio tones is available. The audio range can be easily altered by varying the values of the .1M-resistor and .01-, μf condenser connecting to Grid No. 2 of the 6BA6. When adjusted properly, the tone control should be capable of producing a continuous audio range

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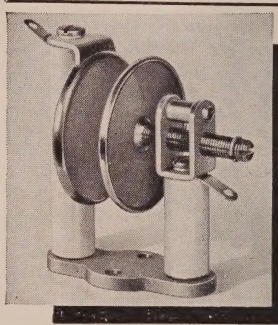
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from below audibility at low frequencies to above audibility at high frequencies.

After satisfactory operation is obtained as a monitor, the receiver output may be plugged into the monitor. The volume control on the receiver should be adjusted until the volume of the received signal is the same as that of the audio monitoring note. The .5M pot will now act as a volume control for both the receiver output and the audio note. Either the phone output or the speaker output on the receiver may be used as a point to pick up the audio signal to feed into the monitor.

The signal from the receiver will be amplified by the monitor regardless of whether your transmitter is on or off. This allows break-in operation, or if this type of operation is not desired, the receiver may be turned off when transmitting by any of the usual systems.

Monitoring your phone signal is accomplished by switching to the "phone" position, and adjusting the coupling as explained previously.

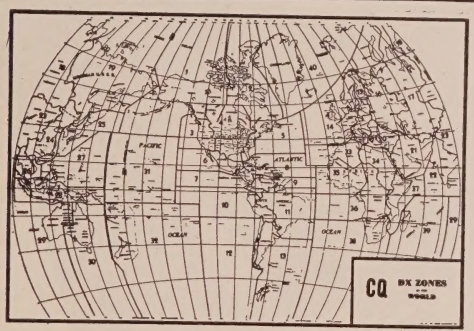
AMATEUR NEWCOMER

[*from page 37*]

into the 115-volt line with both primary and center-tap switches in the "off" positions. Turn the primary switch to the "on" position and observe the filament of the rectifier to determine if it is operating. This will be indicated by a dull red glow after three or four seconds. When the filament of the rectifier appears to be operating satisfactorily, turn the center-tap switch to the "on" position and observe the reading of the voltmeter. If it reads 375 to 425 volts the supply is operating normally. If it reads much more than 425 volts, turn the supply off immediately and check the voltage-divider circuit to determine if one of the 10-watt resistors is open. If they all appear to be good, then check the wiring to see if it conforms to the circuit diagram. Excessively high voltage output indicates that there is an open circuit in the bleeder system or incorrect wiring of the transformer secondary circuit.

If the voltmeter reads much *under* 325 volts this is an indication that one or more of the bleeders is shorted or is improperly wired in the circuit. There is also a possibility of a shorted condenser, but in this case there would probably be no output voltage. In the event that the output voltage is extremely low or is zero, the supply should be turned off quickly and both wiring and parts carefully checked.

As a matter of experiment, it might be wise to try the supply with a choke-input filter instead of the condenser-input filter. To do this, disconnect the first condenser from the input side of the first choke and reconnect it in parallel with the second condenser. The output voltage



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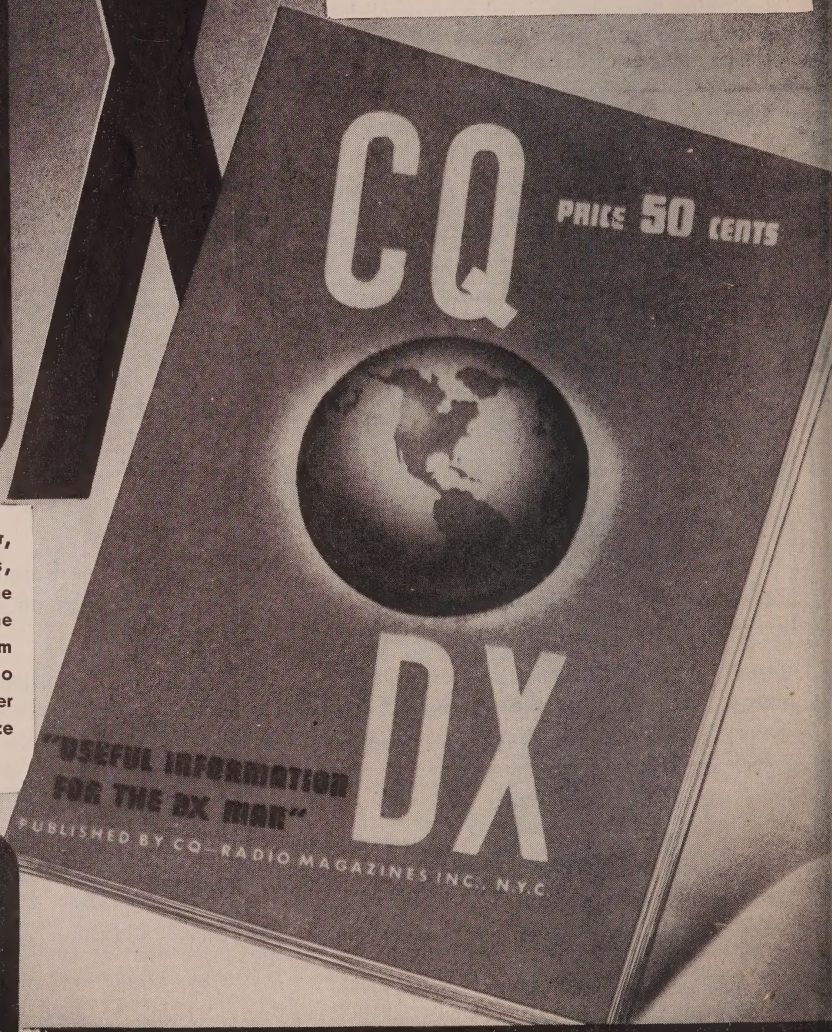
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should be noticeably lower than it was with condenser input. If sufficient voltage is available with choke input, the supply may very well be operated this way, with improved regulation and longer component life.

When the output is satisfactory from the standpoint of voltage, check each of the taps on the voltage divider individually at the terminals on the rear of the chassis and then check them through the tap-switch. Moving down from the positive side of the divider the voltage should be reduced by about 20% of the total output voltage for each tap, except for the last, which should be about 10%. If the measured voltages conform to the above description, the supply is ready for use with the audio amplifier to be described as the next project in this series.

Bibliography

RCA Receiving Tube Manual, pp. 3-6.

Keith Henney—"Principles of Radio" Fifth Ed., John Wiley & Sons 1945, pp. 282-296.

W. L. Everitt and others—"Fundamentals of Radio," Prentice-Hall 1942, p. 71; Chapter 5.

THE CARDIOID BEAM

[*from page 29*]

a signal strength reading of R7 to 8 off the front end. Now even if the two signals are arriving from directions differing by only 20 degrees or so, the R9 signal may still be zeroed in the null of the pattern and while the desired signal may now be heard with an R reading of only 3 to 4 it is still entirely readable and satisfactory communication may be maintained.

There are cases which arise where there are more than two stations operating on the same frequency and these are being received with approximately the same signal strengths. In such instances it is difficult to do much, especially if they are all arriving from different directions, but generally at any one time the interference is being caused by only one outstanding signal. However, it may be necessary during a QSO to reorient the null to combat a signal other than the one causing the original QRM when the contact was established. It is recognized that this represents a more or less negative method of operation but it has produced results where the more common method of favoring the received signal to the maximum extent has failed and with us it is the final result represented by a 100% QSO that counts.

Design Considerations

General design data for the beam for ten and twenty meters is given in *Fig. 3*. Orientation of the beam in a vertical plane was decided upon in order to obtain a low angle of radiation and thus concentrate the signal at those angles which

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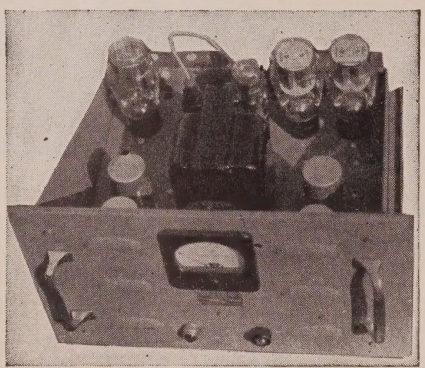
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favor long distance communications. It is also recommended that the center of the beam be located a quarter wave above a good ground since this particular height produces the most desirable low angle of radiation. In this case the beam was located on the flat roof of a comparatively high building and a ground screen employed directly under the elements, the lower elements coming to within a few feet of the screen. But an elevation of ½ to ¾ wavelength above ground is entirely satisfactory if the beam is to be mounted at the top of a pole as is the usual case.

Feeding the Beam

The feed of the two elements is a very important consideration to assure the proper operation of the array. In order to assure the presence of a uniform cardioid pattern with an absolute null it is imperative that the currents in each element be the same. This practically dictates the use of a flat line and 70-ohm coaxial cable has proved quite satisfactory for use in connecting the two elements. Since the transmission line which feeds the two elements is terminated in two 70-ohm resistances in parallel its characteristic impedance should be about 35 ohms. 50-ohm coax was used for the main feeder line and works wite One more word about the location of the feed leun In a vertical array of this type it is quite diffinlll. to keep the feeder out of the field of radiation cda. since antenna currents are easily induced into the outer conductor of the coax, it is seen that this is, a factor which may easily distort the pattern sufficiently to make the antenna useless for our purpose. In order to eliminate this source of trouble the first element is fed as a vertical coaxial antenna with the 50-ohm coaxial line and the 70-ohm line connected between this and the second element. This system works very well keeping the currents in the two elements equal and the transmission line out of the field of radiation. In addition, the line below the bottom of the first element is isolated from the antenna and this tends to improve the balance of the fed dipoles.

It is advisable to provide for continuous rotation of the beam. Slip rings may be used or one of the excellent surplus rotating couplers for coaxial cable will do a fine job. In addition, a good rotating head should be employed which will give a speed slow enough to permit accurate positioning of the null with respect to the unwanted signal. Instant reversing is also a requirement.

It has been gratifying to be able to sit at the operating position and engage in a QSO knowing full well that the means of pulling him through and finishing the contact lay in the proper operation of the motor control switch which determines the position of the null.

SWISH-LESS V.F.O. CONTROL

[*from page 20*]

v-f-o units previously described has been the almost total lack of accessibility of the various components. We have heard of surgeons who practice tying knots in a string inside a penny-match box, just to give them the digital dexterity required to tie up sutures deep within an operational cavity, but most of us lack such ability. Anyway, it's much easier to build stuff when one can reach the parts. Realizing this, the r-f components were placed on a shelf-type sub-chassis (4¾ wide by 5½ inches deep) fastened to the front panel of a 6x6x6 box. The power supply cable and r-f coax are also terminated on this sub-chassis and come out the rear thru slots cut in the rear panel. Thus, the entire r-f package may be assembled with convenience, then placed in position and held by means of the front panel screws.

The power supply and control connections are made by means of a cable plug and a socket on the 7x11 base chasis. This chassis holds the power supply components, operating switch, the terminals A and B for the remote control, a pilot light, an a-c cord, and the a-c On-Off switch.

The r-f package is mounted on live rubber grommets, thus eliminating some of the effects of vibration on the v.f.o. Air tests revealed that the addition of a sponge rubber pad underneath the base chassis further reduced vibration effects almost to zero.

The operations switch lever was purloined from a long-forgotten BC set and is mounted upside down. It is surprising how much more convenient it is that way!

Since the entire 3500-4000-kc band was covered, there is a terrific amount of crowding on the 0-100 dial. Perhaps a much better arrangement would be a National Type A Velvet Vernier with the tuning knob calibrated, and with the normal dial used to indicate the frequency *band* in use. However, the use of this type of dial would add to the mechanical complications as it requires back-of-panel mounting for the associated variable condensor.

The various voltage and control circuits are terminated on a row of tie lugs mounted on the rear of the sub-chassis. The short supply cable likewise is connected to these lugs and terminated in a plug. Similarly, these circuits connect to a socket on the base chassis, making as easy job in the installation or removal of the r-f package.

If desired, it would be entirely practical to build more than one r-f package, say one for each band to be covered, and to make them plug-in by eliminating the machine screws through the grommets and using banana plugs and jacks in the

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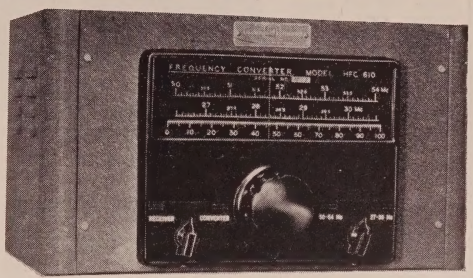
[*from page 26*]

ate their v-f-o near the edge of the band. Here again the ray tube is used as a plate detector for r.f. The grid, biased to minimum target shadow by the cathode potentiometer, is coupled very loosely to either an intermediate stage or the transmitter output. A crystal is placed across the grid resistor. When the grid is excited with r.f. the shadow angle will increase. The increase should be slight, made so by the very loose coupling. When the r.f. approaches the parallel resonant frequency of the crystal, the voltage across the crystal, and therefore the grid, increases and the shadow angle widens considerably. Since the resonant frequency of the crystal will not change perceptibly unless it is subjected to unnecessary heat, the v-f-o dial may be marked with a calibration point at the place where the shadow shows its maximum width. To check the v-f-o calibration thereafter, it is only necessary to rotate the tuning dial to the point of maximum shadow, then note the position of the original calibration point. If an error is noted, then it may be corrected with a trimmer across the crystal or carried mentally and applied across the remainder of the v-f-o dial.

If the crystal is ground for slightly within the limits of the edges of the band and then placed in parallel across the ray-tube grid a very good pair of band-edge markers are assured. When the v.f.o. is tuned toward either end of the band, opening of the *eye* will be a danger signal and will tell the operator, that regardless of the calibration he is approaching the band edge and should stop.

If two crystals are used the indication on the *eye* will naturally not be as great as with one crystal due to the lower total impedance. However, the indication will be very sharp but due to the extra capacity of the crystal holders, etc., the resonant frequency may be slightly changed. This is best cleared up with one of the cheap crystal grinding sets on the market today. In any case, this method is amazingly inexpensive and the results are far superior to those obtained by the use of a frequency meter. Should it be found that the reduction in sensitivity prevents your getting a good shadow angle indication, it may be necessary to divide the v-f-o dial into two parts. Paint the low frequency end of the range red and the other end of the band yellow. Put a double throw rotary switch in the grid circuit of the ray-tube so that a dot of either red or yellow paint will indicate whether the high edge or low edge crystal is in the circuit.

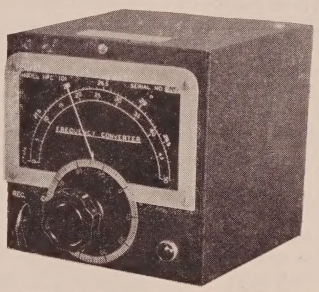
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Write for Bulletin C8 describing high gain 6, 10, and 11 meter Frequency Converters, and also FM Modulator Exciter.

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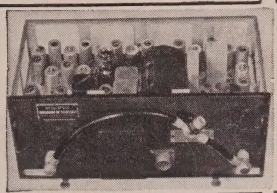
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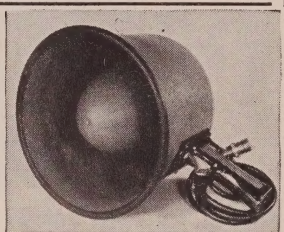
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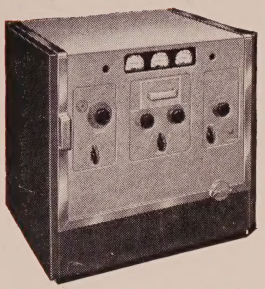
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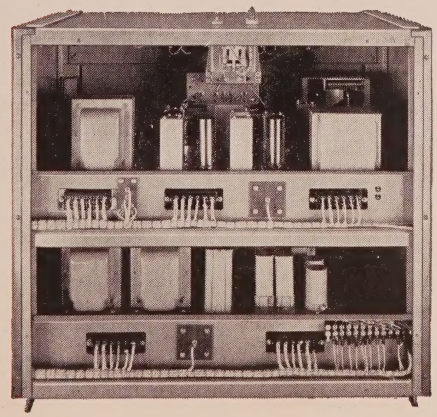
We at Temco, who have been Radio Amateurs all our lives, have been wrestling with this problem for over ten years. Spurred by the desire to build Temco Transmitters that would fill every Amateur requirement at prices within easy reach of all, yet represent a sound, practical merchandising plan for the dealer, we enlisted our wartime experience with sectionalized units and plug-in construction to solve this long standing problem.

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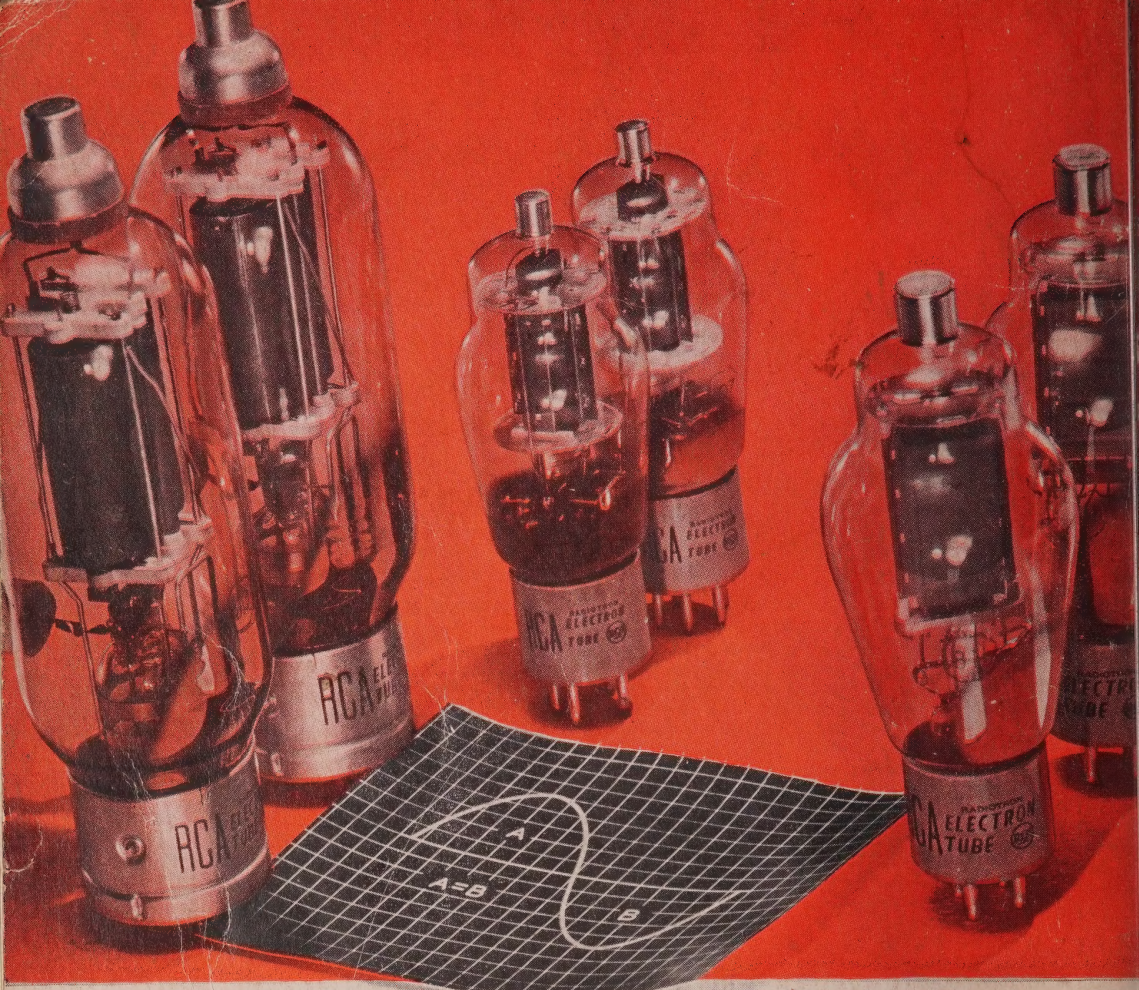
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SERIES RA TRANSMITTER CABINET (Rear View) showing universal wiring and plug-in arrangement with chassis units in position. Cabinets are wired for all combinations in 150 and 250 Watt input ratings.

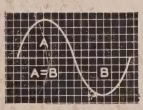
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