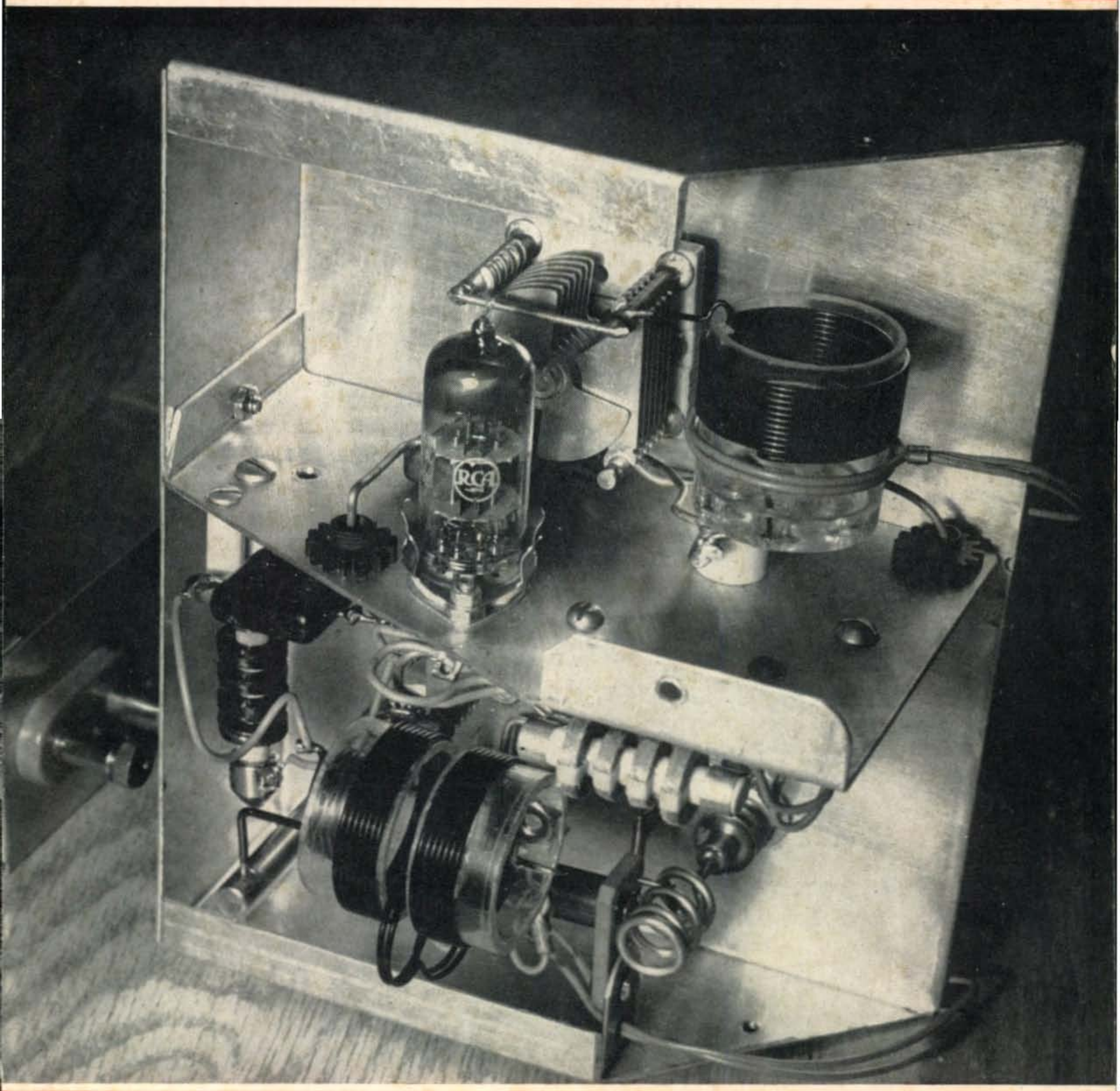
CQ

DECEMBER, 1947

The Radio Amateurs' Journal

35¢



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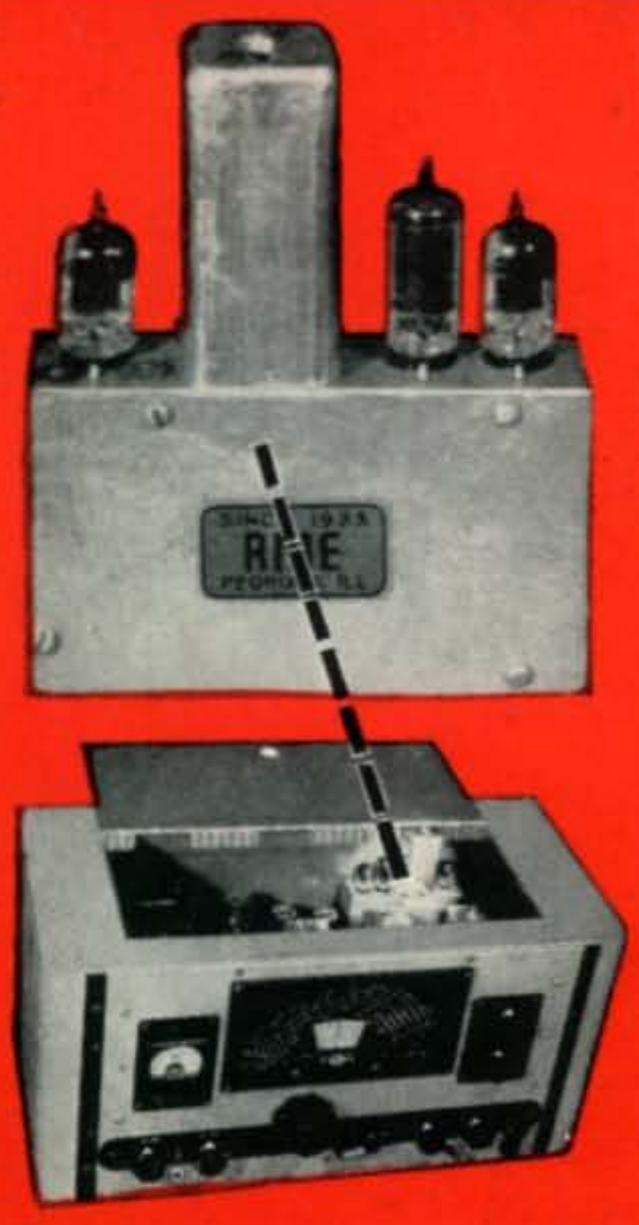
RME *Announces...*

THREE NEW PRODUCTS!



THE NEW RATIO DETECTOR (NBF4)

For Optimum Narrow Band FM Performance

The new RME NFM Ratio Detector is the solution to high sensitivity and noiseless reception of NFM (narrow band FM). With this plug-in unit and an RME 45 receiver, the noise-reducing advantages of NFM are fully realized. NFM Signals that can't be heard with good AM communications receivers come in loud and clear against a noiseless background.

The new RME NFM RATIO-DETECTOR PLUG-IN UNIT is designed for optimum results with amateur systems where the deviation is only ±2.5 KC. With the unit, equal sensitivity can be enjoyed on AM or NFM. It employs a highly efficient ratio-type detector and a limiter for noise-free reception of NFM signals. The unit is switchable—from AM to NFM at will. For the owners of RME 45's, B Series, there are no soldered connections—simply plug the unit into the detector tube socket. In other model 45's, slight circuit changes can be made at the factory or at official RME service centers. Only RME 45 receivers can employ the unit. RME owners can once again be happy with their choice—for RME equipment stays modern!

Amateur Net **$19.50**

THE BOOMERANG (MB-3)

A Break-In And Monitoring Device For CW & Fone

Signals come right back to you because of the monitoring features of the "Boomerang." While monitoring your own keying or speech, you'll also enjoy instant break-in operation for c. w. or fone, even on your own frequency. The moment your key is depressed, or the transmitter turned on for fone operation, receiver output is silenced. You'll also hear incoming signals during the keying intervals. The "Boomerang" can be used with any receiver that has a phone jack. Simply plug the "Boomerang" into your fone jack and an AC line. The "Boomerang" makes possible efficient and enjoyable QSO's.

Amateur Net **$22.50**

THE HF 10-20 CONVERTER

For 10-11-15 and 20 Meters

Because of the double conversion system, the HF 10-20 provides outstanding and imageless reception on the above frequencies. And its an especially vital adjunct to those receivers that tune only to 18 mc. or possess inadequate bandspread. The HF 10-20 provides an average of 7.8 linear inches of calibrated bandspread on each of the three bands. An all-gear planetary mechanism is used. Images are non-existent. The output (I. F. frequency) of the HF 10-20 is 7 mc. It can be used with any all-wave or amateur receiver. Features include provision for separate antennae, self-contained power supply, antenna selector switch, band selector and high gain.

Amateur Net **$77.00**

TIME WILL TELL

RME

FINE COMMUNICATIONS EQUIPMENT

RADIO MFG. ENGINEERS, INC.

Peoria 6, Illinois U. S. A.

Wishing you a

Merry Christmas

and a

Prosperous New Year

MEISSNER

RADIART

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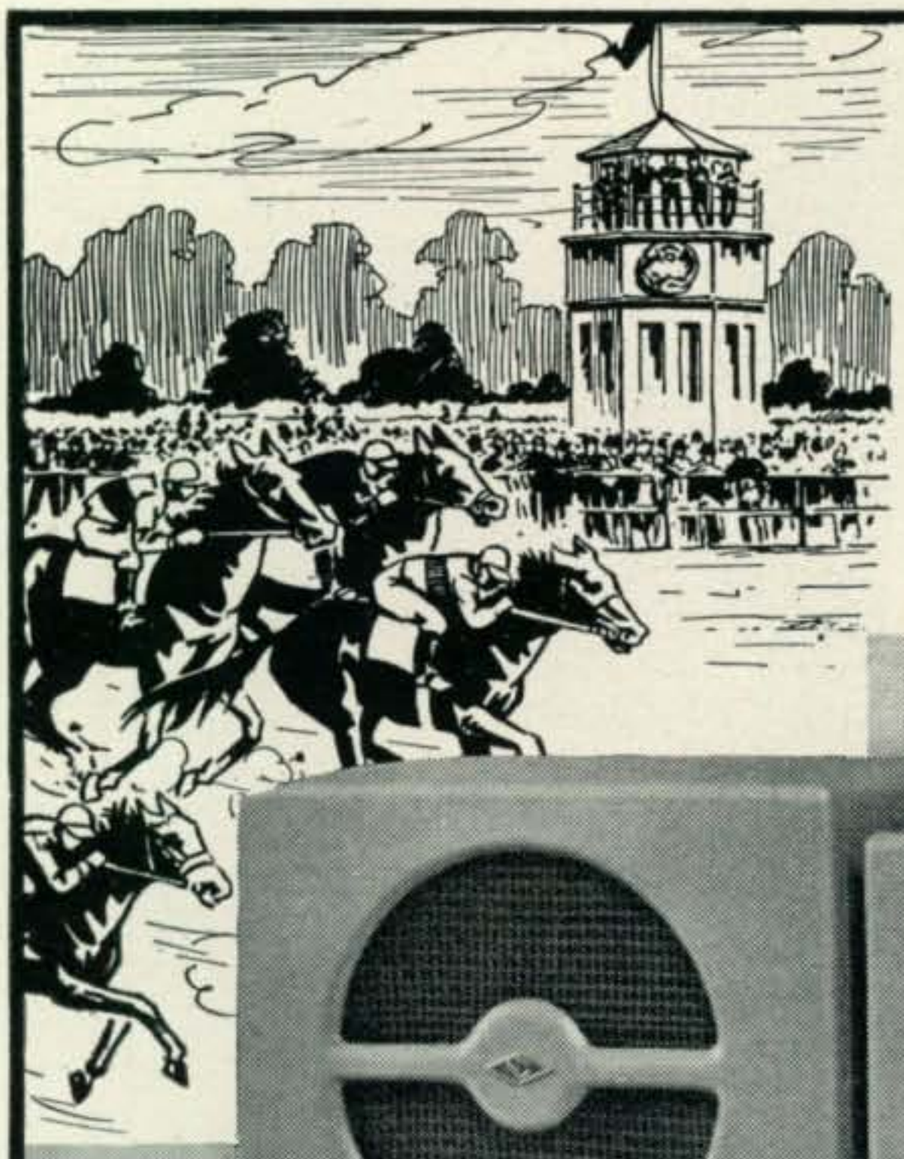
MAGUIRE INDUSTRIES, INCORPORATED



ANOTHER NATIONAL *FIRST*

THE NC-183

National
EST. NC 1914

FEATURES:

- Frequency coverage from 0.54 to 31 Mc Plus 6 meter band. Band-switching on all frequencies.
- Adjustable sensitivity control for S-meter operation on either c.w. or phone.
- Automatic adjustable threshold double-diode noise limiter.
- 115 volts 50/60 cycle AC operation. Easily adapted to 230 volts.
- Amateur Net (Complete with 10" speaker) $269.00

For the first time, a ham receiver incorporating *all* the latest innovations demanded by amateurs is now available at a reasonable price.

The NC-183, latest in National's great new line of communications receivers, is a band-switching set covering frequencies from 0.54 to 31 MC plus the 6 meter band. Two r.f. amplifier stages provide remarkable image rejection and the latest crystal filter aids in maintaining the highest degree of selectivity.

In addition, a stabilized voltage regulated circuit makes the NC-183 a truly top-flight performer on the highest frequencies. A push-pull audio output stage with separate 10" speaker affords excellent fidelity of output.

These, plus many other features, combine to make the NC-183 a really "hot" receiver. It will certainly become a strong favorite with those stations that specialize in digging DX out of the background.

See and hear the NC-183 at your nearest National distributor this week.

National Company, Inc.
Dept. No. 9
Malden, Mass.

MAKERS OF LIFETIME RADIO EQUIPMENT

CQ

The Radio Amateurs' Journal

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Vol. 3 **DECEMBER, 1947** **No. 12**

In This Issue

COVER—W6WB discusses a preselector designed to give more signal without an equal increase in noise. This photo shows the basic mechanical construction and layout. Despite its complicated appearance, the preselector can be constructed without elaborate shop facilities. For more signal and less noise turn to page 13.

Model SX•43

"The hottest ham performance ever at this price . . ." That's the verdict of amateurs who have had a chance to try Hallicrafters new Model SX-43.

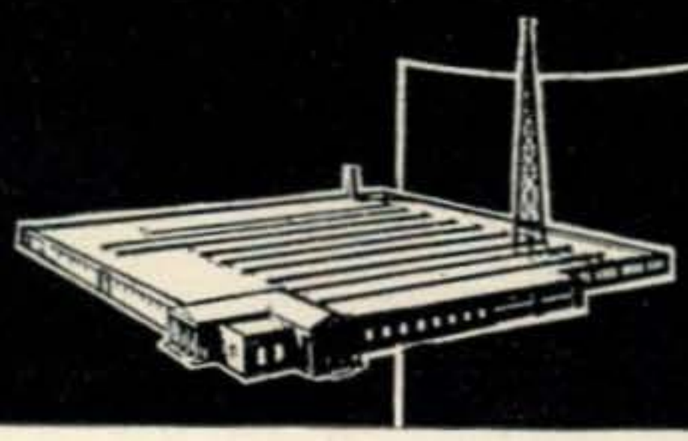
This new member of the Hallicrafters line offers continuous coverage from 540 kilocycles to 55 megacycles and has an additional band from 88 to 108 megacycles. AM reception is provided on all bands, except band 6, CW on the four lower bands and FM on frequencies above 44 megacycles. In the band of 44 to 55 Mc., wide band FM or narrow band AM just right for narrow band FM reception is provided.

One stage of high gain tuned RF and a type 7F8 dual triode converter assure an exceptionally good signal-to-noise ratio. Image ratio on the AM channel on band 5 (44 to 55 Mc.) is excellent as the receiver is used as a double superheterodyne. The new Hallicrafters dual IF transformers provide a 455 kilocycle IF channel for operating frequencies below 44 megacycles and a 10.7 megacycle IF channel for the VHF bands. Two IF stages are used on the four lower bands and a third stage is added above 44 megacycles. Switching of IF frequencies is automatic. The separate electrical bandspread dial is calibrated for the amateur 3.5, 7, 14, and 28 megacycle bands.

Every important feature for excellent communications receiver performance is included in the SX-43.

FEATURES FOUND IN NO OTHER RECEIVER AT THIS PRICE

- ALL ESSENTIAL AMATEUR FREQUENCIES FROM 540 kc TO 108 MC
- AM - FM - CW RECEPTION
- IN BAND OF 44 TO 55 MC: WIDE BAND FM OR NARROW BAND AM . . . JUST RIGHT FOR NARROW BAND FM RECEPTION
- CRYSTAL FILTER AND EXPANDING IF CHANNEL PROVIDE 4 VARIATIONS OF SELECTIVITY ON LOWER BANDS
- TEMPERATURE COMPENSATION FOR FREEDOM FROM DRIFT
- SERIES TYPE NOISE LIMITER
- PERMEABILITY ADJUSTED "MICROSET" INDUCTANCES IN THE RF CIRCUITS
- SEPARATE RF AND AF GAIN CONTROLS
- EXCEPTIONALLY GOOD SIGNAL-TO-NOISE RATIO
- SEPARATE ELECTRICAL BANDSPREAD CALIBRATED FOR THE AMATEUR 3.5, 7, 14, AND 28 Mc BANDS



hallicrafters RADIO

THE HALLICRAFTERS CO., MANUFACTURERS OF RADIO AND ELECTRONIC EQUIPMENT, CHICAGO 16, U. S. A.

Sole Hallicrafters Representatives in Canada:
Rogers Majestic Limited, Toronto-Montreal

• • • Letters • • •

To all our readers

Merry Christmas

and

Happy New Year

Some Friends In Need

U.S. Marine Hospital, Neponsit, L. I., N. Y.

Editor, *CQ*:

Among the patients here at the government's TB sanatorium are three hams—two W2s and a W6. At present our ham activities are confined to thumbing through a few well-worn copies of *CQ*, and endless hours of rag-chewing.

It occurred to us that you might know some of the gang who have some unused gear lying around which would help us get on the air. We don't like to have to go around "scrounging," but prolonged illness has exhausted our resources, so we hope some of the boys will be able to help us out until we can get back to the old QTH again.

Fred M. Parry, W2MDF

CQ Readers Express Their Preference

1528 N. Euclid Ave., Dayton 6, Ohio

Editor, *CQ*:

Re 9-point type on a 10-point slug versus 8 on 9, here is one "bird" who likes to have his reading made easy. Remember, there are lots of your readers who wear spectacles now and have trouble reading 9 point on 10. Especially so when they have neglected to have the necessary corrections made to compensate for the accommodation "slow up" with increasing age.

No, I'd say leave your type as was, namely 9 on 10.

John Kantrowe, W8RHH

---

337 W. Lexington St., Glendale, Calif.

Editor, *CQ*:

Use the 8 point on 9 by all means in your articles. As you say, leaded lines are always easier to read than solid, and any guy who can't read 8 point easily needs glasses anyhow.

Willoughby Speyers, W6RUE

5007 Capitol, Dallas 6, Tex.

Editor, *CQ*:

The 8 on 9 is okay with me and I use bifocals.

V. Morrison, W5GER

---

509 Hall St., Charleston, W. Va.

Editor, *CQ*:

Your new format and type sizes are very good looking and highly approved. I am willing to use a magnifying glass if necessary if it will mean more dope per issue.

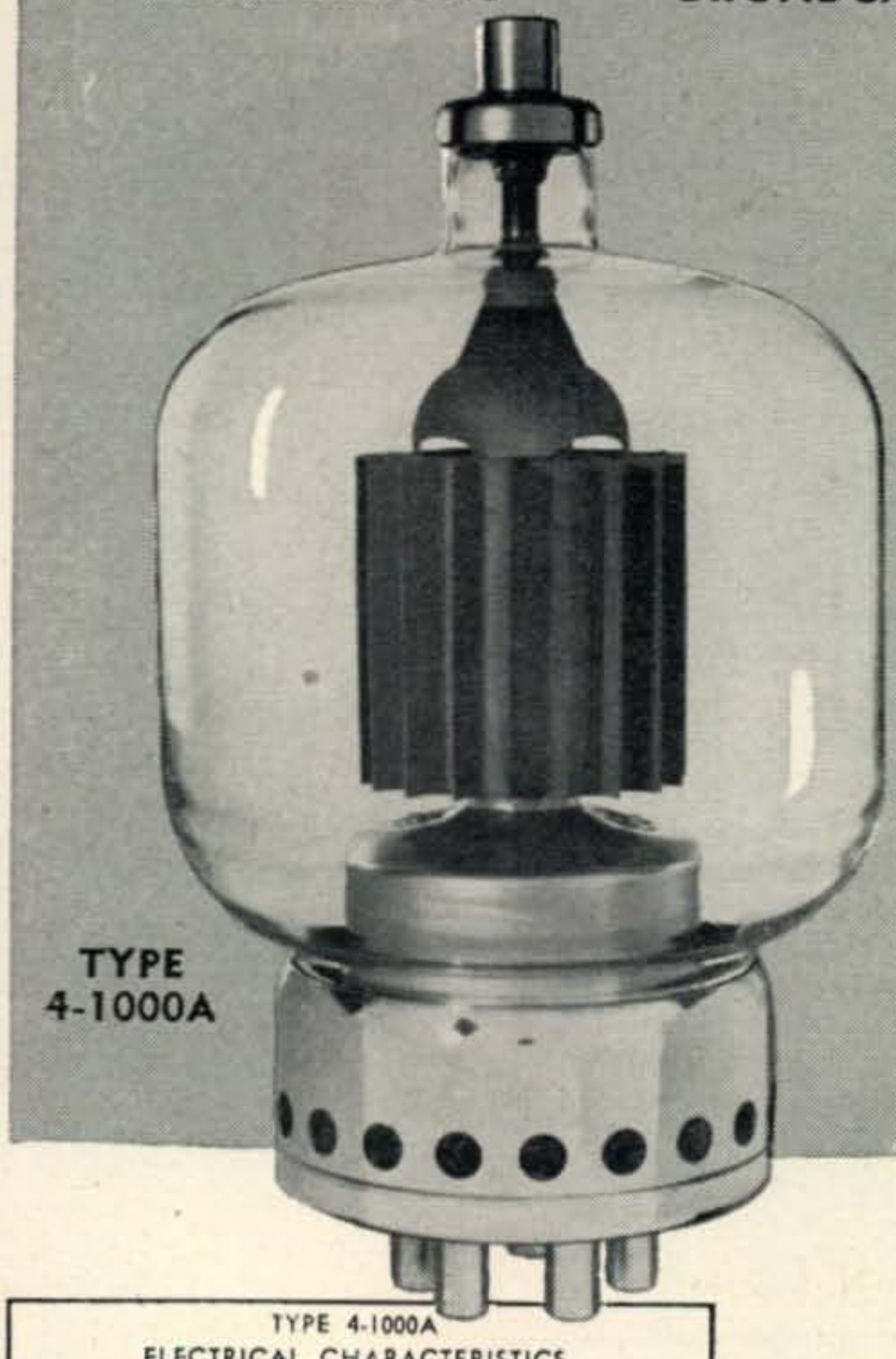
R. W. Timmerman, W8YIF

P.O. Box 92, Ellensburg, Wash.

Editor, *CQ*:

After a careful perusal of the examples in October *CQ* I really like the 8-point type on 9-point slug

COMMUNICATIONS • BROADCAST AM & FM • INDUSTRIAL • AUDIO



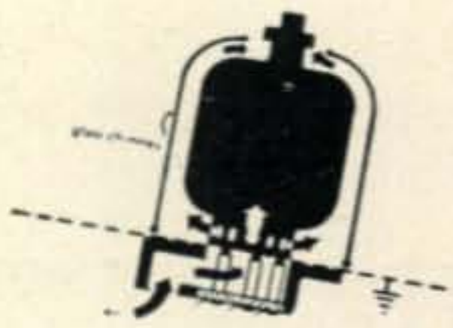
TYPE 4-1000A

OUTPUT 3 Kw. WITH 14 WATTS DRIVE

Workhorse for communications and industry, the recently announced type 4-1000A is presently the largest of Eimac radiation cooled power tetrodes. High power-gain capabilities, on the order of 230 times, fit the tube to applications requiring high power output with low driving power needs.

The tube has been ruggedly designed to withstand the abuse of the most severe application and abnormal overload. Eimac "know how" of vacuum tube design provides long life expectancy and overall economy of operation. Virtual isolation of the input and output circuits has been achieved, simplifying associated circuit design. Short, low-inductance leads, Eimac's non-emitting grids, and rugged plate impart a high degree of operational stability. High efficiency may be maintained well into the vhf, above 110-Mc. As an example, two tubes operating well within ratings, have provided 5 kw useful output power at 110-Mc.

As a functional accessory, a unique socket design to assist in adequate cooling is available. Illustrated below is the complete unit and a diagram indicating the control of air-flow past the terminals, base seals, around the envelope and to the plate seal. The pyrex glass chimney is included with each socket.



TYPE 4-1000A
ELECTRICAL CHARACTERISTICS

Filament: Thoriated tungsten	
Voltage	7.5 volts
Current	21 amperes
Grid-Screen Amplification Factor (Average)	7.2
Direct Interelectrode Capacitances (Average)	
Grid-Plate (without shielding, base grounded)	0.24 μμfd
Input	27.2 μμfd
Output	7.6 μμfd
Transconductance (i_b = 300 ma., E_b = 2500 v., E_{c2} = 500 v.)	10,000 μmhos

RADIO FREQUENCY POWER AMPLIFIER AND OSCILLATOR
Class-C Telegraphy
(Key-down conditions, per tube)

MAXIMUM RATINGS	
D-C Plate Voltage	6000 Max. Volts
D-C Screen Voltage	1000 Max. Volts
D-C Grid Voltage	—500 Max. Volts
D-C Plate Current	700 Max. ma
Plate Dissipation	1000 Max. Watts
Screen Dissipation	75 Max. Watts
Grid Dissipation	25 Max. Watts

TYPICAL OPERATION (Frequencies below 40 Mc.)	
D-C Plate Voltage	6000 Volts
D-C Screen Voltage	500 Volts
D-C Grid Voltage	—200 Volts
D-C Plate Current	681 ma
D-C Screen Current	141 ma
D-C Grid Current	41 ma
Screen Dissipation	71 Watts
Grid Dissipation	6.1 Watts
Peak R-F Grid Input Voltage (approx.)	348 Volts
Driving Power (approx.)	14.3 Watts
Plate Power Input	4086 Watts
Plate Dissipation	746 Watts
Plate Power Output	3340 Watts

Follow the Leaders to

Eimac TUBES

The Power for R-F

Export Agents: Frazar & Hansen, 301 Clay Street, San Francisco, 11, California

EITEL-McCULLOUGH, Inc., 185 San Mateo Avenue, San Bruno, California

much better. It makes for a neater appearing page as well as a greater amount of reading matter in each issue. *Henry S. Guichard, W7HVM*

Lake City, Fla.

Editor, *CQ:*

After looking over the set-up I would endorse the use of 8-point type on a 9-point slug. It gives the reader a break on more usable information for the space you have available.

A. G. Snow, Jr., W4IQV

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223 W. Summit St., Somerville, N. J.

Editor, *CQ*:

I think that you should use 8-point type on a 9-point slug. This presents by far a better appearance than 9 on 10 and takes up less room with the same amount of legibility. I also think that 8 on 8 is all right for the columns. *Arthur Larky*

Readers are overwhelmingly in favor of 8 on 9 for text type face and 8 on 8 for columns. We have therefore standardized on these for CQ. This month starts another feature that the gang has long been waiting for —flat mailing. We hope you find CQ arriving more promptly and in better physical shape—Ed.

How to Enjoy Field Day

Ringvagen 14, Danderyd, Sweden

Editor, *CQ*:

You may be interested to know that we had a big field day camp here in Sweden on July 26-30. It was on the beautiful isle Frösön in the lake Strosjön, just one kilometer from the town Ostersund in the middle of Sweden.

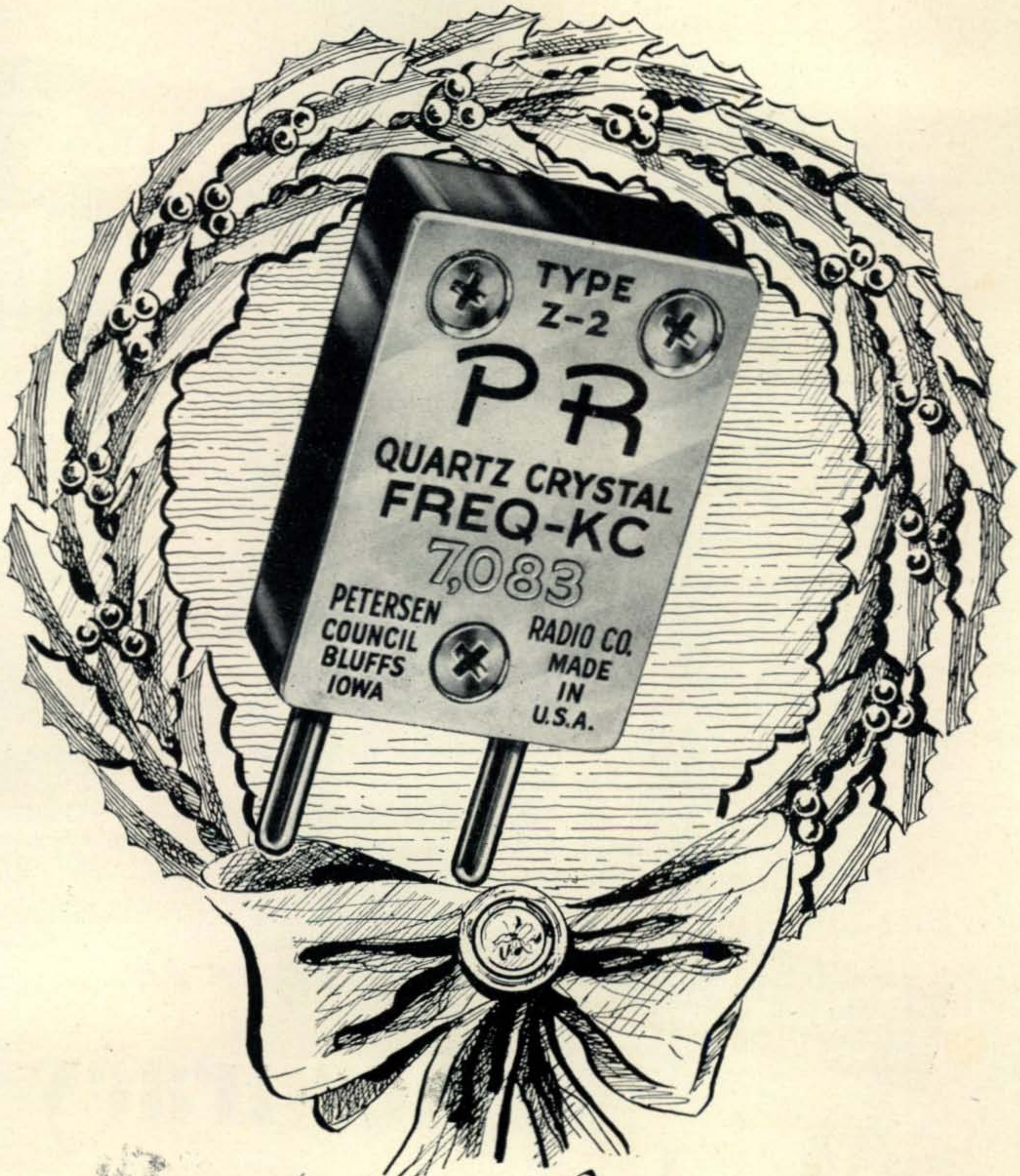
We had three transmitters in two tents operating on 20, 40 and 80 meters, and there were plenty of smaller home-built stations for 5 and 2½ meters. Call sign during these days was SM3XA. Some 300 QSOs were made and all verified by the special QSL card, "The Monster of the Great Lake." Many types of antenna were tested, such as the double triplex rotary beam.

Field day deluxe! SM5IK and SWL.

Nearly 50 licensed hams were gathered, several XYLs and SWLs. Among the hams was W1AKY and his XYL from Boston, and the only Swedish licensed lady at present, SM3IL, Mrs Greta Pettersson, and her two daughters.

By the way, I'm operating on 10 and 20 with only 2 watts output to a 10-meter dipole, phone and c.w.

Arne Skoog, SM5CQ



Happy Christmas

BILL PETERSEN, WØJRY

SINCE 1934

PETERSEN RADIO COMPANY, Inc.

2800 W. BROADWAY, COUNCIL BLUFFS, IOWA

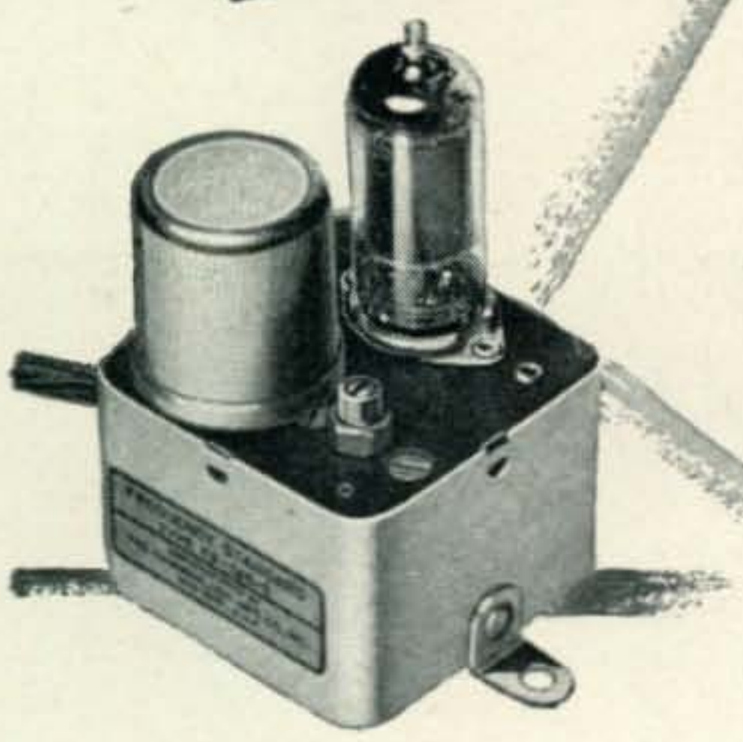
Tops in Value

HQ-129-X

In the shack and on the air, you hear Hams talking about the HQ-129-X —"Best buy on the market." "More for your money than anything I've seen." "Real dollar value." Yes sir, the top value of the HQ-129-X is best proved by the amateurs who own them.

And you get added value from any receiver by installing an FS-135-C Frequency Standard. When you zero beat the FS-135-C with WWV, you'll know it's "tops in accuracy."

FS-135-C
FREQUENCY STANDARD



Tops in Accuracy

BACKED BY 37 YEARS OF KNOW-HOW

Now Available
At Your Dealer's

HAMMARLUND

THE HAMMARLUND MFG. CO., INC., 460 W. 34TH ST., NEW YORK 1, N.Y.
MANUFACTURERS OF PRECISION COMMUNICATIONS EQUIPMENT

THE SIGN OF QUALITY
ESTABLISHED 1910

ZERO BIAS

EDITORIAL

SHARED FREQUENCIES for amateurs actually aren't anything new. Prior to the war, foreigners shared a large portion of the so-called "short haul" bands. But here in the United States, aside from illegal shortwave broadcasting on parts of 20 and 40, Central and South American tropical broadcast stations on 80 were our principal source of annoyance. The Atlantic City agreement permitting propaganda broadcast stations on 40 and sharing 100 kc of 20 with Russian domestic services merely legalizes something quite brazenly done in disregard of international agreement in the past.

Many amateurs will recall the poll conducted by the A.R.R.L. in July, 1939, just before the war, in which the question of phone operation on 7 mc was discussed. 82% of the amateurs who participated in the poll voted that the upper 100 kc of 40 should be open to radiophone for the purpose of combatting broadcast interference. This was a notable step in the right direction. No one will question the logic that calls for A3 to do the most effective QRM job—or shall we phrase it differently and say to make the most effective use of the shared frequencies?

Shared frequencies, at least from the American viewpoint, seems to mean sharing on an equal basis. As an operating amateur, we interpret the word "equal" to mean using the shared portions of our amateur bands successfully. Parts of 80 and certainly 40 will be subject to tremendous shortwave broadcasting interference. What the Russians will do to 20 is still idle speculation, but it is an even money bet that it will be plenty. Now, editorially we have griped about sharing before. We cannot question the right of other services to adequate space in the radio spectrum, but we do question, along with many government officials and private citizens, the value of international high-frequency broadcasting. To share say a portion of 160 with Loran and then interfere with this service would be criminal. To share 40 and interfere with Radio Spain or someone of their ilk, would be doing all radio listeners a service. It isn't our idea that amateur radio should become a jamming device, but we do want to point out that the services sharing our frequencies have little justification for existence.

We have several very definite ideas in mind as to what might be done about these shared frequencies, but before we go into a discussion of them there is one more thought worth mentioning pertaining to h-f broadcasting.

We claim no originality for the idea . . . although it seemed rather naive on our part not to have considered the possibilities. Perhaps other amateurs, other officials, have had reason to wonder about the coincidental placing of h-f broadcasting, but if so we have never read any discussion along these lines. It was brought to our attention by an individual amateur who has been giving a lot of thought to our problems. As the various portions of the spectrum were shifted, as the constant give and take progressed in committee sessions, it would seem strange that the broadcasting services didn't end up on a frequency such as, say, 6000 to 6100 kc. Instead they are on, among other channels, the 7-mc ham band. Stop to ask yourself where is the biggest potential listening audience? What bands are tunable, with bandspread, on the greatest number of shortwave receivers? You spoof about that listening audience—you say you've never even listened to these suave voices of culture and enlightenment—but have you, even once? Propaganda takes the form of a mean and vicious disease. It is based on the half truth, the careful slanting of facts. The broadcasters want one listener out of the vast audience tonight, another tomorrow, and perhaps several the next week. If they can plant the germ of indecision, the basis for doubt about the motives of our own or other friendly governments, they consider it a day's work well done. Internationsl shortwave broadcasting is not solely a means for disseminating the culture of one people to the people of another country, as its proponents claim. It is, even at its best, propaganda. We have come to the conclusion that the choice of amateur frequencies for h-f broadcasting was motivated not so much by expediency as by desire.

Now, you say, what about a cure? The deed is done, the pact is all but ratified, and the broadcasters are eyeing their new audience. There are several steps that can be taken immediately, all of which will benefit the ham and our country. One of the most obvious is, of course, to open up the shared portions of the ham bands to radiophone. A local phone carrier can compete on more equitable terms than c.w. with broadcast. But even phone is no match for 50 kw of r.f. into a high-gain beam. To share the bands on a more equitable basis we think amateurs should be permitted to run inputs as high as 10 kw for purposes of experimental work. Don't shake your head . . . it isn't nearly as fantastic as it appears at first glance. 10 kilowatts today might easily be compared to a 1-kw rig of not so many years ago. True, not too many amateurs could afford that kind of power. But suppose there were several hundred, a very conservative estimate, throughout the United States. They might discourage propaganda broadcasting to such a degree that it would slide back into existing channels. (*Continued on page (87)*

THE COLLINS

32V-1

BANDSWITCHING TRANSMITTER

150 watts CW, 120 watts phone input. Coverage: 80, 40, 20, 15, 11 and 10 meter bands

This versatile transmitter is complete in a cabinet of receiver type and size—r-f (v.f.o. controlled), audio, power supply, and a single section pi-network for antenna tuning and impedance matching.

The Collins 70E-8 variable frequency oscillator employed has a very high degree of accuracy and stability. Frequency is read directly in kilocycles from the band-lighted dial. Audio distortion is less than 8% at 90% modulation with 1000 cps input. The frequency response is within 2 db from 200-3000 cps.

Installation is very simple. The only requirements are a simple antenna, a 115 volt a-c power source and a key or microphone. The 32V-1 may also be used to drive a kilowatt final r-f stage and modulator. In conjunction with this use, the modulation transformer has a 500 ohm tap. Write us for illustrated descriptive bulletin.

Net price, complete with tubes and instruction book, F. O. B. Cedar Rapids, Iowa $475.00

Terms: 20% with order. Balance, plus 5% interest, on contract payable in twelve equal monthly installments.

TUBE LINE-UP

1—6SJ7 oscillator
1—6AK6 class A r-f buffer
1—6AG7 harmonic amplifier
1—7C5 buffer doubler
1—7C5 buffer doubler
1—4D32 r-f power amplifier
1—6SL7 audio amplifier
1—6SN7 audio amplifier
2—807 modulators
1—5Z4 L.V. rectifier
2—5R4GY H.V. rectifiers
1—0A3/VR75 bias regulator

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

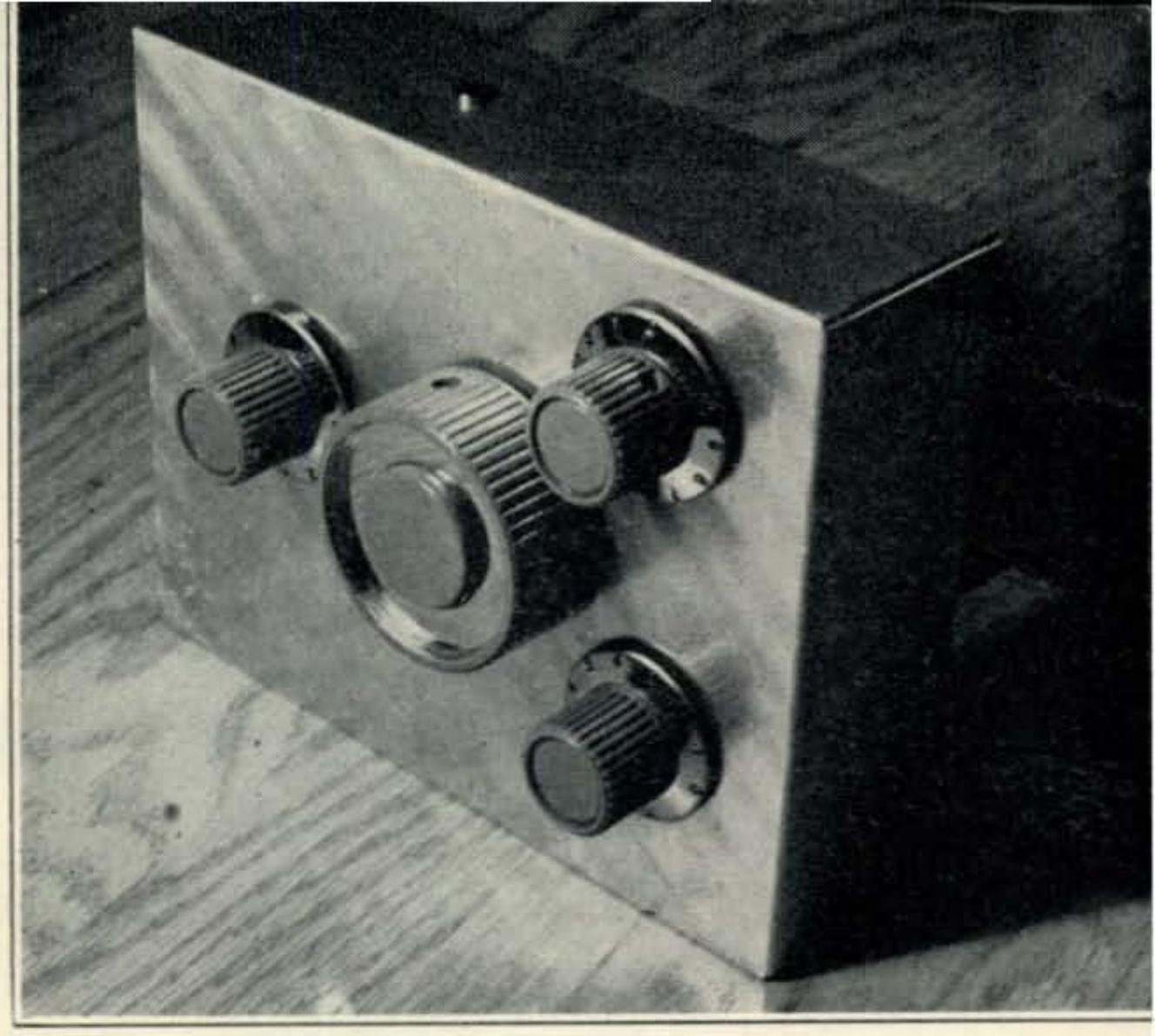
COLLINS RADIO COMPANY, Cedar Rapids, Iowa

11 West 42nd Str[illegible] New York 18, New York

458 South Spring Street, Los Angeles 13, California

More Signal— Less Noise!

C. F. BANE, W6WB*



"A symphony in knobs." Front panel view of twin triode r-f stage.

A twin-triode r-f preselector designed to improve receiver and antenna performance.

SURELY many of us have been concerned over the fact that our beams apparently did not produce the same directional patterns on receive that they did on transmit. When rotational transmitting checks with remote stations indicate that the end nulls are definite and that front-to-back ratio is excellent, it is indeed discouraging to swing the beam and detect little evidence of either substantial end nulls or front-to-back variation in the receive position. Investigation of various factors that bring about this undesirable condition has ultimately resulted in satisfactory corrective measures for some of them. Here then is the background leading up to the design of the preselector stage to be subsequently described which not only greatly improved our receiver performance, but also performance of our rotary on the receive position.

Indefinite end nulls and/or inadequate front-to-back ratios on receive can generally be traced to unbalance somewhere in the system or to undesirable capacitive coupling to the input of the receiver or preselector. If we postulate that the conventional horizontal beam antenna is completely symmetrical insofar as capacity-to-ground is concerned, that the balanced feed point is exactly in the center of the driven element and the array is "in the clear" as far as surrounding conductors of length commensurable with antenna length are concerned, it will follow that the array should be capable of sharp end nulls. We acknowledge that this reasoning is invalid if the signals off the ends are arriving at high angles, however, assumptions to follow will presuppose that the incoming signals *can* be nulled. Now, if the transmission line feeding the beam is in itself symmetrical, the currents in the two wires will be equal in magnitude and opposite in phase (provided the termination of the transmission line is balanced). However, an in-phase signal component also exists on the feeders. That is, the two wires of the transmission line act as though they were merely connected in parallel and the signal current flows in the same direction in both wires. It is thus possible for the transmission line and the driven element to act as an antenna (Marconi-type *top loaded* working against ground), coupled to the receiver input by capacitive coupling. If, in addition, we were to pick up the same signal on a vertical antenna and introduce it into the receiver input at the same time, we would find that the nulls would be "filled in." This is exactly the effect that occurs when we have capacitive coupling along with our normal inductive coupling. The effect is perhaps even more confusing in that it may not exist equally on all signals. The reason for this is that the normal feeder is not truly vertical but may travel for some distance in a horizontal plane. The resulting pattern (superimposed on our beam pattern) may therefore not be circular but may instead exhibit a figure-eight or multiple-lobe pattern depending upon the total length of the feeder. Some stations may lie in a direction that will produce small antenna voltage at the position where the beam itself is at a null and this may explain, in part, the random results sometimes experienced. This point is brought out merely to amplify the fact that unbalanced capacitive coupling to the input of the receiver must be greatly minimized or eliminated entirely if our beams are to reproduce faithfully the same pattern on receiving that they do on transmit.

*155 *Saint Elmo Way, San Francisco, Calif.*

Minimizing Capacitive Coupling

There are several methods for lessening or eliminating capacitive coupling to the input of a receiver or preselector among which the electrostatic or Faraday shield is perhaps the best known. We found that a good electrostatic shield, properly installed, provided almost a complete answer to the problem. Failure of this method to achieve its

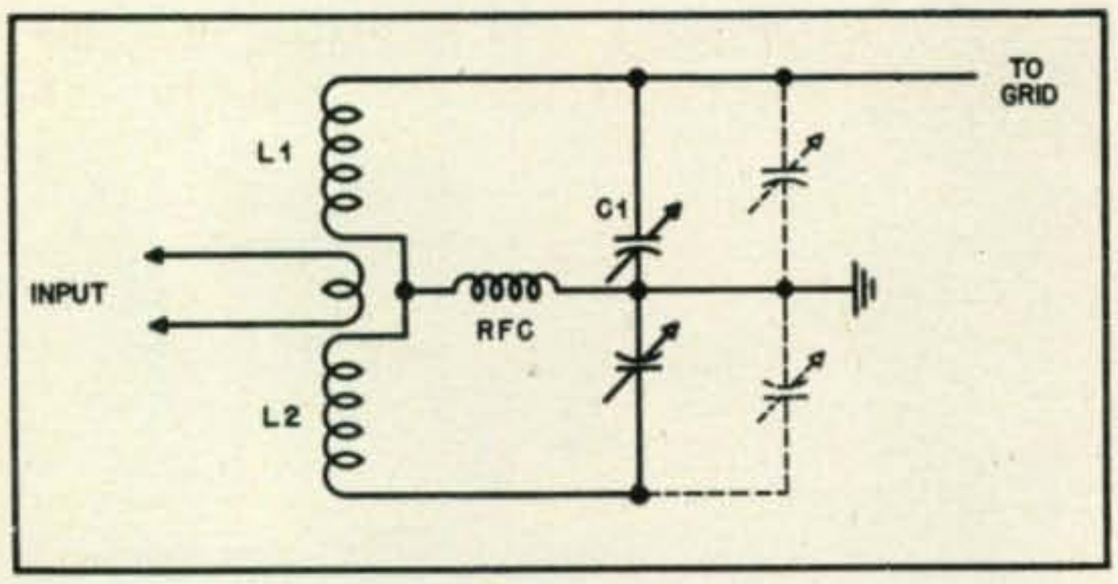


Fig. 1. Input circuit incorporating a split inductor, he center of which is effectively at ground potential.

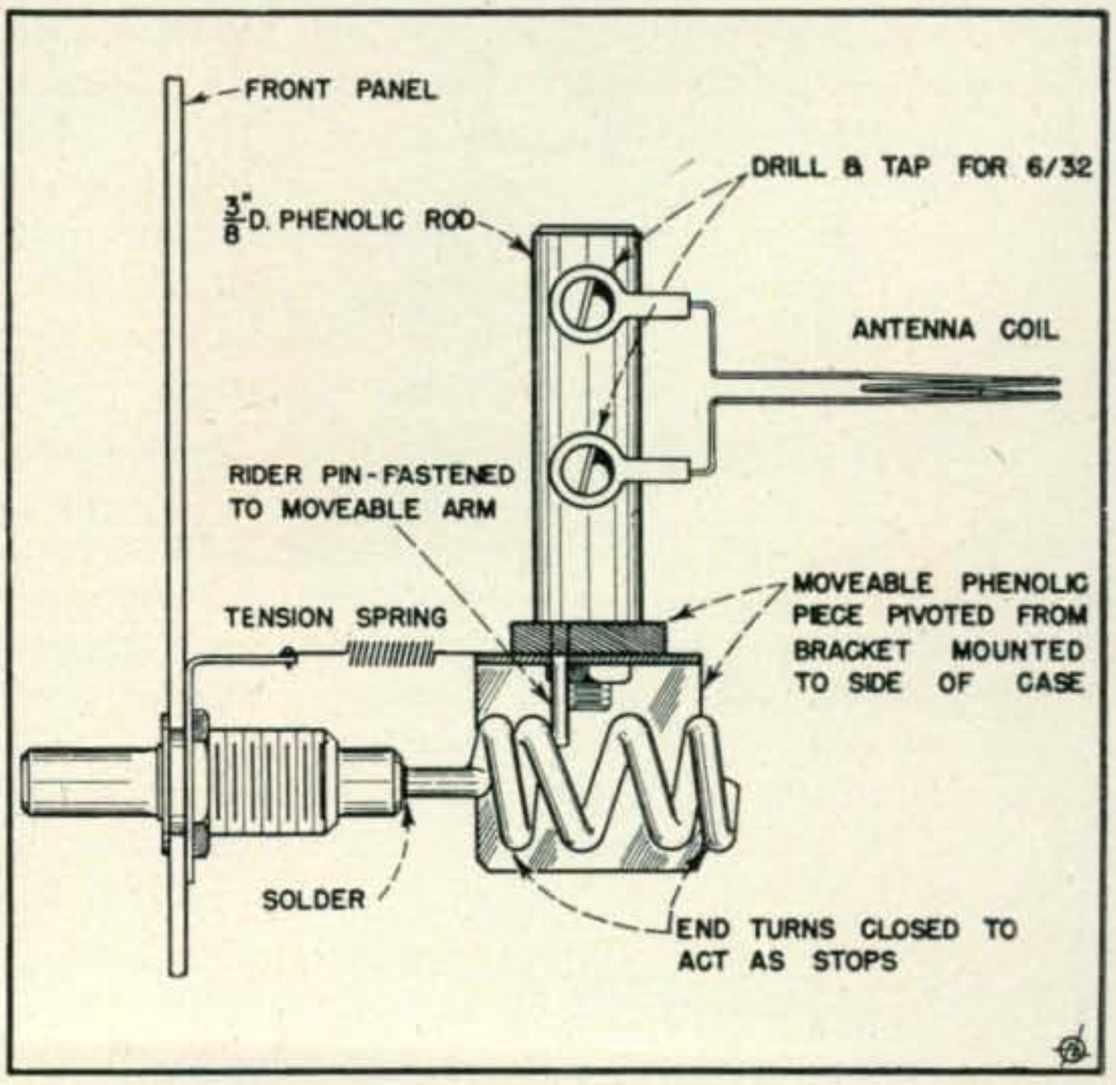
deserving popularity is perhaps traceable to the possibility that a really effective electrostatic shield is not easy to build. There has always been the question of how mechanically to arrange it in relation to the grid coil to avoid excessive distributed capacity across the grid coil to provide a sufficiently high coefficient of coupling and to avoid a capacitively unbalanced antenna coil. While we do not use an electrostatic shield in our unit, the design of the latter is such that the proper shield can be readily incorporated.

It is general practice to wind the antenna pickup on the grid coil form at the "cold end," (the end *away* from the grid, which is normally connected to the ground side of the circuit). In this manner, small potential difference exists and capacity coupling is therefore minimized. Here, however, it will be found that it is rather difficult to maintain both sides of the antenna pickup winding at the same potential with respect to ground and therefore some unbalance exists. It should follow that a push-pull input circuit with the antenna winding introduced in the center (or grounded portion) of the grid coil should be almost ideal in that it will have low capacitive coupling and will result in near-perfect balance of the antenna winding. Granting the effectiveness of such a circuit arrangement, the necessity for a balanced output plate circuit introduces added circuit complications. We leave the subject with the statement that our unit is likewise suited to push-pull should this be desirable.

The Basic Circuit

Fig. 1 shows an input circuit incorporating a split inductor, the center of which is effectively established at ground potential by the capacitive divider *C1*. Both halves of *L1* are of equal inductance, both sections of *C1* are of equal capacity and the circuit is resonated to the operating frequency. If the antenna winding is introduced in the center of the split inductor, it can be seen that equal coupling will exist to either half and that capacitive coupling to either half will be greatly reduced. Instead of grounding the center of the coil directly, we provide a d-c return through an r.f.c. connected to the midpoint of the coils and permit the winding to "float." The center node of the coil can now be set entirely by the capacity divider *C1*. This will all be recognized as conventional push-pull practice. However, it is our desire to use but a single tube connected to one side of this circuit instead of the symmetrical arrangement of a tube on either side. Disregard the fact that we are ultimately going to use a tube and consider only that we are connecting an equivalent capacity to *one side* of the input circuit. This additional capacity will appear in shunt with one section of the capacitive divider and the circuit will become unbalanced in the sense that the nodal point is now no longer in the center of the coil since the two capacitor sections are no longer equal. If we were to add an additional capacity (equal in value to the tube and strays) on the *other* side of the split coil, it is reasonable to assume that balance would once more be restored. This, in essence, is exactly what we do in our final circuit.

The complete circuit is shown in *Fig. 2*. A type 6J6 twin-triode is utilized in a cathode-coupled arrangement composed actually of two stages; the input section having the configuration of a cathode follower, the output being of the grounded-grid type. This circuit is in no way original having been thoroughly discussed and analyzed in technical literature several years ago. Let it be merely stated that it is used because it permits the use of triode amplifiers of the degenerative type (degenerative, *if* the external feedback is reduced to a minimum). A triode was selected solely because of its lower internal noise characteristics. Since we were desirous of exploiting every possibility for improved performance, it was deemed desirable to include controllable regeneration even though it might not subsequently prove to be of too much value. It is possible to achieve tremendous stage gain with regeneration but the signal-to-noise ratio will, of course, be the final determining factor since there is normally little point in bringing up the signal if the noise increases by an equal amount. We have found the regeneration advantageous in many instances and suggest that it be included. In the circuit shown, the added regeneration elements can be completely cut from the circuit by returning *C4* directly to the common ground point instead of to the feedback coil. Additionally, removing the inductance in the cathode circuit will reduce regener-



Antenna coupling detail.

ation (and gain) thereby tending to make the stage more stable. If this change is made it will be advisable to increase the value of the cathode resistor to approximately 500 ohms. (Make certain that the resistor is a carbon type.)

The various photographs clearly show that the antenna coupling is made variable. In ths regard note that the design of the split grid coil is such as to keep the two halves of the coil as close together as possible while still leaving sufficient clearance for the antenna coil. The turns in the antenna pickup winding are thus necessarily limited in order to permit this latter coil to move in and out between the two halves of the grid coil. The windings on the grid coils start very near the end of the form (on the ends nearest the center), again to maintain coupling between the two halves to a very close value.

Front-end Selectivity

It will be apparent that the selectivity of the first tuned circuit will be affected by the amount of resistance coupled in from the antenna circuit. In the experimental unit shown, the design of the coils is such that the unloaded Q of the circuit is quite high since the input resistance of the cathode follower which shunts half this circuit is in itself high at frequencies within the 14 to 28-mc region. Variable coupling will permit advantage to be taken of such selectivity as the particular circuit affords. Perhaps use of the word selectivity may be misleading if one is to think in terms of the total receiver pass band. The latter is set by the i-f channel and the audio system. Therefore the selectivity afforded by the input circuit will have negligible effect upon the selectivity curve, if for example, measurements are made at the conventional half-power points. Increased selectivity in the front end *is* important for at least two reasons, the first being image rejectivity. Here we deal with a signal which cannot be rejected by the i-f amplifier, regardless of its selectivity characteristic. The only thing that will decrease the image response is additional tuned circuits before the signal is converted to the i-f frequency. It follows that a preselector with two tuned circuits can make some contribution to the image rejectivity. This is perhaps better illustrated by stating that the unit described shows approximately 12 db drop in image response over a receiver already having two r-f stages

Front-end selectivity is of further importance in the reduction of cross-modulation due to strong signals operating in the same band. These crossf modulation products are passed along to the i-f

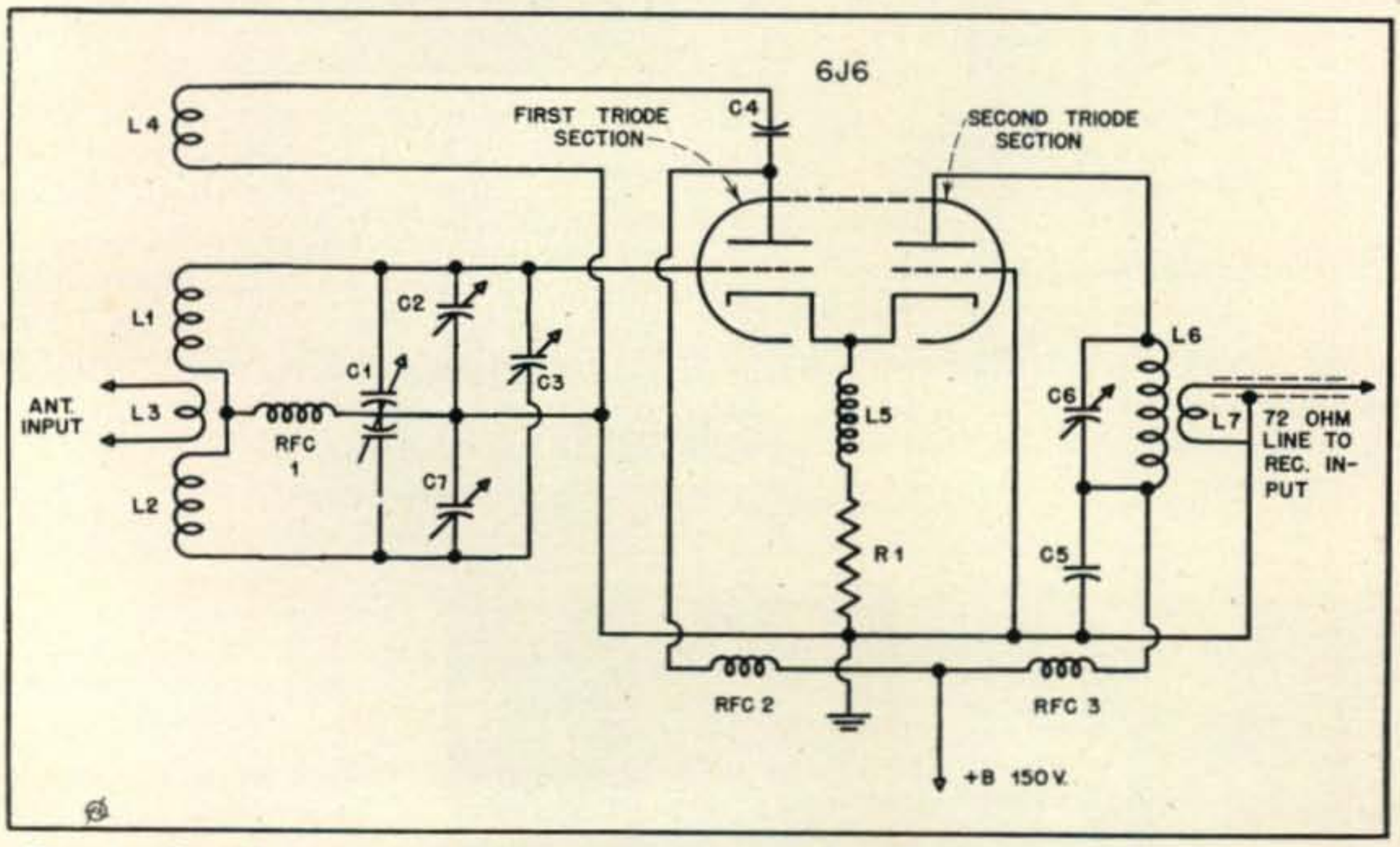


Fig. 2. Complete circuit diagram for twin-triode r-f stage showing balanced input and regeneration control.

C1—40.5 $\mu\mu$f per section split-stator, Hammarlund BFC butterfly capacitor.
C2—3-12 $\mu\mu$f ceramic variable balancing capacitor (Centralab).
C3—3-12 $\mu\mu$f ceramic variable trimmer capacitor (Centralab).
C4, C5—.002-μf 400-wv mica plate bypass capacitor (Cornell-Dublier).
C6—Plate tuning capacitor. Hammarlund butterfly BFC-25 with two stators connected in parallel. (Single 50-$\mu\mu$f variable may be used in this position.)
C7—3-12 $\mu\mu$f ceramic variable balancing capacitor (Centralab).
R1—100-ohm 1-watt carbon (IRC). (L5 is wound directly on this resistor.)
RFC1, RFC2, RFC3—2.5 mh, 100 ma.

L1, L2—Grid coil for 14 mc coverage. Six turns No. 18 enam. wire, wound close-spaced on each half of coil (total of 12 turns, 6 on each side of center) on 1¼" diameter form. Spacing between coils approximately 3/16".
L3—Antenna pickup coil, 2 turns No. 18 enam. ¾" in diameter (OD).
L4—Regeneration coil. 5 turns No. 14 enam. 5/8" in diameter (OD).
L5—Cathode coupling. 1" of winding, No. 26 enam. wound using R1 as a form (approximately ¼" diameter).
L6—Plate coil for 14 mc. 12 turns No. 18 enam. wound on 1¼" diameter form.
L7—Link to concentric line. 2 turns insulated wire wound on B+ end of L6 and spaced approximately ¼".

channel and appear within the pass band regardless of its width. While it may be necessary to use very loose coupling to obtain substantial improvement in difficulties of this sort, an improvement *is* possible. In our own congested area with dozens of strong locals it has been possible for us to set the antenna coupling until a station a half-block away no longer appeared on top of every DX station we could hear. By reducing the coupling one will of course be reducing the signal input and perhaps in that manner avoiding the possibility of grid current flow in the first tube. In any case, the two achieved effects are in the proper direction to improve the final result.

It has been rather clearly shown in a number of papers that with substantial r-f gain ahead of the mixer, the main source of the noise will be from the thermal effects originating in the antenna and the first tuned circuit provided the r-f amplifier tube has a high ratio of transconductance (mutual conductance) to cathode current and the resultant "shot noise" due to cathode current referred back to the grid is negligible with respect to input circuit noise. Further, best signal-to-noise ratio will be obtained when the input coupling is somewhat greater than the critical coupling value which provides maximum signal transfer. This in itself should suffice as a justification for variable input coupling although in our humble opinion there are many times when it is more important to copy *anything* through strong locals let alone worrying about a fractional microvolt signal that may approach the noise level of the receiver.

Adjusting the Balanced Circuit

A brief procedure for adjusting the balanced circuit shown in *Fig. 2* will be given since this will also bring out certain methods for determining the degree of capacitive coupling to any receiver input circuit.

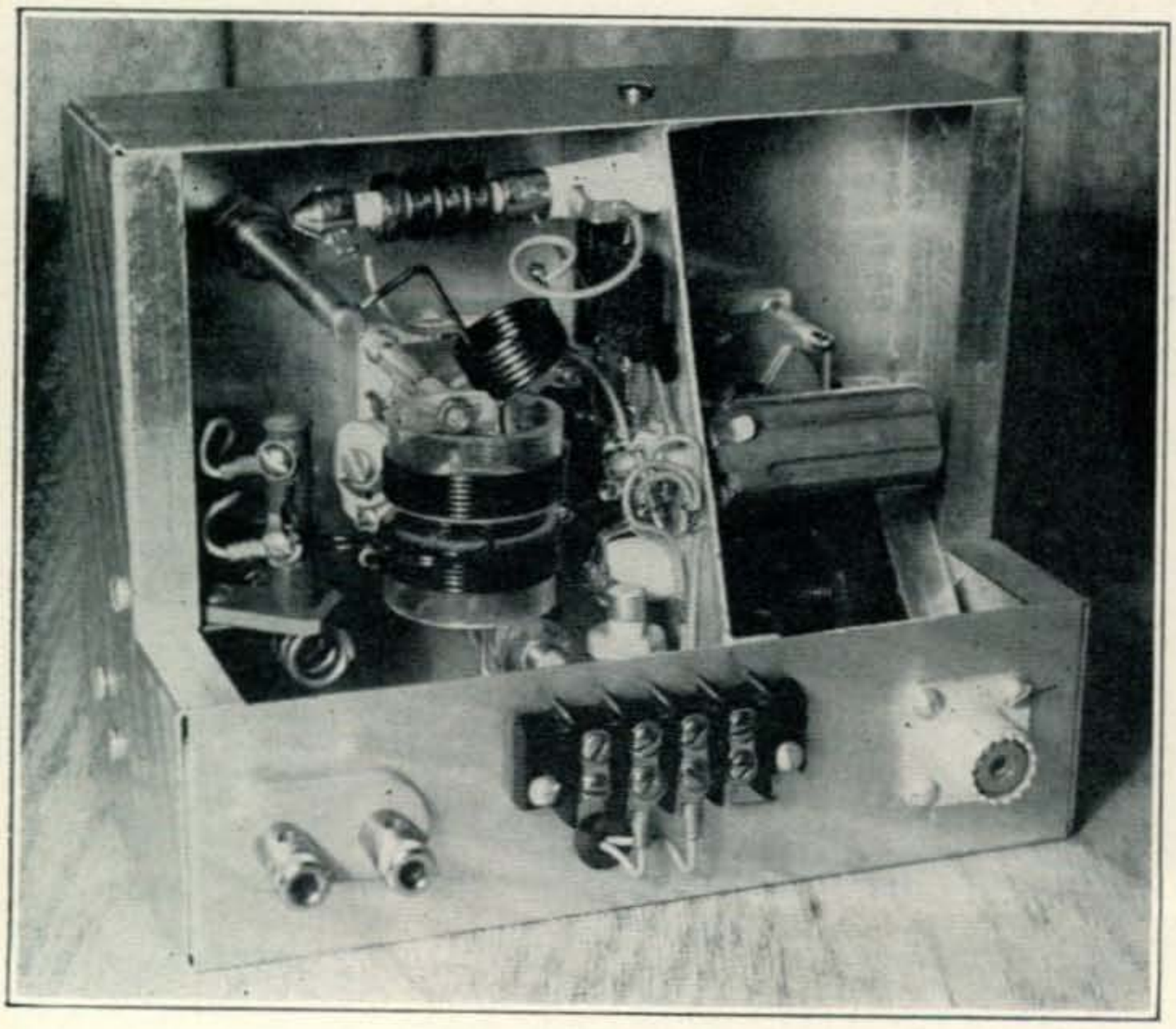
In making the initial setup it is desirable to have some fixed source of signal input (preferably modulated), and this might well be provided from a BC-221 type frequency meter. Lacking this, use some phone signal. For these initial tests use merely *one* wire from your feeder—here we *want* an unbalanced input signal since the final achieved effect will be to *reduce* the signal to as low a level as possible. Step-by-step procedure follows:

Connect *one feeder* to one terminal of the antenna input coil and with an incoming signal, adjust grid and plate circuits for resonance (maximum response).

Starting with the antenna coupling coil fully in, carefully reduce the coupling until a point of definite minimum signal is reached. Check this point by making certain that the signal will again increase even though the antenna coupling is further decreased. The fact that the signal may still be of substantial proportions will indicate that capacitive coupling is present.

Move the single feeder wire over to the other antenna input post. If the circuit is truly balanced the input signal should be equally weak. If, as will probably be the case, the signal is very much stronger, unbalance is present and the nodal point is not in the center of the split grid coil. Change the setting of the coupling until a definite minimum is again obtained and, if possible, log the two settings of coupling that produced definite minimums with the single feeder connected in turn to the two antenna input terminals.

The next step will be to adjust the ratio of the two parallel padders across each section of the split-stator butterfly until the two minimum signal points occur at the same coupling setting. Normally the padder on the grid side of the circuit can be left at minimum and all adjusting done with the padder on the opposite side. The reason for the inclusion of the grid padder is to bring the capacity on the grid



◆ ◆

Rear view of complete double-r.f. unit. Note center dividing partition between input and output circuits upon which the 6J6 mounts horizontally. The two input terminals may be seen on the lower left-hand side; the concentric output to the receiver being directly opposite. The small coil mounted to the front-panel shaft is for adjustable regeneration and coupled to the main grid coil directly beneath. The RFC in the upper foreground is also part of the regeneration circuit (RFC2 in Fig. 2). The cathode choke-resistor (L5-R1) can be seen directly beneath this latter choke.

◆ ◆

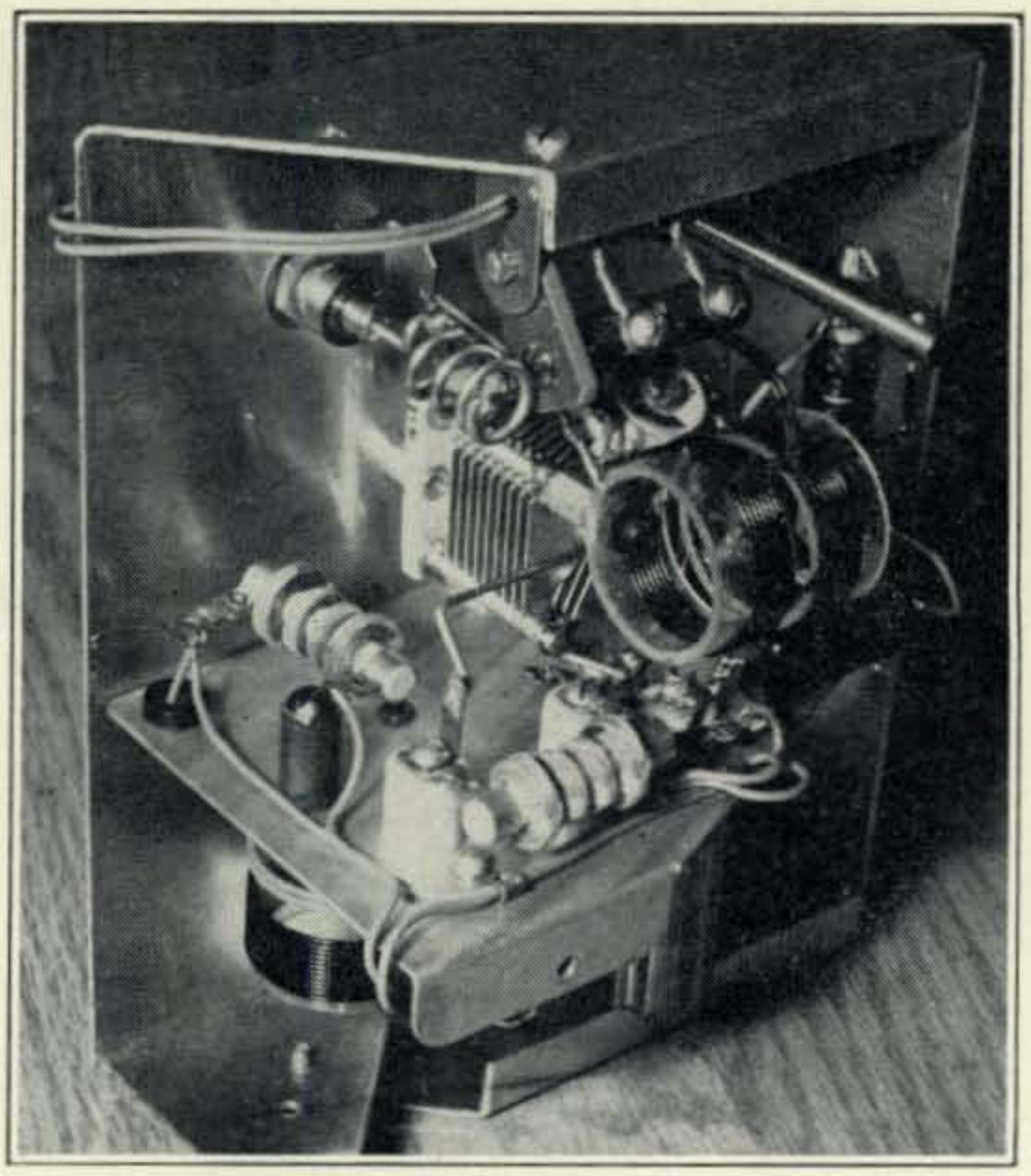
side to a slightly higher value (if required). Obviously, the minimum capacity of padders is not zero, therefore it is possible that the balance point might be at a value of capacity lower than that of the minimum on the opposite (to grid) padder. Adding some capacity to the grid side insures that this condition will not occur.

The circuit must be restored to resonance each time a new ratio is established since the padder capacitors will detune the circuit. Ideally, a double section capacitor wherein one section decreases by the amount the other increases would cause no detuning since the net capacity across the tuned circuit would remain the same even though the *ratio* would change widely. When the two coupling settings have been made to coincide, one should be able to touch either antenna input terminal and obtain the same signal response. A final check can then be made by changing the coupling to a new setting and noting whether or not the response on either antenna input terminal is the same.

The degree of capacitive coupling can be checked on the average balanced input communications receiver by disconnecting the two feeders then touching each of the two antenna input terminals in turn, meanwhile noting the response. Here again, the response should be the same. This test is not strictly infallible because a certain amount of inductive coupling can exist even though one antenna post is left "floating," due to the fact that the floating end of the antenna coil can be completed to ground by stray capacity thus providing an inductively coupled circuit. If the response on one side is very much stronger than that on the other, capacity coupling is almost certainly present.

Mechanical Details

The mechanical arrangement of the preselector shown is such as to permit a number of different input circuits to be used. Thus the same arrangement of the input coil, tube and coupling system is well suited to a more conventional input circuit wherein the balance and freedom from capacitive coupling is achieved by proper use of an electrostatic shield. Merely eliminate half of the split inductor and use the split stator as is with the two stator sections connected in parallel as they are in the output plate circuit. It is well to note in this regard that the circuit shown in *Fig. 2* puts the grid of the tube across only half of the coil, therefore the step-up from the antenna coil is reduced 50%. This loss is normally not consequential; over-all gain generally being more than we can use. However, when the electrostatic shield system is used the full step-up is again realized. Both systems perform well and the choice is left to the individual. The variable coupling can be used with either system and the remarks relative to its advantages will apply equally. The effectiveness of the balanced system was, in fact, initially checked by introducing an electrostatic shield between the antenna coil and both halves of the split grid coil. When the circuit was adjusted for proper balance as described, introduction of the electrostatic shield made absolutely no difference. In contrast, the introduction of an electrostatic shield to a normal unbalanced input makes a very marked difference.



Close-up of the grid input section, unit set on end. Details of the variable antenna coupling shown in the sketch are clearly shown. Note also the split grid coil L1-L2. RFC1 in the foreground, is in the center-tap of the grid coil. The grid coil is mounted directly to the connecting studs on the split-stator capacitor.

A Word About Coils

The split coil shown in the model is actually two separate coils wound on cut-down polystyrene forms, the inner ends of which are spaced just far enough to permit free entry of the two-turn antenna pickup coil. One of the miniature B-W air-wound coils could have been adapted to the purpose by clipping out two or three center turns; rejoining, of course, for the center-tap junction. Some thought should likewise be given to the need for a reasonable form factor for the coils. Speaking generally, long narrow coils or short squatty ones should be avoided since such shapes do not provide the highest Q. Final dimensions should be used that will permit a coil having a diameter-to-length ratio of unity.

The photographs should serve to illustrate fully the various mechanical details. Our experimental unit is constructed from a single aluminum chassis. The rear section (on which the input and output terminals mount) is actually the lower portion of the original chassis folded back. The folding is done by cutting two 90-degree sections on opposite sides (with a fine blade hack saw) and using the right-angle triangles so obtained as the means for holding together the front and rear sections. The necessity for a front panel-chassis combination is eliminated by using the face of the aluminum chassis for the front panel.

Regardless of whether or not this particular type of construction is followed, it will be highly desirable to isolate the input grid and output plate circuits by a dividing baffle shield similar to that shown. It is highly important to keep the external feedback possibilities to a minimum and to avoid stray coupling. In our model the main tuning grid butterfly capacitor does not ground to the front panel but rather has its ground connection brought

(*Continued on page 80*)

Another All-Band Antenna

H. C. SHERROD, W5ZG*

SOME YEARS AGO John Kraus, W8JK, performed some excellent research in the field of directive antennas. One of the developments of this research was the 8JK end-fire, bi-directional, fixed beam which in succeeding years has enjoyed wide popularity.

Upon the resumption of amateur radio operation in the United States in the later part of 1945, the writer constructed a four-section, 28-mc, 8JK fixed beam antenna for use with a 400-watt transmitter. This antenna was initially end fed with a two-wire feed line. Results were excellent and performance all that could be desired.

However, the antenna as constructed was definitely for use on 28 mc only. A tentative survey was made of the family homestead to determine the possibilities of erecting an antenna for the lower frequencies. When the object of this survey became known to the wife, complications immediately developed.

When the gentle southern breezes of this tourist mecca had dispelled the smoke of domestic friction, it had been definitely and finally established that:

1. One antenna, and only one would be conceded to each husband, if required. (The antenna—not the husband).
2. There are many potential husbands who don't require antennas. (An inference, I believe.)
3. Should other antennas be constructed, same would be on real estate other than that occupied by the *whole* family.

Having been established as facts, these statements were given careful consideration in the tranquil privacy of the shack with the reciever tuned to the low end of 20. Current real estate prices, together with obvious domestic complications, made it

(*Continued on page 93*)

**4715 Crockett Blvd., Galveston, Texas.*

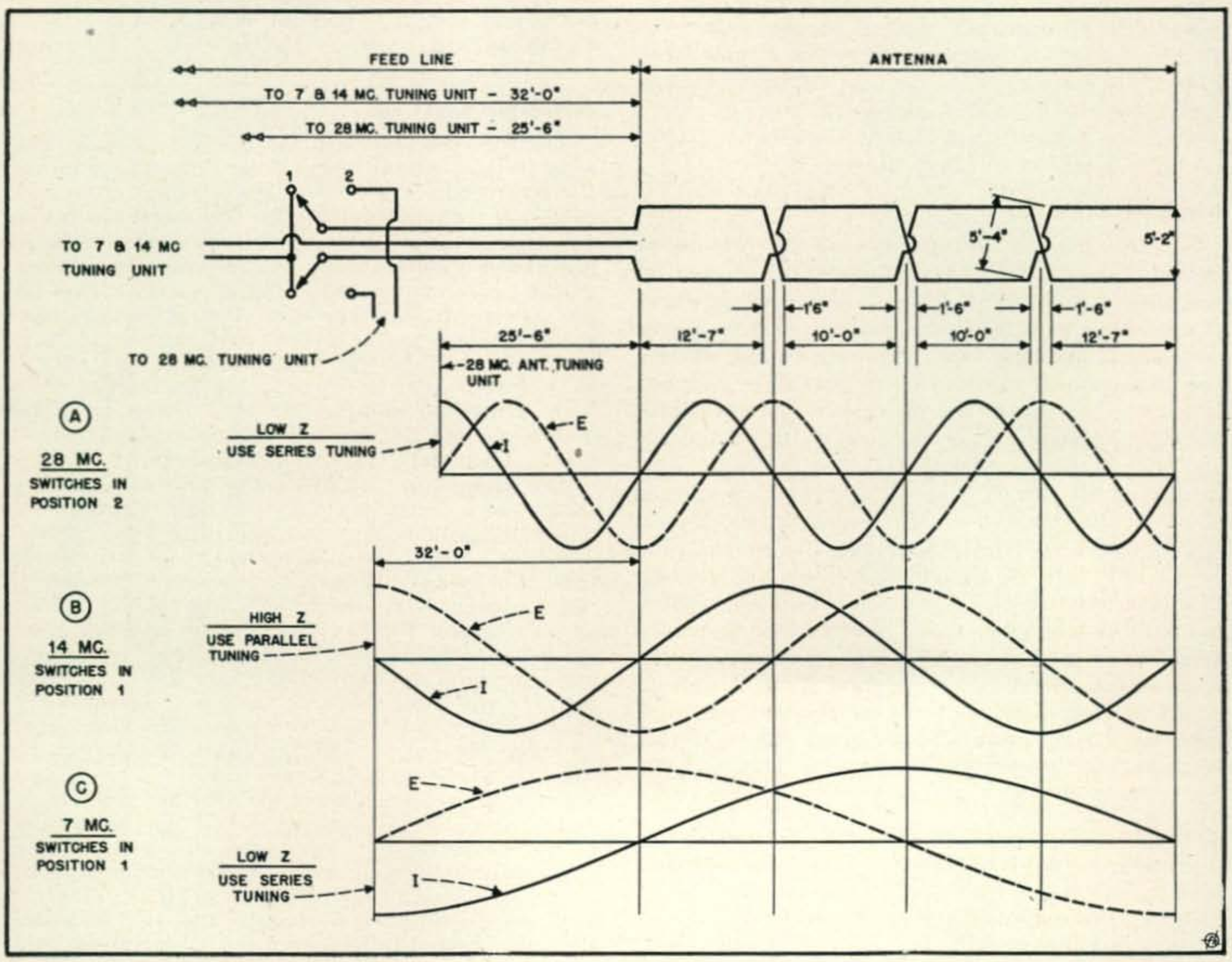
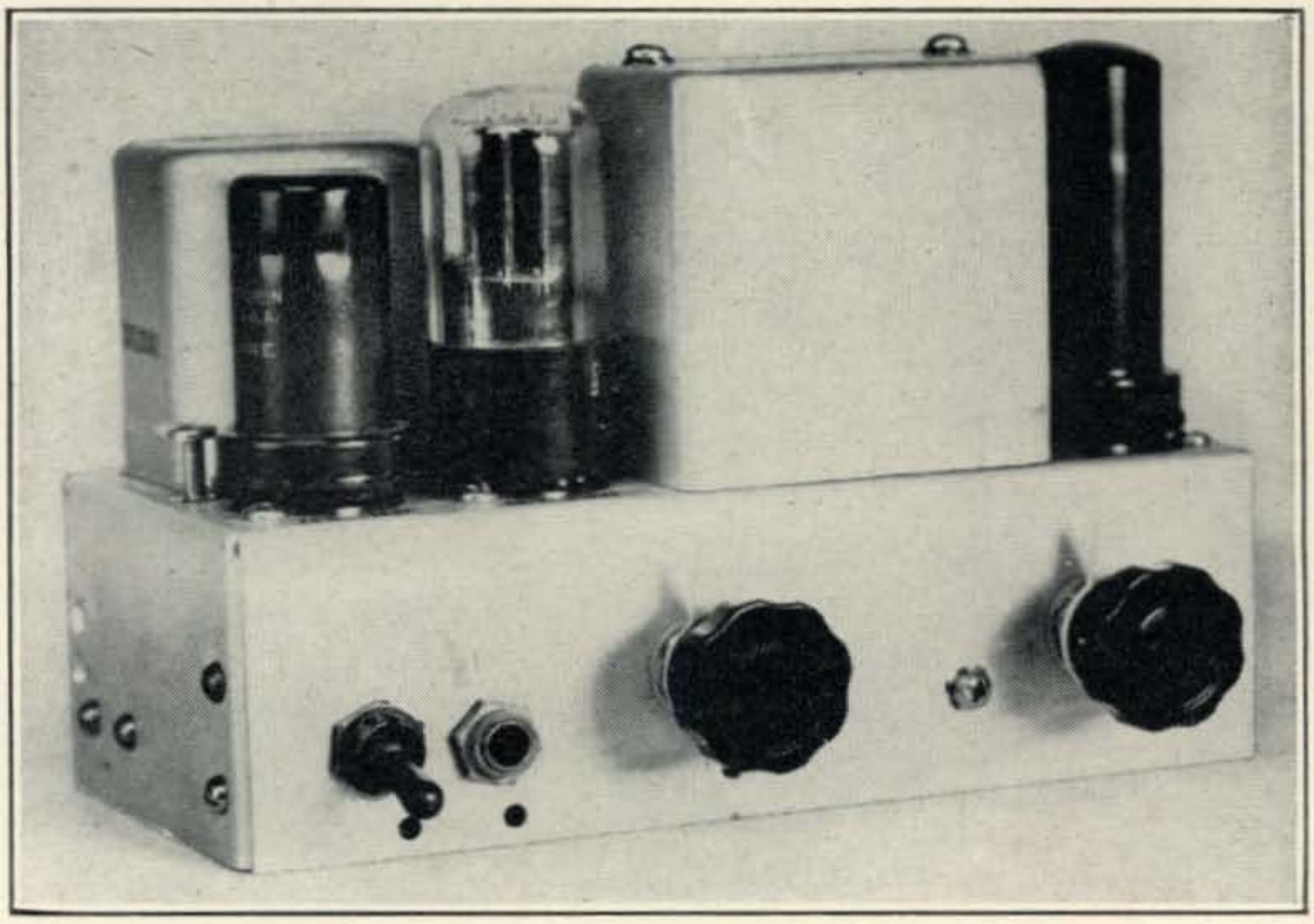


Fig. 1. Schematic diagram of modified 8JK showing feed system and current and voltage distribution along the antenna and feed line for three-band operation.



The converted ART/13 speech amplifier and a-f driver fits comfortably on the original chassis. The 6H6 speech amplifier is mounted in an inverted position below the chassis.

Converted ART/13 Speech Amplifier

with Peak Clipper & Low-Pass Filter

W. M. SCHERER, W2AEF*

THE SPEECH AMPLIFIER and a-f driver unit originally used in the Collins ART/13 autotune transmitter is now available on the war surplus market. The price of the units is generally around $3.00, less tubes, and, with the addition of a few inexpensive components, may be converted to an excellent high-gain speech amplifier (with high and low impedance input) and driver sufficient to push a pair of 6L6s, 807s, 809s or 811s as modulators. The conversion also includes a simple speech clipper with its associated low-pass filter, a feature which increases the effective modulation of the carrier by raising the average audio level.

The revised circuit is shown in *Fig. 2*. The voltage amplifier stages and the driver are quite conventional. The clipper is about the simplest to install and is similar to that employed by Collins.[1] One of the incentives for this conversion is the fact that one of the components, *T203*, originally furnished with the unit is very well suited for the low-pass filter inductance. The lack of this inductance, from amateur conversations heard on the air, is evidently somewhat of a stumbling block for those desiring to install a low-pass network in their modulators.

Purpose and Operation of the Peak Clipper

With a complex waveform, such as that of the human voice, 100% modulation of the carrier is determined by the amplitude of the maximum peaks of the voice wave. These peaks occur at various intervals during speech, resulting in an average modulation level less than 100%. The peaks are also generally composed of vowels which contribute little to speech intelligibility, while important consonants of less energy are down in the average level. The average modulation is usually approximately 25-35%, depending upon the characteristics of the

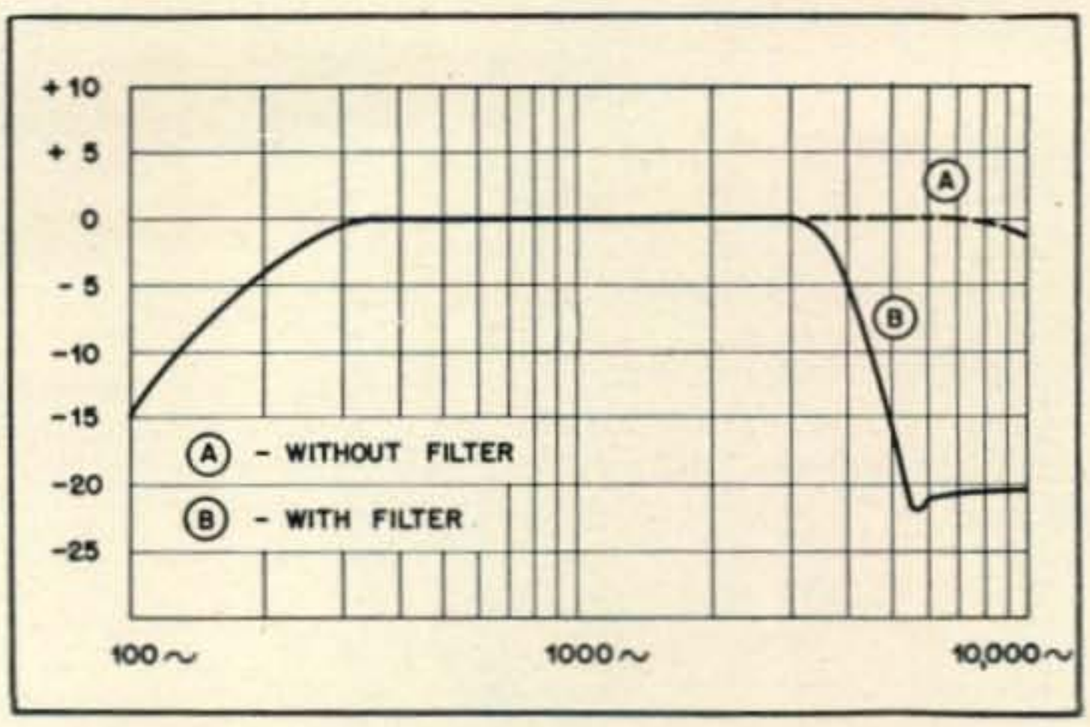


Fig. 1. Amplifier frequency response curve with and without the low-pass filter. The filter cutoff is 3500 cycles.

*Cliff Trail, Fayson Lake, P. O. Butler, N. J.

[1] *J. W. Smith & N. H. Hale, "Let's Not Overmodulate,"* QST *Nov. 1946*

particular voice, the speech amplifier, and the microphone. This, of course, means that the average power is far less than the four-times carrier peak power attainable at 100% modulation. If the maximum peaks are suppressed or clipped, the amplifier gain control may then be advanced so that the average level, containing the vital speech sounds, will be increased without exceeding 100% modulation and the carrier will be more fully utilized. Thus a stronger audio signal of better intelligibility for cutting through QRM, etc., will be realized.

Clipping creates a certain amount of distortion dependent upon the degree of clipping. In practice, 10 to 12 db of clipping is very satisfactory, but above this amount the distortion becomes objectionable and defeats the original intent.

In order to prevent the high-frequency harmonics, created by the distortion of the clipped wave, from modulating the carrier and from causing side band splatter, a low-pass filter is installed following the clipper tube. The filter cutoff frequency is 3500 cycles, permitting ample high-frequency response for voice transmission. *Fig. 1* shows the amplifier frequency response curve with and without the filter. It will be noted that the low-frequency response falls off in both cases. This is due to the small coupling condensers between stages. These were in the unit originally and are used to minimize the additional components required, especially since increased low-frequency transmission would add nothing to intelligibility.

The clipper, in this unit, is a 6H6 connected as a

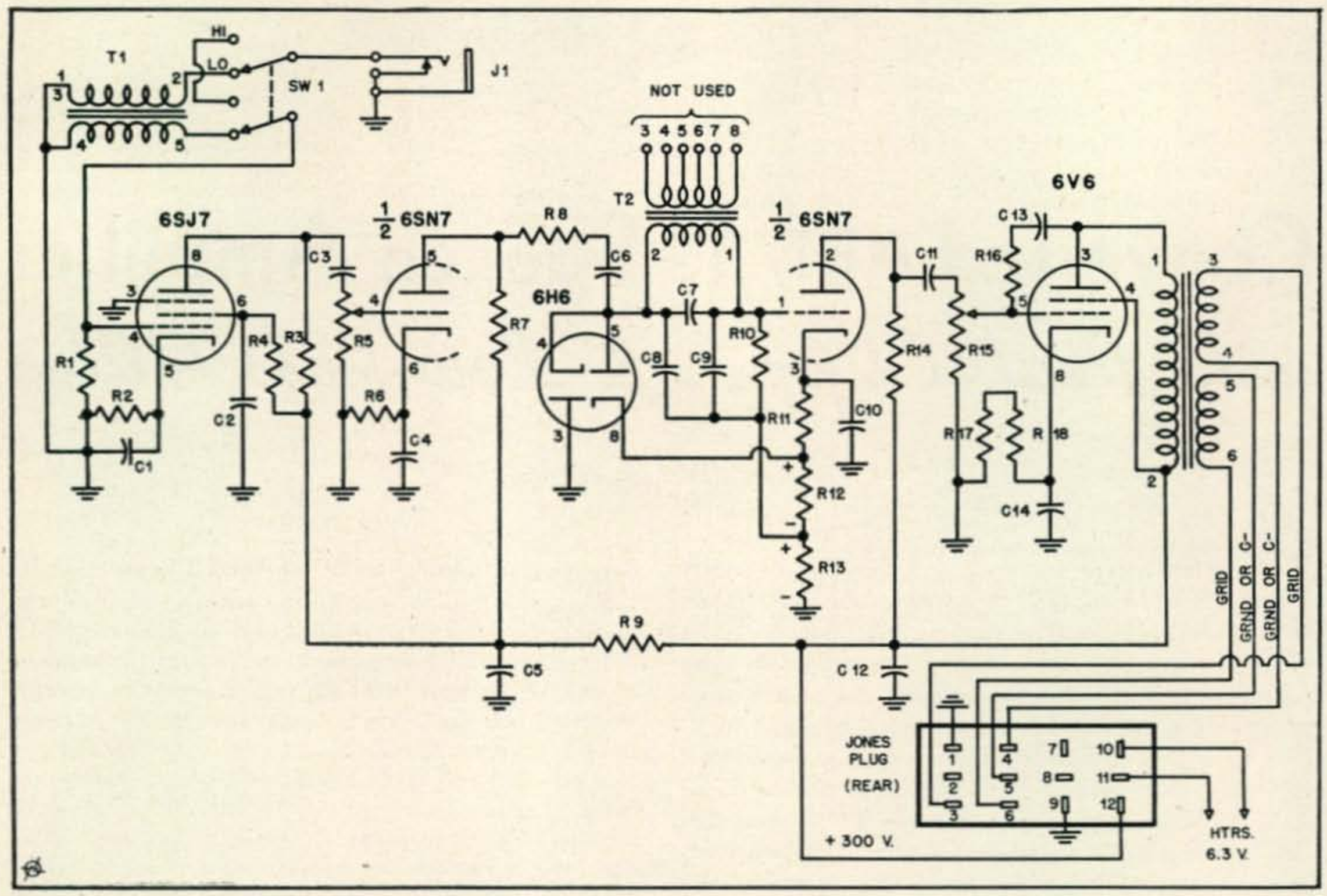


Fig. 2. Circuit diagram of the ART/13 speech amplifier after conversion.

C1—20 μf, 100 v., bathtub
C2—.05 μf, 600 v., tubular
C3—.001 μf, 1500 v., mica
C4—20 μf, 100 v., bathtub
*C5—8 μf, 450 v., dry Electrolytic
C6—.003 μf, 1500 v., mica
*C7—250 μμf, 400 v., mica
*C8, C9—.001, 400 v., paper
C10—20 μf, 100 v., bathtub
C11—.005 μf, 1500 v., mica
*C12—8 μf, 450 v., dry electrolytic
C13—.01 μf, 400 v., mica
R1—470,000 ohms, ½ watt
R2—2200 ohms, ½ watt
R3—220,000 ohms, ½ watt
R4—1 megohm, ½ watt
*R5—500,000 ohms, Centralab Midget Radiohm (or equivalent)
*R6—1500 ohms, ½ watt
*R7—50,000 ohms, ½ watt
R8—100,000 ohms, ½ watt
*R9—5000 ohms, ½ watt
*R10—50,000 ohms, ½ watt
*R11—1200 ohms, ½ watt
*R12, R13—1000 ohms, ½ watt, each, matched
*R14—50,000 ohms, ½ watt
*R15—500,000 ohms, Centralab Midget Radiohm (or equivalent)
R16—750,000 ohms, ½ watt
R17—250 ohms, ½ watt
R18—100 ohms, ½ watt
J1—Single closed circuit jack
SW1—DPDT Toggle
T1—Input transformer (T201)
T2—Low Pass Filter Inductance (T203)
T3—Output transformer (T202)

Denotes additional components required.

shunt-type diode clipper across the output of the second stage. Each diode section is biased so that it does not conduct until a voltage of opposite polarity and greater than the biasing voltage is applied. As it conducts, its low impedance compared to that of the 100,000-ohm resistor, *R8*, in effect acts as a virtual short across the circuit. The biasing voltage then determines the clipping point. With the constants of *Fig. 2*, this clipping joint is at about 2.5 volts. Each diode section of the 6H6 is connected in opposite polarity to the other in order to clip each half of the audio cycle. *R5* is set for the desired amount of clipping, while *R15* is adjusted for the required amount of a-f driver output to produce 100% modulation.

Rebuilding the Amplifier

Remove all wiring and all components. Clean out the solder from the socket lugs, transformer terminals, etc. Along the socket side of the chassis, drill holes for toggle switch, microphone jack, and volume controls according to the layout in *Fig. 3*. A square hole must be cut for the Jones plug on the opposite side of the chassis. Mount the sockets so the guide pins face the top left corner when looking at the chassis as in *Fig. 4*. Install a grounded lug under each socket screw along the chassis center. Wire socket grounds and heaters. The original wire will be ample for all wiring. If it is desired to ground one side of the heaters, do so by making the ground connection at the Jones plug only. On the input

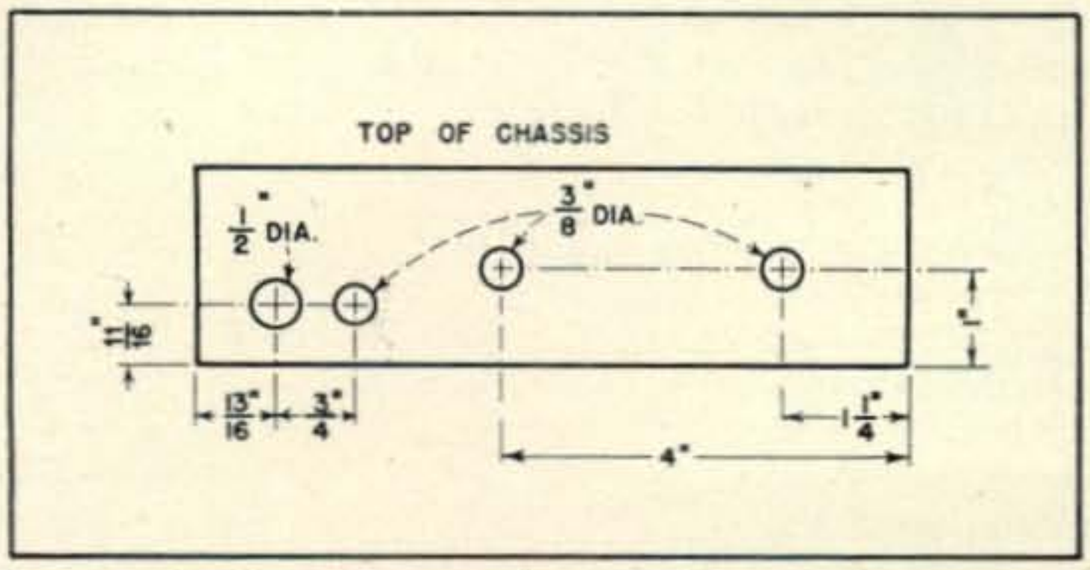


Fig. 3. Drilling layout for modifying the original chassis to permit mounting of controls.

transformer, *T201*, connect terminals *1*, *3*, and *4* together. These will then be grounded to the case. Mount the transformers as indicated. The *20-μf* bathtub condensers should be remounted above the chassis in their original positions. The cathode resistor *R2* is mounted on the bathtub condenser protuding through the chassis center. The bathtub condenser at the side of the chassis is wired to the cathode of the second half of the 6SN7 socket terminal *3*. The cathode resistors and condensers *R6*, *R17*, *R18*, *C4*, and *C14*, are mounted above the chassis. Resistors should be mounted on the strips according to *Fig. 4*, and leads should be soldered to the rear terminals before the strips are bolted to the chassis.

Mount and wire the Jones plug. Mount the volume controls and wire as many of the components as possible. Mount and wire coupling condensers *C3*, *C6*, and *C11*. Holes will first have to be drilled for the mounting bolts of the condensers. These

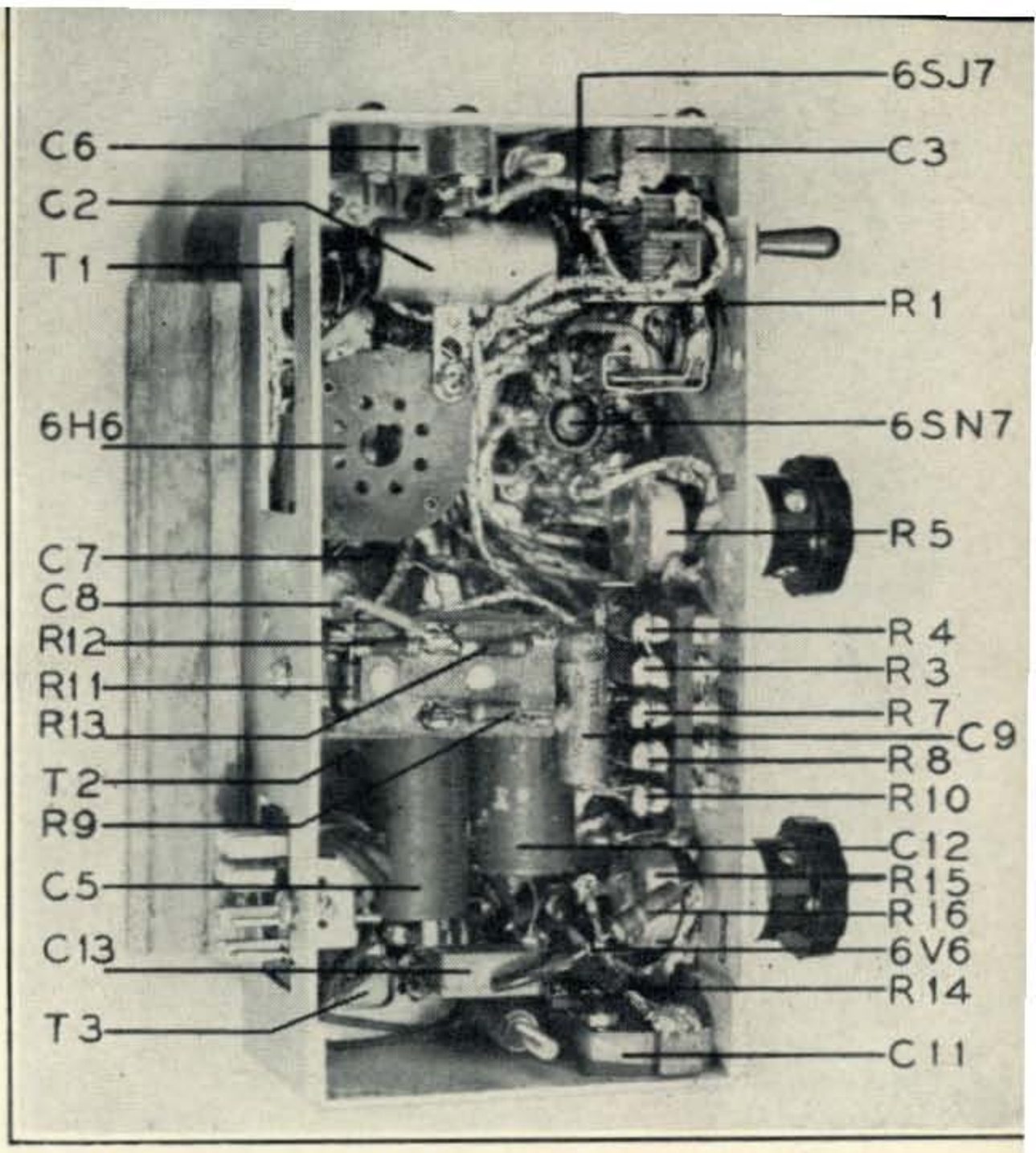


Fig. 4. Bottom view of the amplifier showing placement of components. Location of the cathode resistors and by-passes, not visible, is described in text. The 6H6 is removed from it's socket to show positioning of the keyway.

condensers are rated at 1500 vlots and make good r-f bypasses, so it is desirable to save them and substitute cheaper paper ones with a 400-volt rating. Wire in *R14*, *R16*, and *C13*. Mount and wire microphone jack, toggle switch, and *R1*. The switch "up" position should be "hi" impedance input and the "down" position should be "lo." A wafer-type socket should be selected for the 6H6 with mounting holes spaced so that the socket may be mounted on 1/2-inch pillars screwed to the transformers bolts. Solder leads to the socket before mounting it. Wire screen bypass, *C2*, and mount it by fastening its clamp with one of the 6H6 socket screws. Wire in filter condensers *C5*, *C7*, *C8*, *C9*, and *C12*. Complete all unfinished wiring. *(Continued on page 88)*

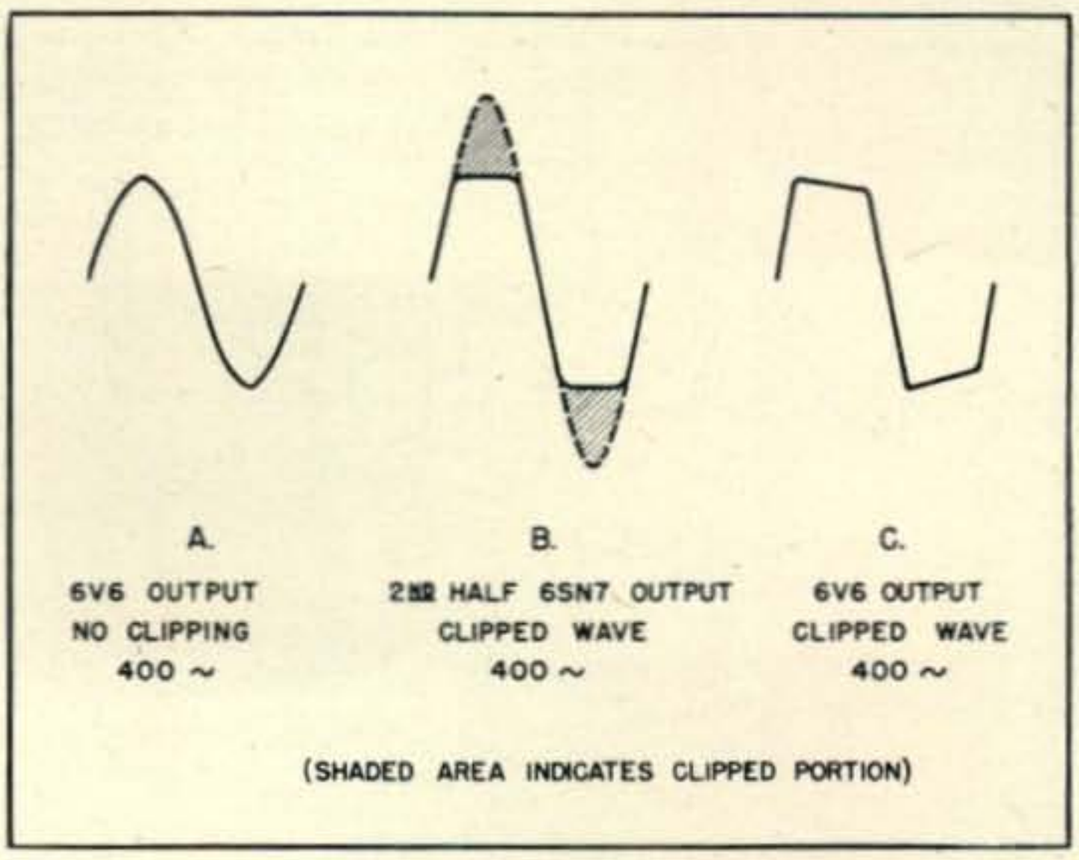


Fig. 5. Approximate waveforms before and after clipping.

COMMENTARIES • • •

A Department of Technical Discussions

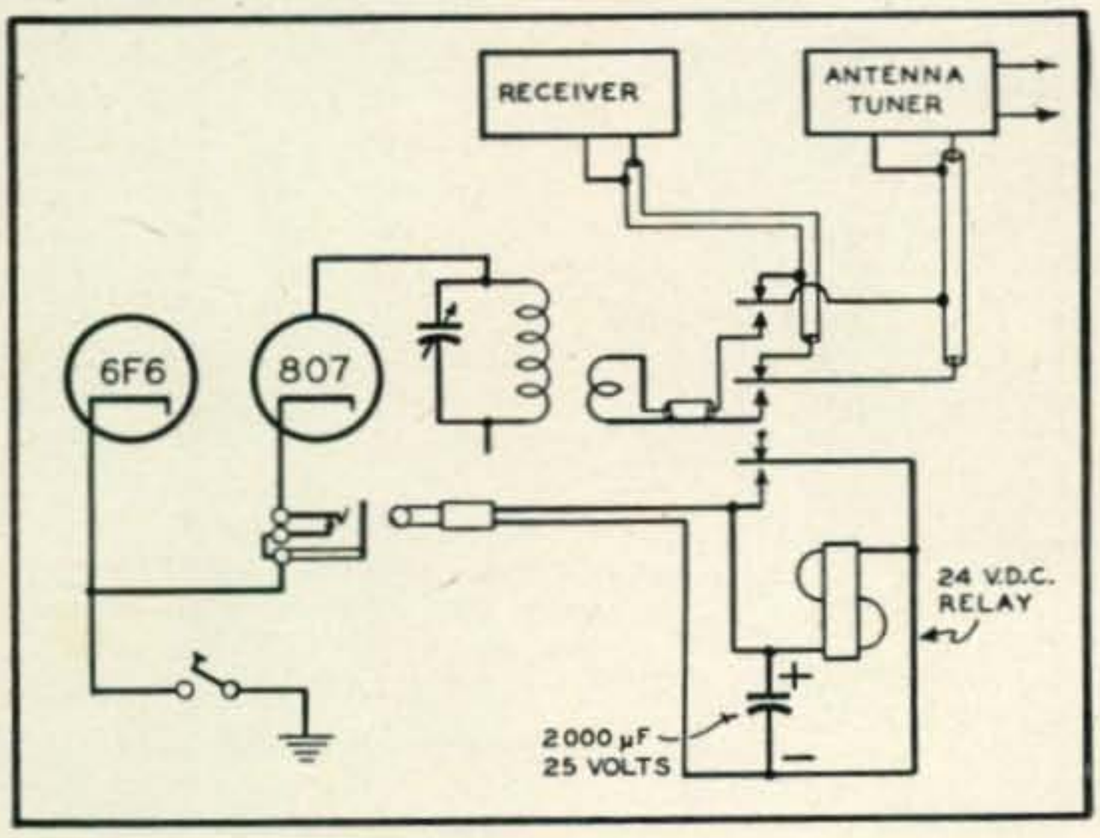
Automatic Antenna Relay

ONE OF THE MOST common faults I have found in a number of ham stations I have visited has been the lack of facilities which incorporated both break-in operation and the use of the transmitting antenna for the receiver. In some instances considerable thought had been given to the effectiveness of break-in operation, but the switching of the transmitting antenna had either been totally neglected or posed such a mechanical question that it was soon forgotten.

Before the day of our super-sensitive receivers there were few anateurs who did not tune their receiving antennas as well as their transmitting array. At the present time, however, we hear the same signals with only a piece of wire thrown out of the window or across the floor. This might well have remained the status quo had it not been for the highly directive transmitting antennas which many of us now use. Logically speaking we use rotary beams and fixed wire arrays to cut down the QRM on our signal at the other end of our DX contact. But, if we do not hear the DX for the QRM, then why not turn the problem around and use directive reception? Also, it is self-evident that the response of a resonant antenna will be far greater than that of an untuned short length of wire.

From a mechanical and electrical standpoint, this problem of v.f.o. break-in c-w operation has been solved at W9TJC by using the relay circuit shown in the accompanying schematic. The relay itself is one of the war-surplus variety with 3-pole double-throw action and a 270-ohm 24-volt coil. The contacts are made to withstand about 500 watts at 117 volts a.c.

Two poles of the relay are used to switch the main antenna between the receiver and the final amplifier of the transmitter. In the case where the antenna is a long-wire array and uses a tuning network the contacts of the relay are inserted in the low impedance line between the final tank coil and the antenna tuner. The third pole of the relay is used as a holding contact.



Circuit diagram of the automatic antenna relay system for full break-in operation.

The relay coil requires about 85 ma for rated operation at 24 volts. At W9TJC we have wired the coil of the relay into the cathode circuit of our 807 to serve as a means of protective bias. Wired in this fashion the relay operates the instant the key is depressed and the antenna is automatically changed from its normal receiver input position to transmitter output position. A 2000-μf 25-volt electrolytic condenser is wired in series with the holding contacts and provides the necessary voltage to hold the relay on transmit while keying at our normal speed. The condenser is not across the relay coil when receiving and therefore does not prevent instantaneous action of the relay. Once the condenser is charged through the holding contact there is sufficient charge to prevent relay action between individual dots and dashes. Actually it takes about one-quarter of a second for the relay to switch back to the receiver.

This system has proven to be quite successful in operation. Transmission may be started at any time and reception is possible between words, thus ensuring excellent break-in performance. There is no extra switching to do between transmissions. On high-power transmitters this relay arrangement would be used between driver stages. Naturally, more elaborate arrangements are possible with relays having more contacts. For example, an extra contact could be used to control the oscillator, or the final cathode circuit.

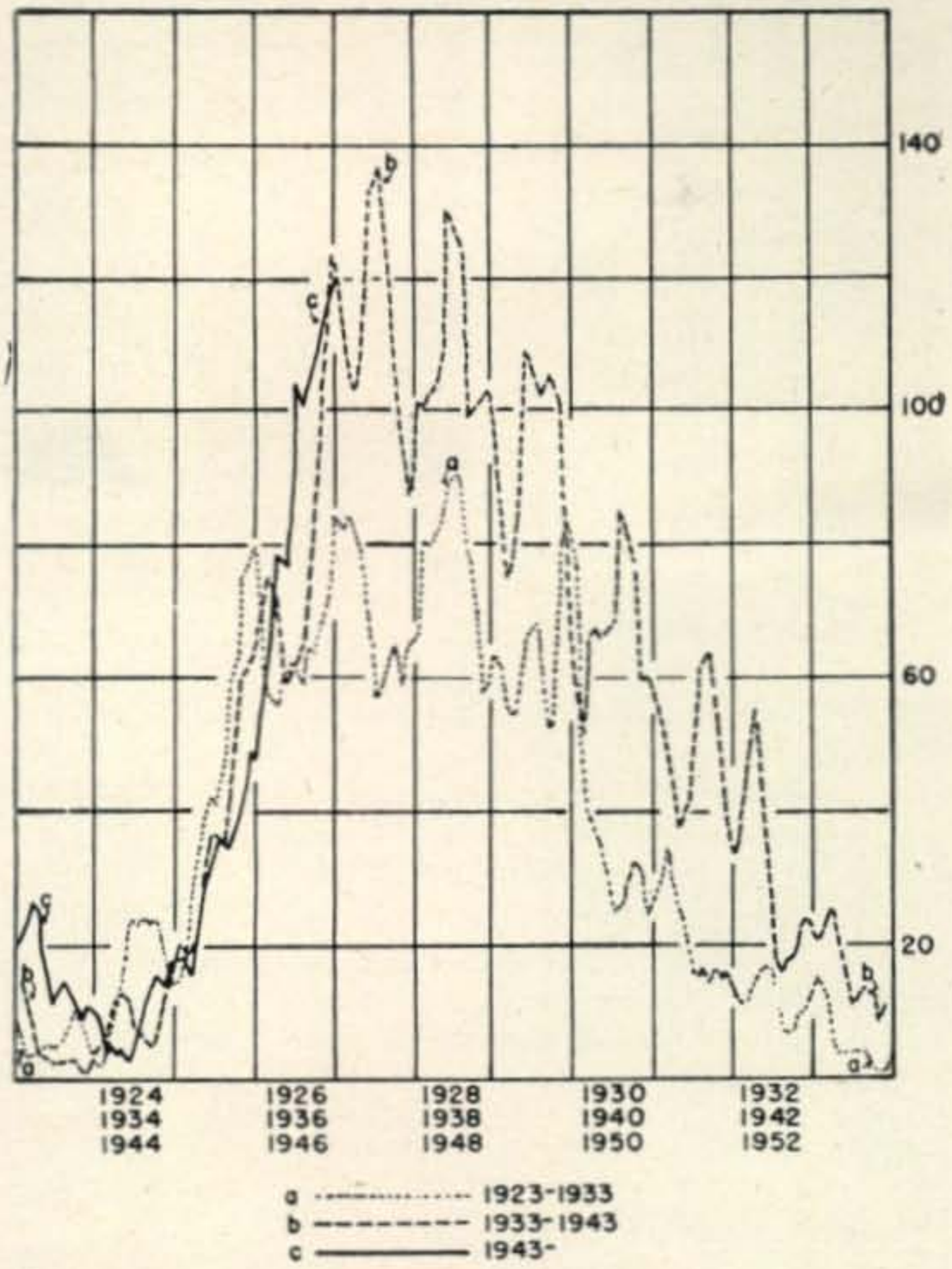
H. Van Jepmond, W9TJC

The Sunspot Maximum

RADIO WAVE propagation may always be expressed in terms of solar activity. Good high-frequency conditions follow very closely the number, area and position of the sunspots. Thus, this fundamental but important relation of radio communication to solar activity makes of special interest the determination of the time of maximum sunspots.

The accompanying graph, *Fig. 1*, gives a comparison of the form of the sunspot curve throughout the rise and fall centered about the last two maxima with curve *C* showing the progress of the present cycle. It will be noted that for the last several cycles the alternate maxima have, in general, been lower and flatter than the intermediate maxima such as was experienced in 1917 and 1937. Should the present rising sunspot cycle parallel closely thus far the cycle of twenty years ago we might have anticipated the coming maximum to occur in the middle of 1948. This current sunspot cycle, however, has already risen to activity which parallels more closely the rise of 1937 than that of 1927 and 1928. The graph is drawn with the three months' moving average which emphasizes the secondary maxima that ride on the general carrier trend of the cycle.

We have had very high sunspot activity in the early part of 1947 (with excellent DX conditions—Ed.) and if the intervals between the secondary maxima continue in the recognized pattern, we may anticipate a minor slump in sunspot activity during the summer months of 1947 with another rise in the late fall which may reach the actual maximum for the present cycle, somewhere between September



Comparison of the form of the sunspot curve throughout the rise and fall centered about the lasr two maxima.

1947, and February, 1948. It is to be anticipated that for yearly values of sunspot numbers, the year 1947 will prove to be the top year for activity in the present cycle.

The graph in *Fig. 1.* also emphasizes that the last several sunspot cycles have much more nearly covered an interval of ten years rather than one of eleven years duration. The customary tendency to adopt 11.2 years as the sunspot cycle can, therefore, lead to gross errors. The value of 11.2 years arises only when the average of more than 150 years of sunspot records have been taken into account. The sunspot numbers exhibited here are those of Zurich, utilizing provisional sunspot numbers for the recent record.

An interesting factor in our study of radio wave propagation at the Cosmic Terrestrial Research Laboratory, Needham, Mass., has been the comparison of the night-time field strength intensity measurements of the 5.0-mc carrier frequency as transmitted from Beltsville, Md., and received in our laboratory. In general, there has been a very marked increase of about ten fold in microvolts at the receiver at the present time as compared with night values recorded in 1943. On the other hand, the noonday values have averaged progressively lower since the sunspot minima of 1940, presumably this is due to increased E-layer absorption of F2-layer transmission.

When the diurnal curves of field intensities near the sunspot minima are drawn for the reception of WWV they will show two maxima fields in the winter time, one following sunrise and the other preceding sunset. In general, the summertime reception is characterized by high nightime field strengths and low day fields. The effect of the rapid rise in sunspots during 1946 has been to promote a continuance through the winter of 1946-47, of the summertime pattern reached in August, 1946. This means that for frequencies about 5.0 mc the daytime fields have been far below that which might normally be expected. Undoubtedly similar effects are noted in the amateur 75-meter band.

Harlan T. Stetson
Cosmic Terrestrial Research Laboratory
Needham, Mass.

Postscripts

Tube Falls 10,000 Feet, Survives

A story of an electronic tube that fell 10,000 feet from a Flying Fortress and survived to power a radio transmitter has been made known by engineers in the Tube Division of General Electric Company's Electronics Department at Schenectady, New York.

The electronic tube's descent, following an attack by the Luftwaffe on a formation of Flying Fortresses in 1943, was described in a letter from A. A. Bliek, Enschede, Netherlands who reported that the tube was still functioning.

During the battle several airplanes exploded and shortly thereafter a package fell to the earth. Upon examination, it was discovered that the package contained a GL-211, a standard transmitting tube, and that no damage had been done to the filament or other elements. The tube is now in operation in V.E.-R.O.N.'s transmitter, Bliek said.

Stig Ekeroot, SM7UZ, sent to the U. S. by the Swedish Government to study medical electronics at the Mayo Clinic at Rochester, N. Y., combined business with a vacation and wedding trip with Mrs. Ekeroot, during which he visited many amateurs. Pictured here, left to right: W6AM, SM7UZ, Mrs. SM7UZ, and W6MA. *Photo by W6RO.*

W2PBI

Meet the YLs

AMELIA B. LOBSENZ, W2OLB/7*

Here are an even dozen households where Christmas shopping is no problem for the OM

W6UHA

RECENT RECORDS indicate about 2000 licensed YLs in the country today. This is a small percentage of the total number of hams in the United States, but this group is large in influence, for ham radio is a social as well as a technical hobby, and in a social matter the influence of women cannot, of course, be neglected.

We have compiled here pictures of some of the better-known YLs. Some belong to the group of those licensed during the war years, having become interested in radio through civilian defense activities or while in the service. There are others who have become licensed through marriage to a ham, or because of encouragement from a ham brother or father. Then some have been licensed for many years and rank with the old-time hams in experience and knowledge.

Over 200 YLs are banded together in the Young Ladies' Radio League. This began with an idea of one YL. In July of 1939 Ethel Smith, W7FWB, asked, "How many YL key twitchers are there? Nobody seems to know, but I think we could tell." Ethel already had plans for a YL radio club and had lined up a few interested girls. The idea was picked up by girls all over the country and letters poured in to her until the organization grew to its present size.

In many of the larger cities the girls also have formed local branches of YLRL, and hold regular meetings to discuss matters of interest. These subjects are not the usual chatter of recipes and housekeeping, but are more apt to pertain to the new rig under construction or how a dipole should be put up. The YL is usually a friendly person inclined to clubs and roundtables. She is keenly interested in other YLs throughout the country and is especially fond of working them on the air.

**820 N. 60th St., Seattle 3, Wash.*

W2PBI, Jerry Weinberg

Jerry, W2PBI, of Brooklyn, N. Y., received her ticket in 1942, after years of interest in the hobby. She operates on 10-meter phone only and says she is "fascinated with this moody band." At present she's trying to make up for time lost during the war years and is working for WAS and WAC.

Although the OM, Max, a fireman, is not yet licensed, he evidences considerable interest and Jerry expects him to take his exam soon. Whenever he's around he shares all operating time with her.

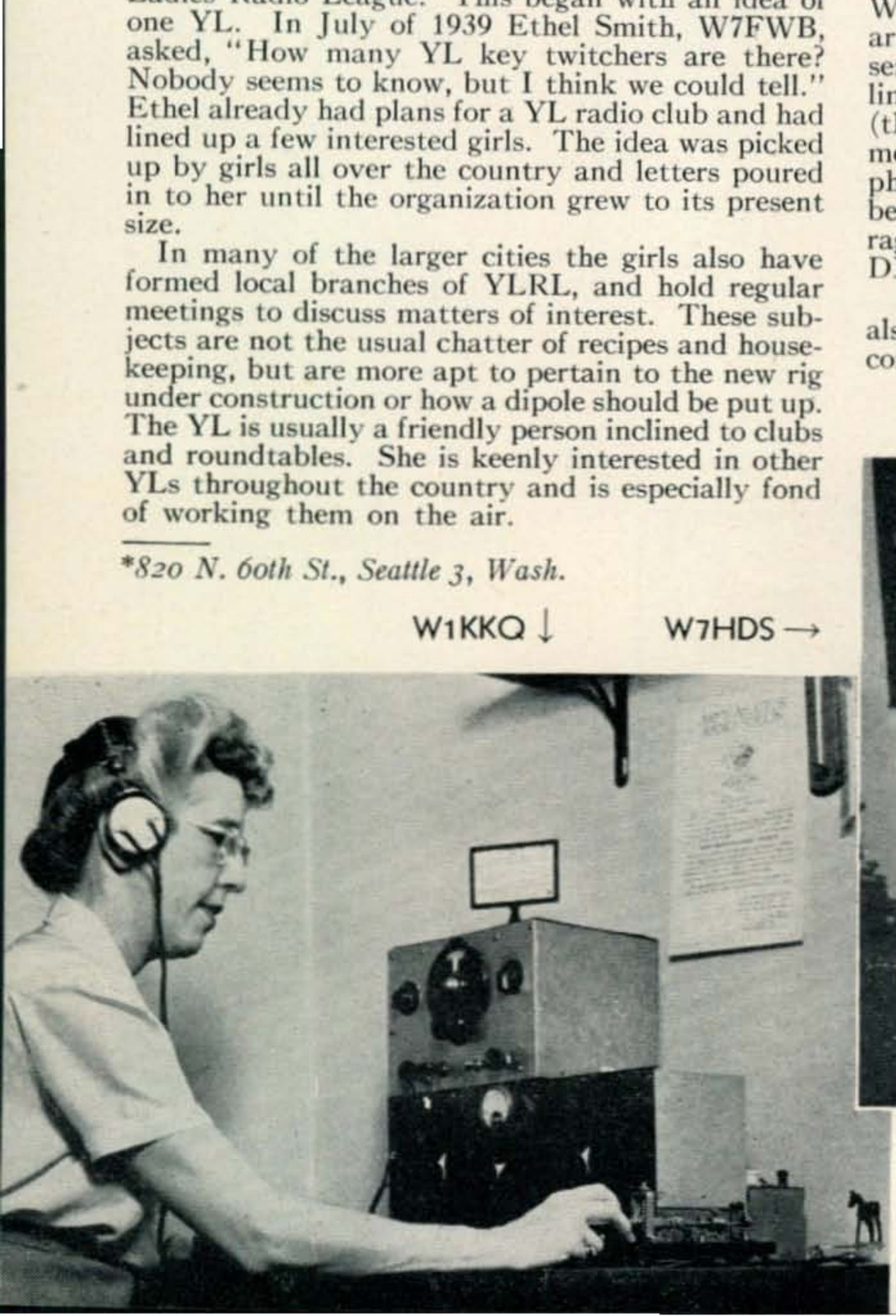
Jerry's the gal we told you was national 80-meter hurdle champion in 1936 under the name Jean Hiller.

W6UHA, Maxine Willis

Like so many of the W6-YLs, Maxine Willis, W6UHA, has spent much of her operating time in arranging personal QSOs for families of boys in the service at various Pacific stations, along with handling overseas traffic. Maxine, whose OM is W6TS (the first ham to work across the U.S. on 20 and 40 meters back in 1922), operates mainly on 10-meter phone with a kilowatt rig, but this summer she has been quite active on 20-meter c.w. Besides the usual rag-chewing Maxine has been successful at snaring DX and counts 79 countries and 32 zones to date.

Secretary of the Los Angeles YLRL Club, Maxine also finds time for her other hobbies of home recording and music.

W1KKQ ↓ W7HDS →



VE6DF

W7HHH

W2AFZ

W9EFW

W7HHH, Bea Austin

One of the numerous YLs who was intrigued by the OM's hobby is Bea Austin, W7HHH, of Bend, Ore. Her OM, Carl, is W7GNJ, formerly 7ADD. Bea became licensed in 1939 after a little persuasion from the OM in the form of a new transmitter for her very own. Bea became very active in the 160-meter AARS net and is a member of the YLRL of which she is District Chairman. She's received a WAS certificate for phone and has held a Class A license since '39. Bea operates on 10, 20 and 75 meters.

For two years after Pearl Harbor the Austins taught radio school during which time Bea also helped Carl with their bicycle shop. She learned to ride a bike only four years ago and says, "For an old lady like me that is quite an accomplishment!" Bea also likes to raise flowers and to crochet and embroider.

W6QOG, Helene Leonard

Another ham family is the Leonards consisting of Helene, W6QOG, and Harry, W6MBD, of Los Angeles. Helene is well known on 10 and 20-meter phone, where she uses the OM's 500-watt rig, and on 75 with her own 500-watt transmitter. They plan to be on 6 soon and both have mobile 10 and 11-meter rigs. During the war Helene was active with WERS using both fixed and mobile rigs. Besides consistent traffic handling and personal skeds with the Pacific, she's also held a series of regular schedules with LU7AZ. Helene was formerly District Chairman for YLRL. Her other hobbies consist of stamp collecting and coin collecting.

W9JMI, Clara Fehr

A strictly phone YL is Clara Fehr, W9JMI, of Willmar, Minn., who is well known on 10 meters. Her main ham interest is rag-chewing. Clara is a nurse at the Willmar State Hospital, where she's been working for two years. Besides radio Clara's hobbies include quilt-making and contract bridge.

W7HDS, Lizette Wolf

Lizette, W7HDS, of Cheyenne, Wyo., first became interested in radio when answering QSL cards for the OM, W7EUZ. When he went on phone she decided that it was about time to get her own ticket and enjoy the fun. To start off with a Class A ticket, Lizette took a commercial license exam and was soon on 20-meter phone, where she was very active until Pearl Harbor. She then went to work for the local broadcast station KFBC, where she did everything that the men engineers did—such as serving all turns at the transmitter, handling remotes for baseball and football games and cutting records for delayed broadcasts. When the Wyoming Highway Patrol needed a radio dispatcher, Lizette signed up with KWHC.

Now back as a housewife, Lizette enjoys working all the phone bands and a little on 80 c.w. She's EC for Cheyenne, OPS, and member of RCC. She served as vice-president and later as secretary of the local Shy-Wy Radio Club and was District Chairman for YLRL. Lizette says, by the way, that she's the one in that family who spends the grocery money for new 866s and comes sneaking up from the ham shack at 5 a.m. after an all-night session on 75. She says the OM wonders now if he should have been so anxious for the little woman to get a ticket!

W2AFZ, Della Parker

Another YL, who is also a commercial operator, is Della Parker, W2AFZ, of Westville, N. J. Della has been interested in radio since high school days, and took her commercial exam right after graduation with the hope of going to sea as a radio operator. She found she was unable to do this, but she did obtain a position as radio operator with WWAD in Philadelphia. During the war she took a government radio course, and immediately afterward went to work with the radio net of the Immigration and Naturalization Service handling traffic, all c-w work, regarding aliens and their movements. She's been there four years now, says it is very interesting and is just like being paid for continuing one's hobby. At home she's active on 10 meters with a BC375 all set for 20 and 40. The OM, who is taking a radio course, helps keep the gear in repair.

W9JMI →

W2PMA, Lillian Ruocco

Another happy family in which only the wife is licensed is the Ruoccos. Lillian, W2PMA, was one of the New York City girls who became licensed through the American Women's Volunteer Service classes during the war years. After passing the exam Lillian stayed on with the AWVS giving code instruction five nights a week. She operated a mobile WERS rig and was active for a time with the Interceptor Command. She's a former District Chairman of YLRL, and has been secretary of the New York City club since 1942. At the present time Lil is active on 10 phone exclusively, usually on 28,820 kc. Her OM, Abbey, is her "mechanic" and is now studying for his own ticket.

W1KKQ, Leora Howe

A former WAC radio operator, Leora Howe, W1KKQ, since leaving service has been taking G.I. training as a photographer's assistant in Nashua, N. H. Leora has been licensed since '37 and prefers operation on 40 and 80 meters.

VE6DF, Dot Fitts Ciccone

Also a former army radio operator is Dot Fitts Ciccone, VE6DF, one of the Canadian YLs, who was an operator for the Signal Corps of the Canadian Women's Army for four and a half years during the war. She finished up as a staff sergeant in charge of wireless, and continued on the same job, but wearing civilian clothes, until last December when she got married and retired. With time now available she does a little photography and likes experimenting in her own darkroom.

Top, W2PMA; bottom, W6QOG.

W1MDV

Dot's been a licensed ham since 1938, when she first became interested through listening to the local "75-meter breakfast club." She's always worked 40 c.w., spending most of her time rag-chewing. Dot, incidentally, lives in the famous town of Calgary, Alberta, known for its annual cowboy and Indian stampedes.

W1MDV, Louise Bruya

Louise, W1MDV, of Waltham, Mass., is active on 80 and 40-meter c.w. She is married to W1KKJ, Howard, who's on 75 phone. Strictly a c-w operator, Louise is known for traffic handling and DX contacts. She's held a Class A ticket since 1939. For two and a half years during the war she worked in the test laboratory at Raytheon as an electrical inspector. Now she's a lady of leisure, she says, with plenty of time for hamming.

W9EFW, Esther Davis

W9EFW is Esther Davis of Fort Wayne, Ind., who has been a licensed amateur since 1938, when she decided to join the OM in his hobby. Though Esther says the OM, James, isn't very active himself, he does provide her with all necessary equipment from his radio store in Fort Wayne, and built her a four-element rotary beam. Esther uses this on 10 meters only, her greatest interest being DX chasing, at which she spends many hours waiting for the band to open or for short skip to appear.

During the war Esther put in over 2000 hours as a nurse's aide in her local Methodist hospital and still helps out when her friends, or her friends, friends, need her. Esther incidentally, is one of the youngest grandmothers in our acquaintance, and is very proud of her year-old granddaughter.

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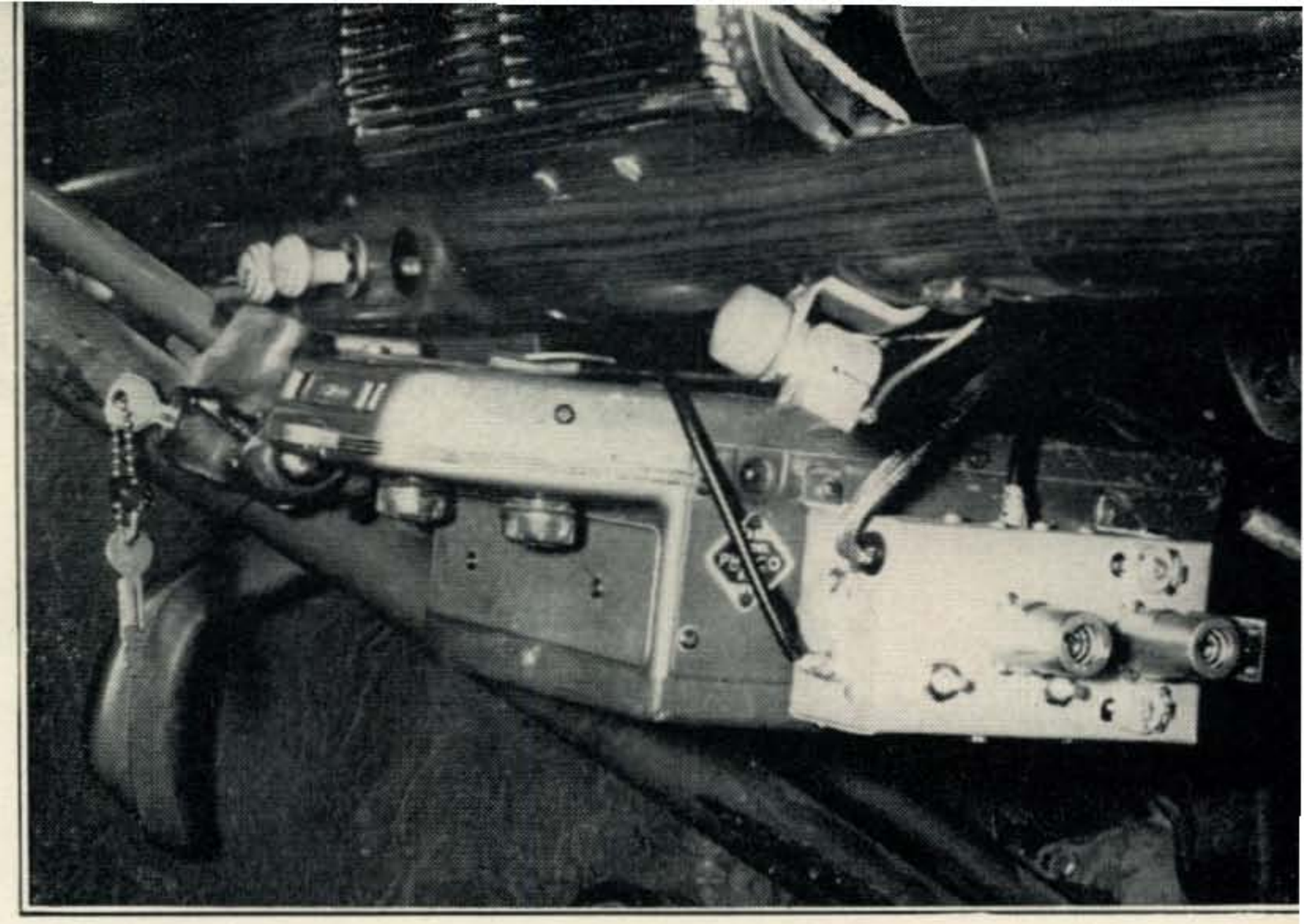
Postscript

Two Massachusetts hams merged rigs recently in a cHAMpion amateur radio marriage when Norma Schall, W1NHN, was married to Harold Olsen, W1NUF, by Norman Davis, W1IDR. The minister's wife is also a ham, and the two bridesmaid's are both wives of hams, married to W1JLI and W1JNX. The church was on NeedHAM Street in DedHAM, Mass. Although the groom's knees were seen to be slightly oscillating, a crystal clear future was predicted for the happy couple(r).

W2CLB

The crystal-controlled converter mounted on the side of a Philco auto radio. This model is identical electrically with the unit described, but varies slightly in mechanical layout.



Broad-Band Crystal-Controlled 10-Meter Converter for the Car

NORMAN F. ENNIS, WØRQN*

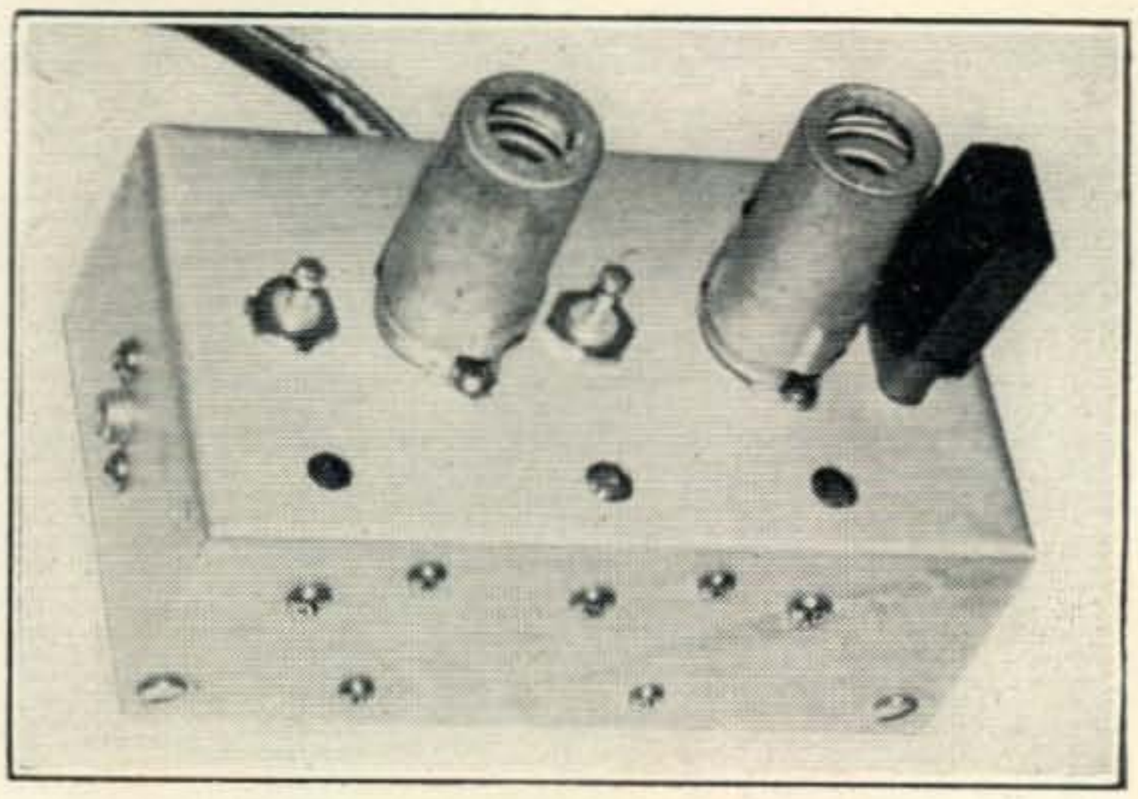
Tuning 10 on the broadcast receiver with stability comparable to low-frequency stations.

EVERY HAM WHO HAS built and operated 10-meter mobile equipment has realized the need for a simple converter that really would be stable. Tuning in stations and keeping them tuned in with the varying filament voltage from the car battery is very discouraging with the conventional converter. The author found that the voltage to the heater of the oscillator tube ranged from 5 to 7 volts depending upon the charging rate of the car generator and the load of headlights, transmitter filaments, etc. This, together with road shock, made it necessary to constantly retune the converter to the station received.

A crystal-controlled oscillator seemed to be the only thing that would "stay put" under these conditions and a broad-band crystal-controlled converter was the answer.

In addition to the feature of almost perfect stability the converter offers accurate calibration, and the same ease of tuning that one enjoys with the auto radio on the broadcast band. Since there are no additional controls the converter may be placed practically anywhere out of the way, or, if space permits, inside the car radio itself. A flip of a single-pole single-throw switch and the broadcast band from 550 to 1500 kc becomes 29,450 to 28,500 kc, which is all but the highest 250 kc of the 10-meter phone band.

A brief study of the schematic discloses a broad-band amplifier which is in fact the "R9er" followed by a 1N34 crystal converter in conjunction with the 6AK5 crystal oscillator. The crystal oscillator quadruples from the 7500-kc crystal to 30 megacycles to which $L3$ and $L4$ are tuned. These two tuned circuits serve to attenuate the undesired harmonics from the 7500-kc crystal. From $L4$ the 30-megacycle output is fed to the output of the broad-band amplifier where it is mixed with the incoming 10-meter signals in the 1N34 converter. Hence a 28,500-kc signal amplified through the broad-band amplifier, then mixing with the 30-megacycle oscillator output, is tuned in on the auto-radio at 1500 kilocycles. Image rejection is no problem as the oscillator frequency is on the high side of the band so that image reception falls in the 9-meter region where there is little or no activity.



Top view of the converter. From left to right on the top deck is L1, the 6AK5 amplifier tube, L2, the 6AK5 oscillator, and the crystal. Access holes cut along the top front edge permit adjustment of C2, C8, and C14. Access to C13, also tuned through the chassis, is partially hidden behind the oscillator tube.

*1843 K Ave., N. E., Cedar Rapids, Iowa.

The broadcast band would also leak through the broad-band amplifier and be received were it not for the use of the 1N34 crystal diode as a converter. For this reason no attempt should be made to use a conventional converter tube.

Because of the high gain of the broad-band amplifier, extreme care should be taken to shield the grid circuit of the 6AK5 from the plate circuit.

Construction

The chassis is aluminum and divided into three sections as shown in the photograph. Chassis size is 5″ long, 3″ wide, and 2″ deep.

The grid circuit consisting of *L1*, *C1*, *C2*, and *R1* are housed in a separate compartment in one end of the chassis. Note that the shield cuts across the 6AK5 tube with a cutout to allow the grid of the tube to extend into this compartment. A phono jack is used to feed a coaxial cable into the compartment. The center compartment contains the plate circuit components of the amplifier. Pin No. 2 one of the two cathode connections, is cut off the 6AK5 socket to eliminate the possibility of its shorting to the shield.

The crystal-controlled oscillator also is contained in an individual compartment with the 1N34 crystal diode and *C9*. The coil shown is *L3*, *L4*. Each winding is 16 turns, close-wound spaced on a 3/8″ form with No. 26 DSC wire. Spacing between windings is approximately 1/4″. The output of the converter is fed through the phonograph jack on the right. A long coax cable is not recommended here because of its high capacitance, so the connections from converter to receiver should be as short as possible.

After working with several different automobile radios we soon learned that some car radio input circuits offer a rather low impedance to the 30-mc signal appearing across the output of the converter, resulting in a serious loss of sensitivity. This was

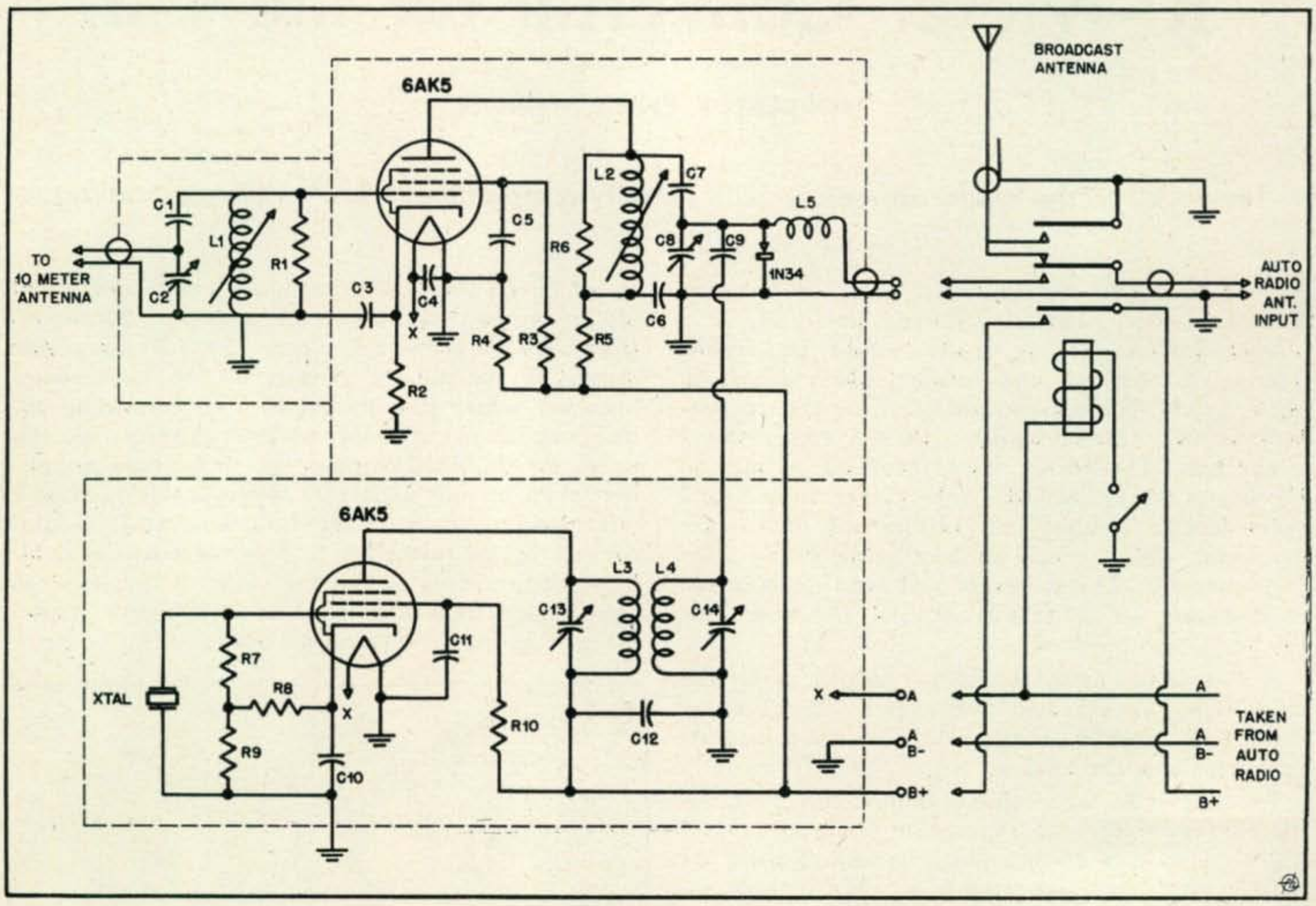


Fig. 1. Circuit diagram of the broad-band crystal-controlled 10-meter converter.

C1, C7—5 μμf. ceramic.
C2, C8—50 μμf. max. trimmer (mica).
C3, C4, C5, C6—500 μμf. mica.
C9—10 μμf. ceramic.
C10—70 μμf. mica.
C11, C12—.01 μμf. mica.
C13, C14—5-20 μμf. trimmer (ceramic or mica).
R1, R6—7000-ohm 1/2-watt.
R2—200-ohm 1/2-watt.
R3—15,000-ohm 1-watt.
R4, R10—25,000-ohm 1-watt.
R5—10,000-ohm 1-watt.
R7—100,000-ohm 1/2-watt.
R8, R9—500-ohm 1/2-watt.
L1, L2—16 turns No. 26 DSC close wound on Millen slug tuned form No. 69041.
L3, L4—13 turns No. 26 DSC on same 3/8″ form, spaced 1/4″.
L5—20 turns No. 26 DSC close wound on 3/8″ form.
Crystal—7500-kc crystal.
2 6AK5 tubes.
2 miniature sockets for 6AK5.
1 crystal holder.
1 IN34 crystal diode.
1 chassis 5 x 3 x 2 inches.

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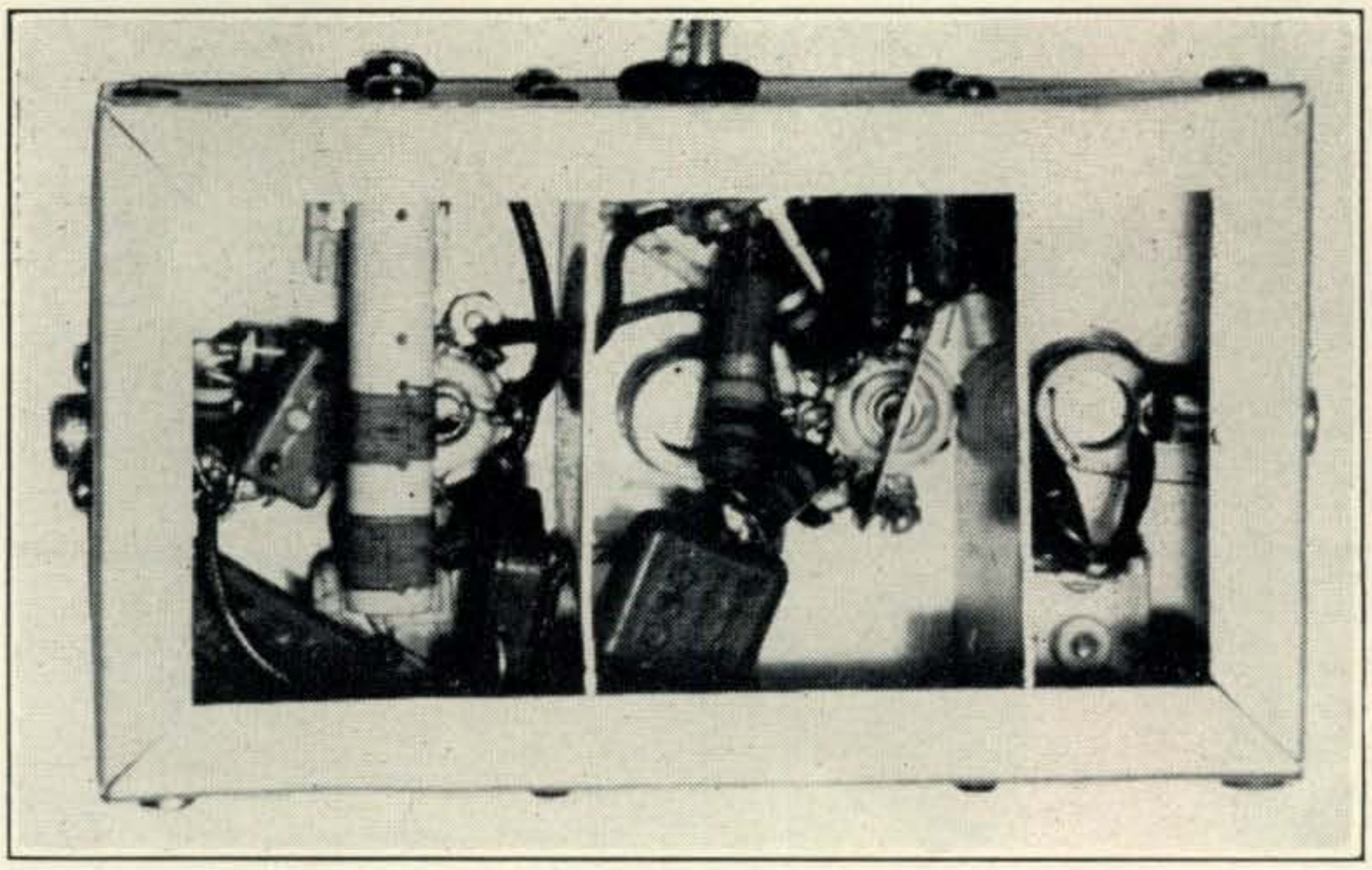
Looking at the converter with the bottom plate removed. The three separate compartments, from left to right, house the 6AK5 amplifier grid circuit and phonograph type input jack, the 6AK5 amplifier plate circuit, and the 6AK5 crystal-controlled oscillator and phono output jack. The power leads connect directly to the auto receiver power supply.



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corrected by the addition of a high-frequency choke, *L5*, between the output of the converter and the car radio input. *L5* is mounted inside the converter can. The choke isolates the 30-mc components being mixed in the 1N34 crystal detector from the car radio input and yet passes the 550 to 1500-kc band of frequencies. If any doubt exists in your mind as to the type input on your auto receiver put in *L5*, since the addition of the choke will not aflect operation if not needed.

Looking at the top view of the converter it will be noted that there are four holes (one of the holes is partially hidden behind the 6AK5 oscillator tube) or adjusting *C2*, *C8*, *C13* and *C14*. Each of these condensers is mounted by one of its soldering ears (ground side of trimmer) with a 6-32 bolt through the side of the chassis. Adjustment screws to the left and right of the 6AK5 amplifier tube are the tuning slugs of *L1* and *L2*. Filament and plate power is fed to the converter from the car radio power supply by means of the three leads extending through the rubber grommet from the center compartment.

In the author's installation, a single-pole, single-throw switch is used as a bandswitch, to operate a three-pole double-throw relay which in turn switches the converter and the broadcast antenna. Although this arrangement is shown in the schematic as a

(*Continued on page 86*)

The SID and the Hiss

AT 0958 EST ON AUGUST 21, 1947, several hundred 10-meter amateurs and many more 20-meter operators in the daylight hemisphere experienced a particularly severe ionosphere disturbahce. In less time than it takes to read this sentence all the active sky-wave frequencies in use from 6.0 to 35.0 mc went completely dead. 10 and 11-meter amateurs (and the few who were listening on 6 meters) next found a very loud *hiss* issuing from their loudspeakers. Exactly how many amateurs thought their receivers were going bad will never be known.

The recovery from this sudden ionosphere disturbance (SID) was very rapid and began at 1008 EST. By about 1018 EST conditions above 25.0 mc were practically normal. On the lower frequencies and over the longer paths recovery was not complete until about 1030 EST.

The Fadeout

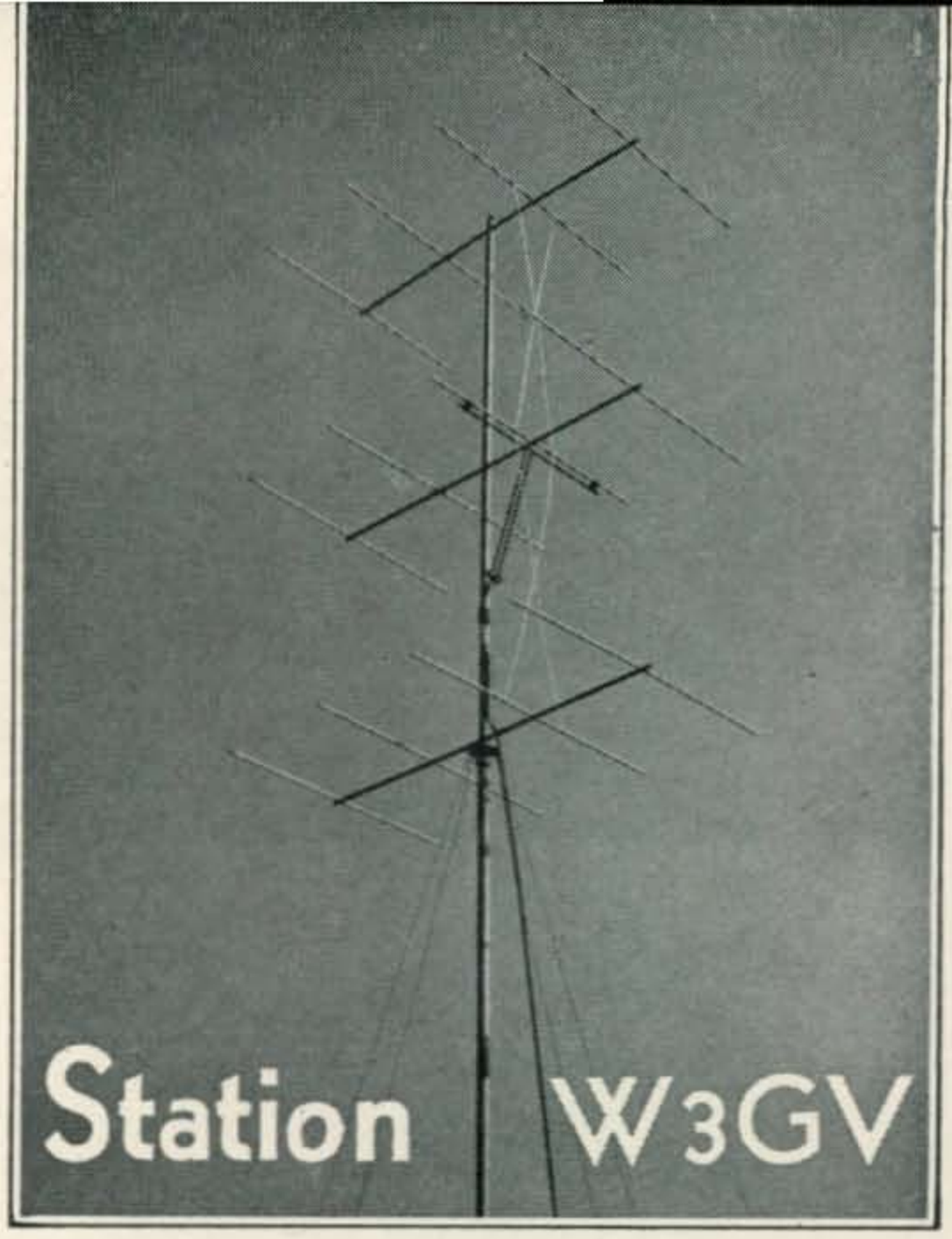
A SID of the intensity noted on August 21 is rather uncommon, although a number of SIDs do occur each month (20 were reported in July, 1947; 24 in June, 1947; 31 in May, 1947). These SID fadeouts are associated with the appearance of solar flares near large sunspot groups. The light from these brilliant solar eruptions is largely in the ultra-violet spectrum. As it reaches the earth' atmosphere it penetrates to the lowest ionosphere levels (D-layer) and the intense ionization that it sets up causes a sudden and complete absorption of all radio signals, normally being reflected by the E and F2-layers. As the solar flare is short-lived, a recovery action in the D-layer generally begins in a few minutes. Within a fairly short time h-f conditions are returned to normal. The SID does not apparently affect the F2-layer for regular 10 and 20-meter transmission, but creates a lower level absorbing layer.

The Hiss

The hiss that was heard by many amateurs shortly after the fadeout is associated with the SID. The first reported observation of intense hiss, or solar static in the v-h-f bands, was made by D. W. Heightman, G6DH, in 1936. Although G6DH attempted in various ways to convince propagation laboratories of this discovery, no importance was attached to the solar hiss until 1942. Since that time the discovery has been claimed by assorted observers—none of which is prior to G6DH's observations in 1936-37.

(*Continued on page 91*)

The Other Fellow's Station



F DAWSON BLILEY, W3GV, has made his mark in amateur radio twice over. One of the outstanding 2-meter experimenters, and co-holder with WØWGZ of the 2-meter DX record for home stations, he is also president of Bliley Electric Company, manufacturers of quartz crystals and associated equipment, one of the first crystal companies in the field.

Dawson received his first amateur radio license, 8AGR, in 1919, going on the air with a spark coil, then a ½-kw spark transmitter. In 1921 he purchased an Audiotron tube and World War I surplus 50 watter, and opened up on 200 meters.

In 1923 with an experimental license, 8XC, he cooperated with the Naval Research Lab, NKF, and W1XAM, to explore the high frequencies to help analyze the propagation properties at various times of the day up to frequencies of 30 mc. This was before the amateur frequencies were laid out in "bands."

In 1925 Dawson attempted transcontinental contact with Frank Jones, W6AJF, on 56 mc, but without success. (W6AJF used probably the first parabolic type antenna system on the amateur bands on this test). In 1926 he became 8GU, the call held until 1946. When western Pennsylvania was shifted into the third call area, W3GV was assigned.

In 1930 Dawson started making crystals as a part of the hobby which quickly grew into a business. During World War II, he was radio aide to the Erie City and County Defense Council and established about 20 active stations throughout Erie County.

In 1939, having an opportunity to pick a location for a home, property was purchased on the most desirable high spot in the vicinity of Erie for very high frequency communication. That is now the present location of W3GV. From this spot it is a clear unobstructed jump to the horizon on Lake Erie, approximately 25 miles, in the two directions in which most DX contacts are made, west and and northeast.

The station is on the top floor of his home and the roof is so designed that a small part is flat to make it safe to work on. The supporting metal pole of the beam antenna over the roof extends down through the roof to the side of the operating table.

The beam is a horizontally polarized affair consisting of three sections stacked one-half wavelength apart. Each section consists of four elements, .2 wavelengths apart. A gain of approximately 15 db is achieved. 52-ohm coaxial cable is used throughout the feeder systems.

The receiver is an RME 152A converter fed into a Hallicrafters SX43 receiver. The transmitter is a Bliley CCO-2A into an 829B with 350 watts power in the final of a pair of HK54 tubes. Phone and i.c.w. only.

Two-meter stations in the Great Lakes area are fairly well scattered geographically and W3GV is able to work between 100 and 150 miles most any evening, in any weather, with 150 to 250 miles being the distances on the occasional better nights. Of course, this year there were several long distance openings when the distance was extended to between 250 to over 600 miles to the west. As he puts it, all DX stations in this part of the country are using horizontal polarization. "Work on 2 seems just like 200 meter spark days all over again."

Not included in the picture and on the opposite side of the radio room is another operating table which is used for low-frequency transmission on 40 and 80 meters. This consists of a NC-2-40 receiver and a Bliley Vari-X oscillator and composite transmitter. The frequency most used is 7299 kc.

Always looking for new horizons in the ultra-high frequencies to conquer, W3GV with other stations in the Lake Erie area are now planning to go on 450 mc with superheterodynes, crystal-controlled transmitters, and high-gain horizontal beams from the start.

Other hobbies are motion picture photography and sound recordings. The XYL also has an operator's and station license to help the OM. They hav four children, three boys and one girl.

The Amateur Newcomer

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

Receiver theory and construction of a two-tube regenerative receiver

ALTHOUGH MOST AMATEURS use manufactured communications receivers rather than home-built sets, a knowledge of exactly how radio reception is accomplished and how receivers are designed and built is important. There is no better way to study the principles involved in reception than to apply them in the construction of a receiver, such as the one described herein; this applies equally to those who plan to use a commercial receiver and to those who will use a home-built receiver.

Before giving the constructional details, several ideas which were introduced in the second article of the series will be reviewed and applied to radio reception with vacuum tubes.

The Principle of Detection

The object of radio communication is to send some form of intelligence from one point to another by means of radio waves. At the transmitting station the intelligence, which may be speech or music or code, is impressed upon the radio wave by a process called "modulation," and at the receiving station the intelligence is separated from the radio wave by a demodulating device known as a "detector." Because the radio wave serves to bring the intelligence from the transmitter to the receiver, it is usually referred to as the "carrier wave," or simply the "carrier."

The effect of modulation on the transmitted signal is illustrated in *Figs. 1a*, *1b*, and *1c*. *Fig. 1a* is an oscillogram (a picture showing how some voltage or current varies with time) showing the audio signal (the voice, for example) to be transmitted; in this diagram the amplitude of the signal corresponds, point for point, to some sound picked up by the microphone. It will be noted that the wave shown is not sinusoidal in form, but is more complex, since the sound of the voice is not a pure tone and contains many overtones. *Fig. 1b* is an oscillogram showing the radio-frequency (r-f) oscillations generated by the r-f section of the transmitter. When a modulator imposes an audio-frequency (a-f) envelope upon the r-f carrier by making the amplitude of r-f oscillation vary in precisely the same way as the a-f signal to be transmitted, the transmitted signal looks like *Fig. 1c*. In *Fig. 1c* it is seen that the two halves of the modulated carrier are symmetrical and that the shape of each is similar to that of the audio signal, the lower half being inverted.

When the transmitted signal arrives at the receiving antenna it consists of the r-f wave and the a-f signal combined as described above. The process of detection is that of separation of the audio signal from the radio frequency signal which serves as the carrier. In the receiver described in the second article of this series,* a crystal diode was employed to perform the function of detection (*see Fig. 2a*) since the diode passes current in but one direction. Let us see what this means in terms of the modulated wave shown in *Fig. 1c*.

When rectification takes place, the entire negative half of each cycle is removed and the resultant looks like the wave shown in *Fig. 1d*, with only the positive (upper) half-cycles present. It will be observed that if a smooth curve were drawn joining the peaks of the half-cycles, the resulting curve would resemble that of the original audio signal. In the circuit of *Fig. 2a* the rectified current is passed through the 'phones, causing the diaphragms to vibrate in correspondence to the relatively slow audio-frequency envelope of the modulation. They cannot, of course, follow the individual impulses that occur at radio frequency. In this circuit the 'phones are by-passed by the capacitor *C*, which

*"*The Amateur Newcomer*," CQ, June, 1947, p. 27.*

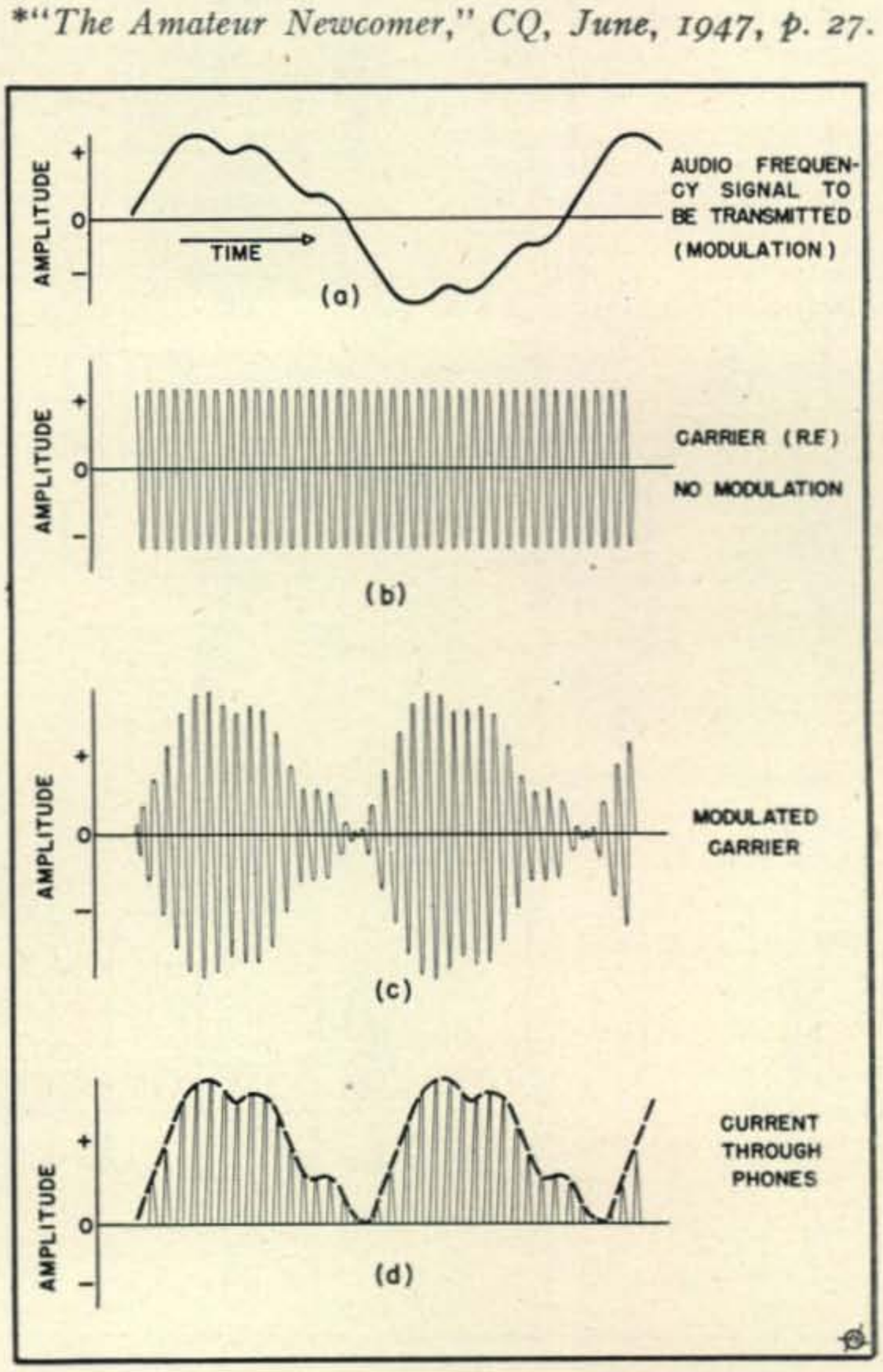


Fig. 1. Diagrams to explain detection (see text).

serves to remove any r.f. that might appear in this part of the circuit by storing energy during the time the crystal diode is passing current (positive half-cycles) and releasing the energy during the time current is not being passed.

Vacuum-Tube Detectors

Fig. 2b shows a diode vacuum tube connected in place of the crystal. Except for the fact that some means for heating the cathode is needed, the functioning of the vacuum-tube diode detector is the same as that of the crystal.

There are many other different ways in which a multi-electrode vacuum tube may be used as a detector. In practice there are two common systems. Broadly speaking, all other methods are simply variations of these two. It is obvious that some means of rectification is required in the process of detection. In the first method rectification is accomplished in the grid circuit, and this is termed "grid" detection or "grid-leak" detection. The other method effectively causes the rectification to take place in the plate circuit of the tube and is called "plate" detection.

A circuit utilizing a triode for grid-leak detection is shown in *Fig. 2c*. Selection of the frequency to be received is accomplished by the tuned circuit consisting of the coil, *L2*, and the capacitor, *C1*. Radio

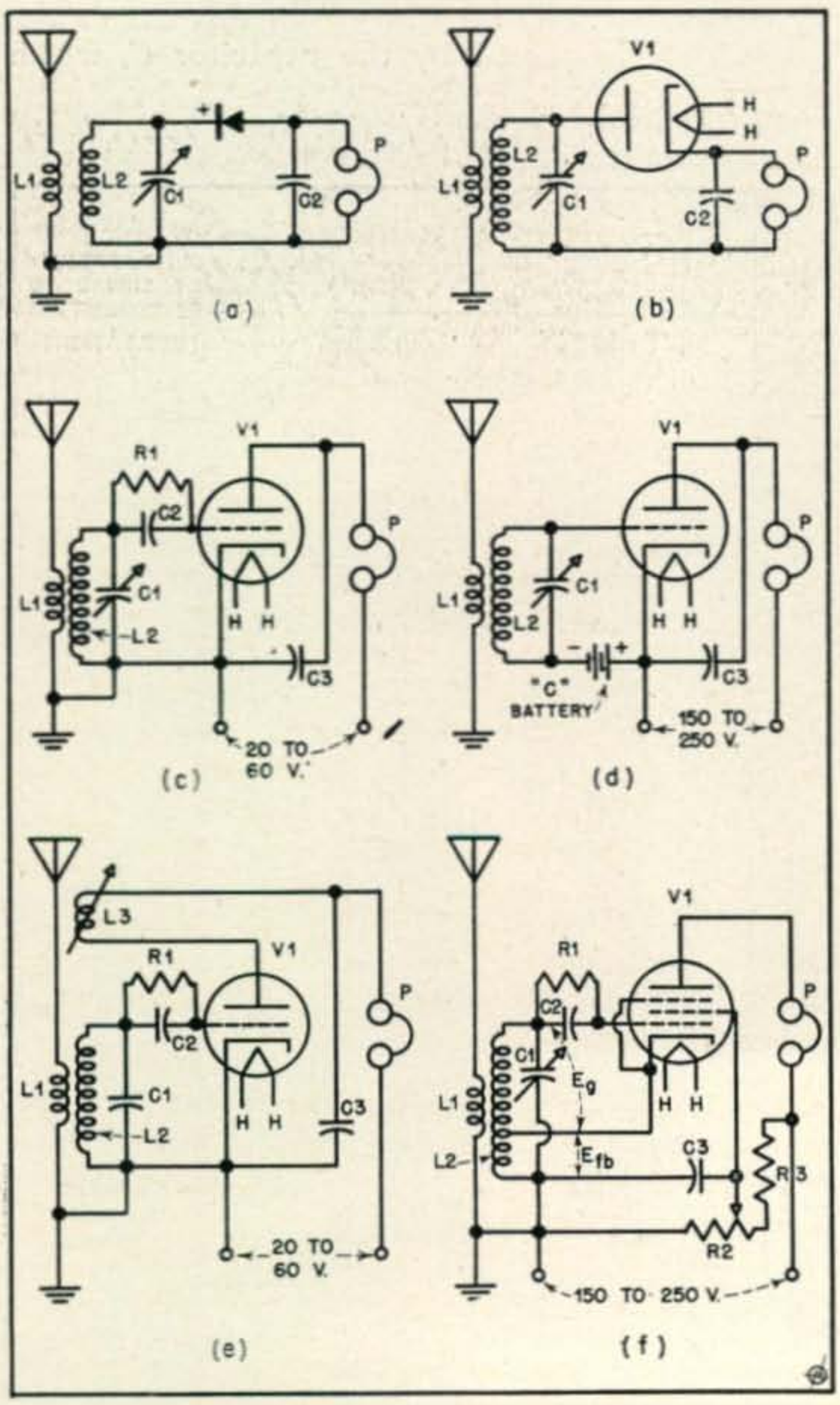


Fig. 2. Basic circuits for various detectors.

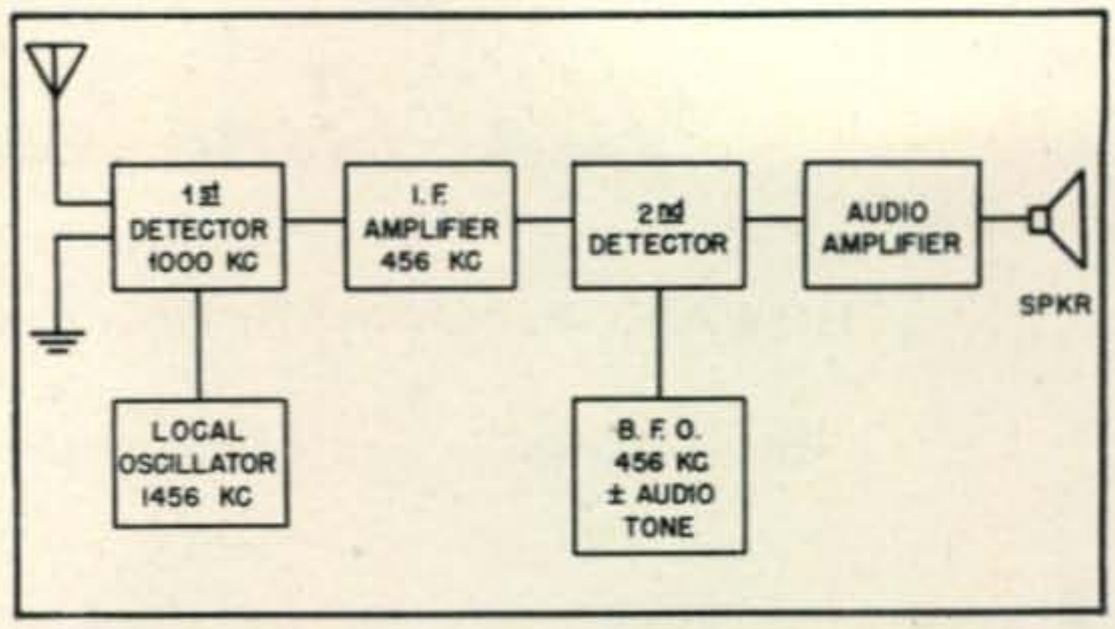


Fig. 3. Block diagram of a superheterodyne receiver.

frequency current is induced in this coil as a result of the current flowing from the antenna to ground through the primary coil, *L1*. The current induced in *L2* develops a voltage across the coil and capacitor and maximizes at the resonant frequency of *L2 C1*. This voltage is applied to the grid of the tube through the capacitor *C2*. When the positive half-cycle arrives at the grid of the tube (the reactance of *C2* is negligible at radio frequencies) some current will flow from the grid to the cathode; that is to say, electrons will be attracted to the grid and will collect upon it. When the negative half-cycle comes along, however, no return current flow from the grid will occur. After a few successive cycles the grid will have collected so many electrons that it will have an effective negative bias. With the tube operating under such conditions of bias, the plate current will increase more during positive half-cycles than it decreases during negative half-cycles; the result is that rectification has been accomplished and the plate current of the tube would appear somewhat like in *Fig. 1d*.

With the tube operating as described above, some method must be provided for the electrons captured by the grid to leak off; if this were not done the bias on the grid would become so great that no plate current would flow. The resistor, *R1*, is called the "grid leak," and its function is to eliminate the difficulty just mentioned by permitting some of the electrons to flow from the grid back to the cathode. In this way the grid is not allowed to become excessively negative.

In some respects the grid-leak detector may be considered to be a combination of diode detection with a triode amplifier, since the rectification occurring in the grid circuit causes the grid to vary in voltage at the audio frequency, which in turn causes a corresponding plate-current variation.

Fig. 2d shows a circuit for "plate detection." It will be noted that in many respects this circuit is similar to that of the grid-leak detector, except that the grid leak and grid condenser are absent and a "C" battery has been added. The bias placed on the grid of the tube is such as to cause the tube to draw very little current when the applied voltage from the coil (the input signal voltage) is zero. Under this condition of bias the plate will draw current only during the time signal voltage is being applied, and the plate current thus drawn will consist of half-cycles only; the result will, again, be similar to that shown in *Fig. 1d*. In this case the

rectification has taken place in the plate circuit of the tube, and it is from this fact that the terms "plate rectification" or "plate detection" have been derived.

Any of the detectors described so far could be employed for reception, but in short-wave receivers, where maximum sensitivity is desired, use is often made of "regeneration" to increase sensitivity and selectivity. The principle is illustrated in *Fig. 2e.* This circuit is nearly the same as *Fig. 2c* except that "feedback" coil, $L3$, coupled inductively to $L2$, has been added. The signal applied to the antenna terminals is amplified by the tube and is then fed back into the grid circuit through the inductive feedback coupling. If the energy fed back into the grid is of the proper phase—that is to say, if this energy is going through its positive cycle at the same time the incoming signal is going through its positive cycle—then the "feedback" reinforces the incoming signal energy and the output from the detector is increased. In fact, if the coupling between the feedback coil and the grid coil and if the gain of the tube is sufficient, enough voltage may be induced in the grid circuit to cause the detector to "oscillate." When the detector is oscillating it is actually generating radio frequency power, the exact frequency has been determined by the constants in the circuit. The greatest sensitivity and optimum results can be obtained from the regenerative type of detector when it is on the verge of oscillation.

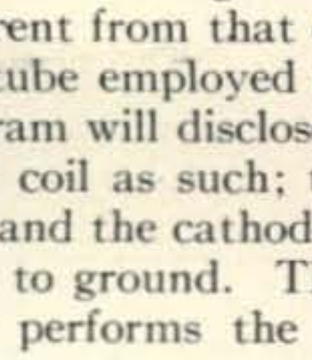
Control over the amount of feedback is usually included; in the circuit of *Fig. 2e* this is effected by varying the amount of induced feedback voltage by varying the coupling between the grid coil and the plate or "tickler" coil, $L3$.

Fig. 2f shows a circuit similar to that which will be used in the receiver suggested for construction. This detector is regenerative, but the necessary feedback voltage is obtained in a manner slightly different from that discussed above. In this circuit the tube employed is a pentode. Reference to the diagram will disclose that there is no separate feedback coil as such; there is, however, a tap on the coil, and the cathode is connected to this tap rather than to ground. The screen grid and plate of this tube performs the function that the plate alone

TABLE I

COIL TABLE

BAND	DIMENSIONS	TAP (Gnd. End)
BROAD CAST	115 TURNS NO.32 ENAM. 1" LONG - 1" DIA.	10 T.
80 M. & 40 M.	18 TURNS NO.22 ENAM. $1\frac{1}{2}$" LONG - $1\frac{1}{2}$" DIA.	2 T.
20 M.	7 TURNS NO.22 ENAM. 1" LONG - $1\frac{1}{2}$" DIA.	1 T.



COIL CONNECTIONS

(JUMPER PINS 1 & 2 FOR BROADCAST COIL)

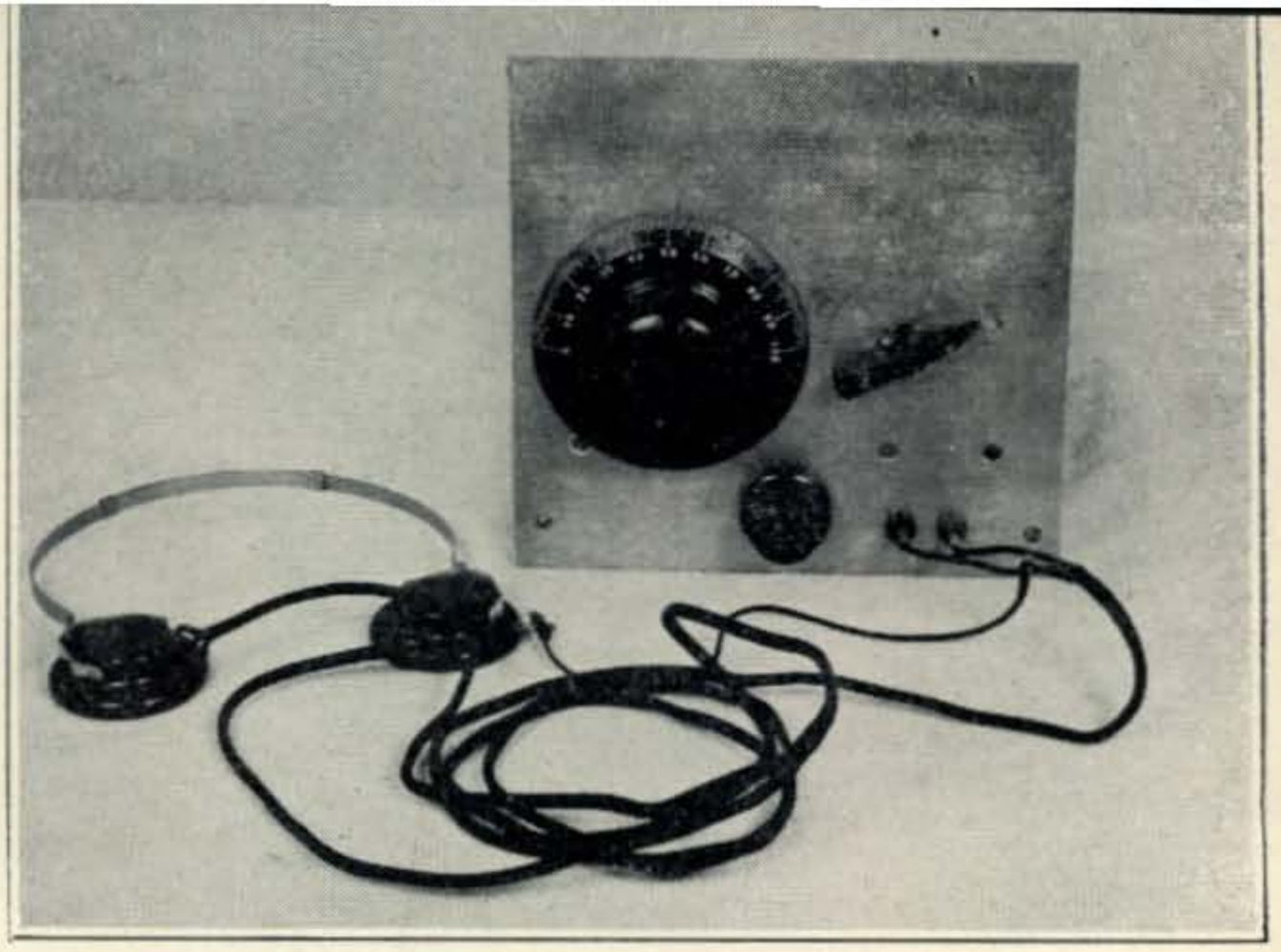


Fig. 4. The receiver to be built. The three controls are for the bandset capacitor, tuning capacitor and regeneration control.

of the triode did in the cases previously considered, and the lower section of the coil induces feedback voltage in the upper section to produce regeneration. The a-c (r-f) screen grid and plate current must flow through the lower section of the coil and in so doing induce the feedback energy into the grid and cathode circuits. The screen-grid voltage is varied by means of $R2$ for the purpose of controlling the amount of regeneration. This type of circuit is known as "electron coupled" because the only way in which the plate circuit is affected is through the flow of electrons, since the plate of the tube is shielded by the screen grid which is at ground r-f potential.

In tuning a regenerative detector when it is oscillating it will be found that whistles are heard as a station is approached. The phenomenon observed is that of "beats" which are produced whenever two signal frequencies are detected simultaneously. The frequency of the audible tone heard in the case being considered is equal to the difference of the two; in other words, it is the difference between the frequency of the station being tuned in and the frequency generated by the oscillating detector. As an illustration, let us suppose that we are tuning to a station operating at a frequency of 1,000 kc and that the detector is oscillating on a frequency of 1,001 kc; the tone heard will be 1 kc, or 1,000 cycles per second. If the detector is then tuned down toward 1000 kc in frequency, the tone will gradually diminish in pitch and will eventually become zero; further tuning in the same direction (to a frequency lower than 1000 kc) will cause the pitch to increase until it again becomes inaudible. It is through the use of the effect of beats that it is possible to receive code signals.

The Principle of the Superheterodyne Receiver

Nearly all modern radio receivers operate on what is known as the superheterodyne principle. Although this type of receiver is considerably more complex than the one suggested for construction, it would be well to become familiar with the way in which it functions.

The superheterodyne, or "superhet," is illustrated in block form in *Fig. 3.* As was seen in connection with an oscillating detector, the combination of two

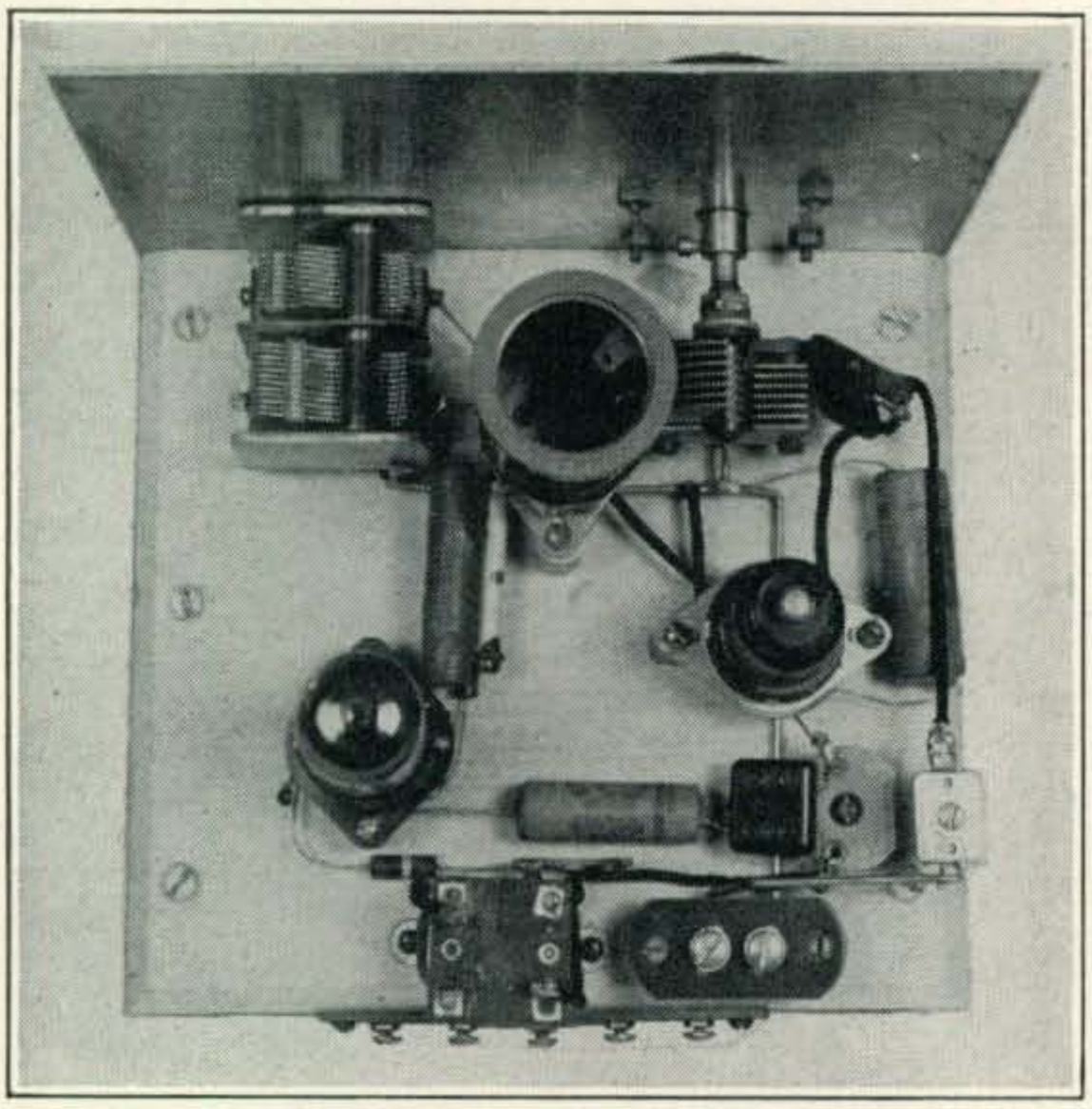


Fig. 5. The receiver from above. Placement of components should be duplicated as shown.

frequencies will produce beat frequencies, or "heterodynes," that are equal to the sum and difference of the two beating frequencies. In the superheterodyne the signal from the antenna is combined in the first detector or "mixer" with a signal generated by a local oscillator in the receiver, with the result that beat frequencies are produced. It is the usual practice to amplify the selected difference frequency by means of a specially designed "intermediate-frequency" (i-f) amplifier. Since the amplified beat possesses the same modulation characteristics as did the incoming signal, it must be demodulated or detected by the second detector before the audio can be obtained. The second detector may follow any of the forms previously discussed, through the diode type is conventional.

To receive code on a superhet it is customary to employ a "beat frequency oscillator" (b.f.o.) in conjunction with the second detector. This oscillator is tuned to a frequency that is different from the i.f. by an amount equal to the audible pitch desired.

In the block diagram, a numerical illustration is given of the various frequencies involved in a typical arrangement. The received signal is 1000 kc and is "mixed" in the first detector with the signal from the 456-kc local oscillator. The resulting beats are 456 kc and 2456 kc. The 456-kc beat is selected and amplified in the i-f system and applied to the second detector. In order to receive c.w. the b.f.o. is tuned to 456 kc plus or minus the audible pitch desired; if the pitch desired is 500 cycles per second, then the b.f.o. is tuned to either 456.5 or 455.5 kc.

The superhet has considerable advantage over tuned radio frequency (t-r-f) receivers. With the superhet, high selectivity can be conveniently obtained. Moreover, this selectivity does not depend upon the frequency of the signal being received, since the actual frequency discrimination occurs in the intermediate frequency amplifiers and these stages are fixed-tuned.

Construction of the Beginner's Receiver

The receiver suggested for construction is a regenerative pentode detector of the type previously described and one stage of audio amplification employing a triode. The output from the receiver may be used to operate headphones or may be fed into the audio amplifier described in an earlier article* to furnish loudspeaker operation. As shown in *Figs. 4* and *5* the receiver is built on a wooden chassis measuring 7" x 8". If preferred, it may be constructed on a metal chassis of approximately the same size. The wooden chassis has two cleats across the bottom to raise the base to a convenient level for the dials. The 8" x 8" front panel is fabricated from 0.064" thick 24S-O aluminum sheet. The dial for tuning the amateur bands is a National Type A, though any other kind will serve the purpose equally well provided that it has vernier action. The general arrangement of the parts is shown in

(*Continued on page 83*)

*"*The Amateur Newcomer*," CQ, Oct., 1947, p. 25.

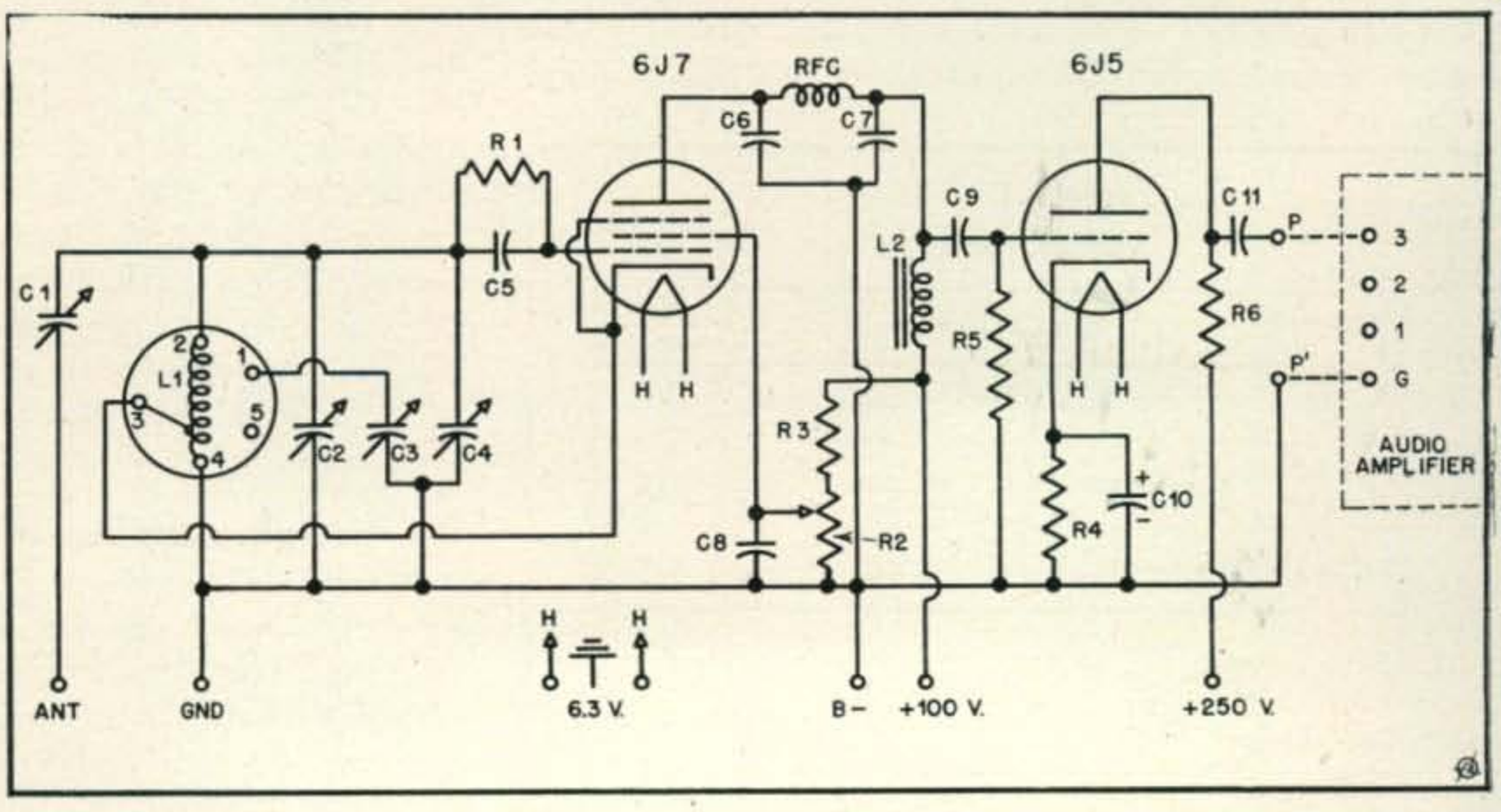


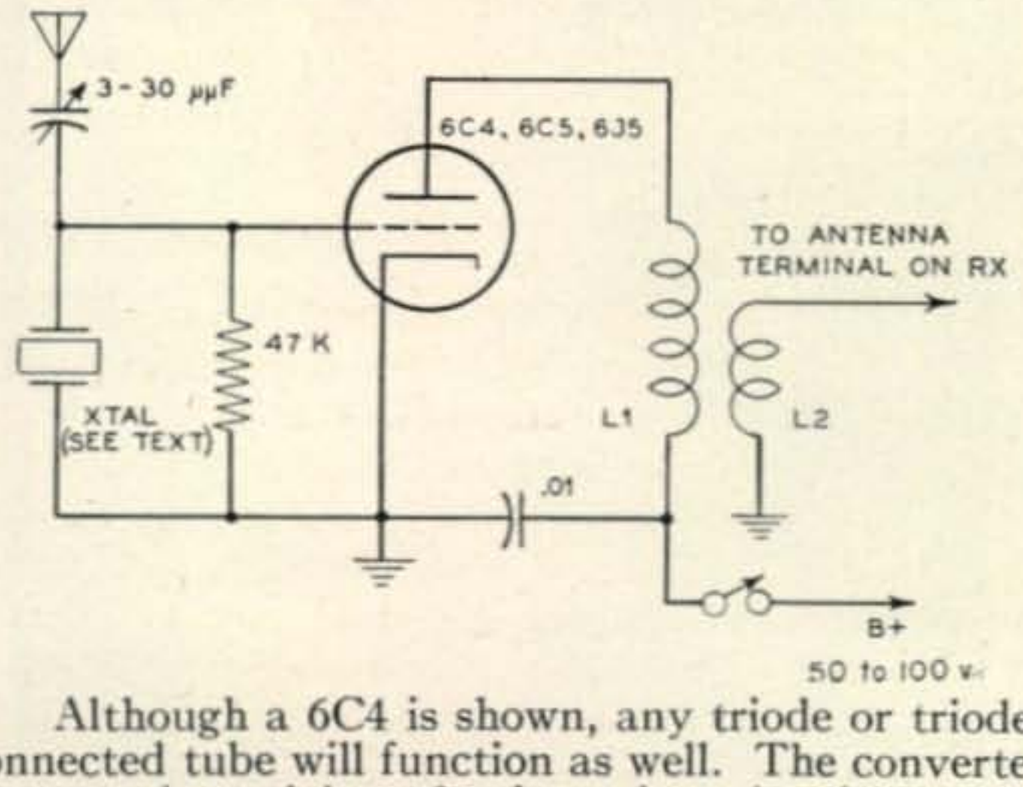
Fig. 6. Wiring diagram of short-wave receiver.
C1—3/30-μμf compression mica trimmer.
C2—100-μμf midget variable.
C3—170-μμf (ocs.) section of two-gang (cut plate type) variable capacitor.
C4—365-μμf r-f section of two-gang (cut plate type) variable capacitor.
C5—100-μμf mica.
C6, C7—250-μμf mica.
C8, C9, C11 — 0.05-μf 400-volt paper.
C10—10-μf 25 - volt electrolytic.
R1—33 megohms, ½ watt.
R2—10,000-ohm potentiometer (linear taper)
R3—47,000 ohms, ½ watt.
R4—2,700 ohms, ½ watt.
R5, R6—100,000 ohms, ½ watt.
RFC—5-mh radio frequency choke.
L1—See coil table.
L2—30-henry 10-ma audio choke.

Inside the SHACK AND WORKSHOP

Conducted by A. DAVID MIDDELTON, W1CA*

Broadcast-Band Reception on Short-Wave Receivers

Most of us who own a surplus military receiver have wished that it could be tuned through the broadcast band. Many of these war surplus models, and even some of the amateur-band receivers, lack broadcast-band coverage but any of these receivers will tune that band if the converter, shown in the circuit diagram, is added to the receiver.



Although a 6C4 is shown, any triode or triode-connected tube will function as well. The converter operates by mixing the incoming signals with a crystal-oscillator frequency, thus producing a high frequency resultant in the plate circuit which is fed into the antenna terminals of the receiver. Instead of using a fixed i-f system, and tuning with the local oscillator and mixer grid circuits as is normally done, this converter frequency is fixed and the intermediate frequency is shifted. It was found that the broadcast signals, being relatively strong, required no tuned circuits to produce the desired results, thus offering an arrangement having no adjustable controls. All tuning is accomplished with the receiver's own tuning controls.

The system operates as follows: Suppose the desired broadcast-band station is operating on 1000 kc, and that a 3500 kc crystal is available. The receiver should then be tuned to 1000 plus 3500 or 4500 *kc;* or, it could be tuned to 3500 minus 1000 or 2500 *kc;* or, using the *second harmonic* of the crystal the receiver could be tuned to 2000 plus 3500 or 5500 *kc.*

Reliable broadcast-band reception is possible up into the 20-meter band with 80-meter crystals in the converter.

Wide variations from the specified values can be introduced with little noticeable difference, as long as the converter is maintained in oscillation.

The coil shown as *L*1 and *L*2 may be an r-f choke with a secondary of about 20 turns between two of the pies, or an old i-f transformer can be used with the tuning condensers removed. Almost any type of coil seemed to work as long as the crystal will oscillate.

If the secondary, *L*2, has high inductance, the converter may be permanently connected to the receiver antenna terminals with no ill effect when receiving on the normal receiver range, as the reactance will be high enough to present an open circuit. The only control necessary on the converter would then be the "On-Off" switch in the "B" plus lead to the converter.

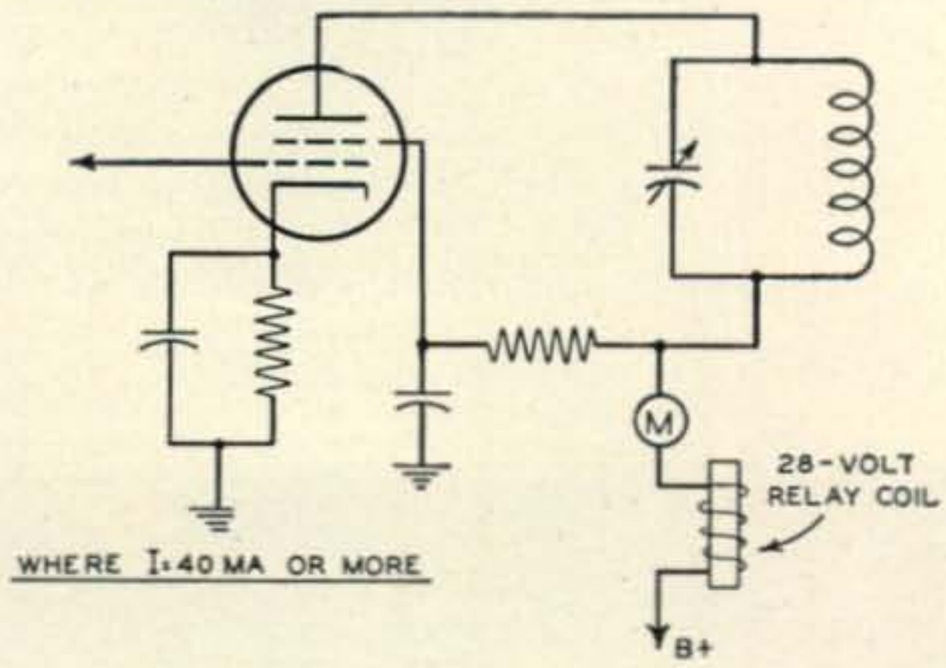
J. Manuel Tellez Benoit, XE1JF

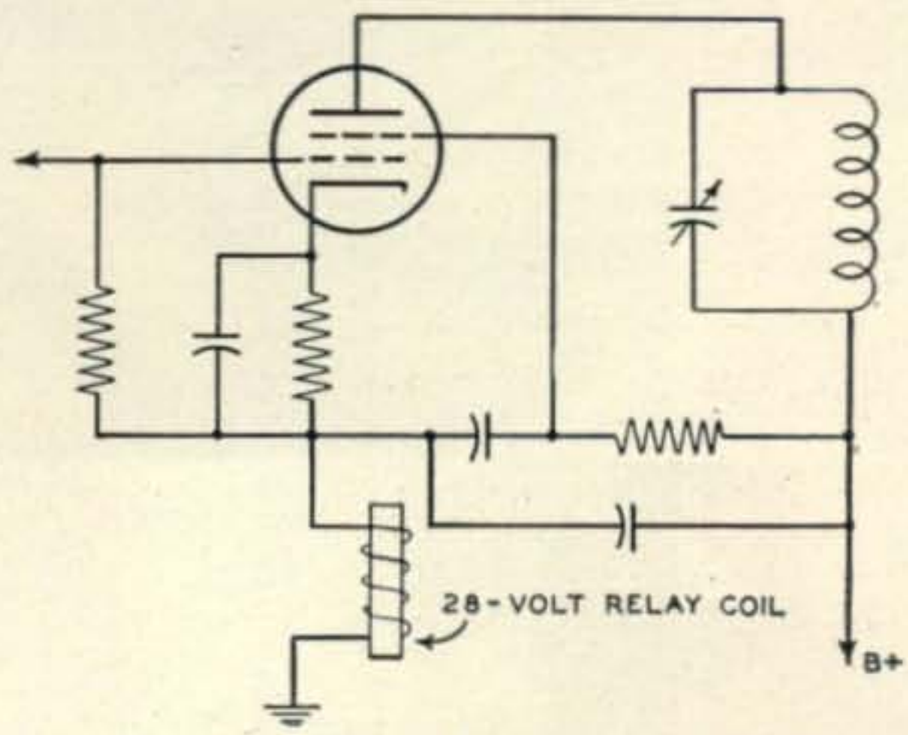
Putting Surplus 28-volt D-C Relays to Work

With an increasing number of 28-volt d-c relays appearing in junk boxes, via the surplus market route, the following offers one solution to the relay problem.

Many of the 28-volt relays will operate on a current of as low as 40 ma. So, if the need arises for an antenna relay, a standby relay or a receiver-silencing relay, merely connect a suitable 28-volt relay in series with a plate supply lead to any transmitter stage that draws at least 40 mils, as shown in the top diagram. The relay will be energized when the plate voltage is applied.

This usage is *not* recommended for circuits where more than 400 volts d.c. are present, unless special precautions are taken to prevent breakdown of the primary circuit of the relay.





The relay could also be connected in the negative side of the power supply. The voltage drop *across* the coil must be taken into consideration unless it is connected as shown in the bottom diagram.

Edw. A. Whitlock, W5LYH

**Address all contributions to S & W Department c/o CQ, 342 Madison Ave., N. Y. 17, New York.*

A Chicago Kilowatt

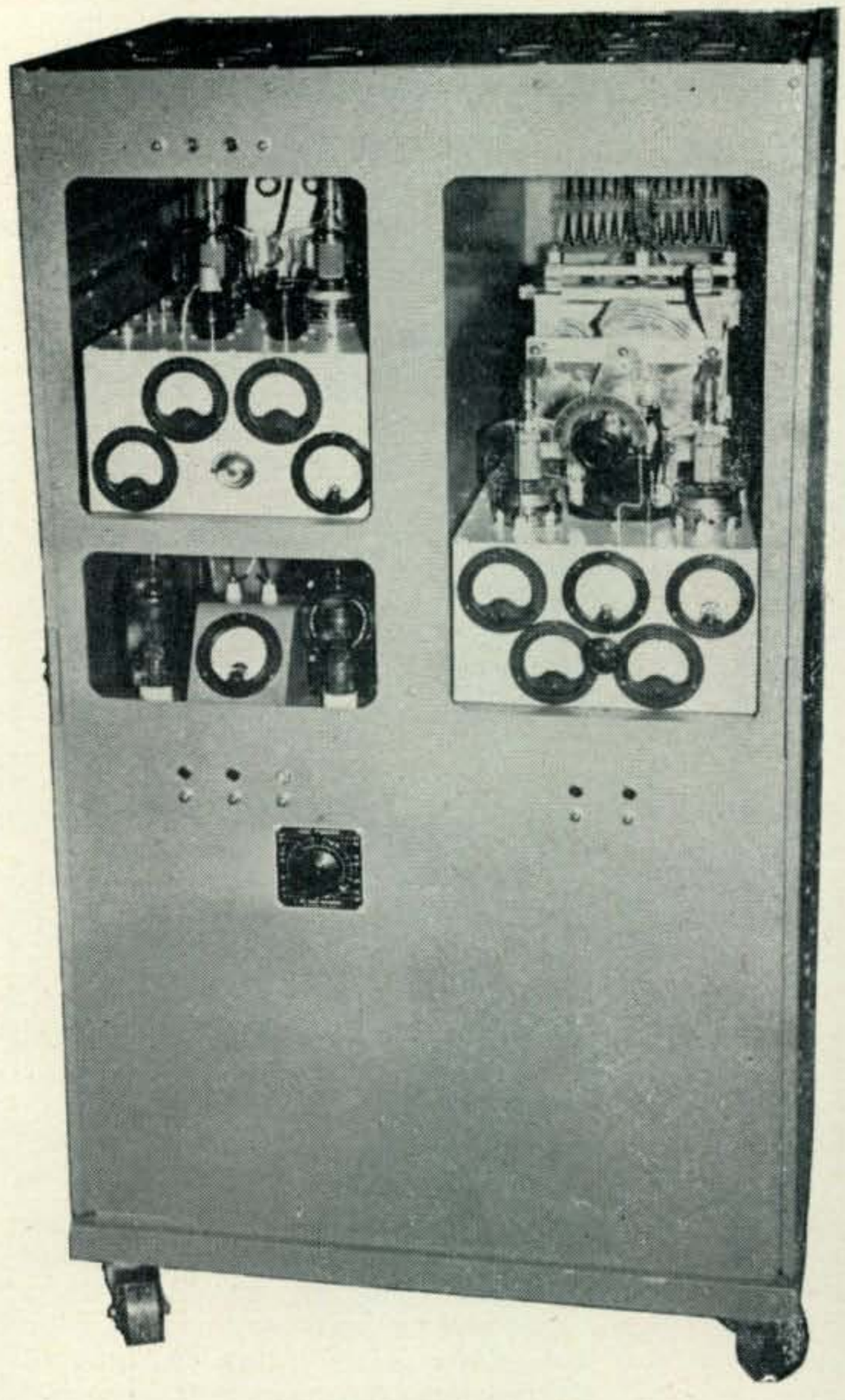
ROYAL J. HIGGINS, W9AIO*

In this complete departure fron conventional layout, the author points the way toward safe and economical high-power construction.

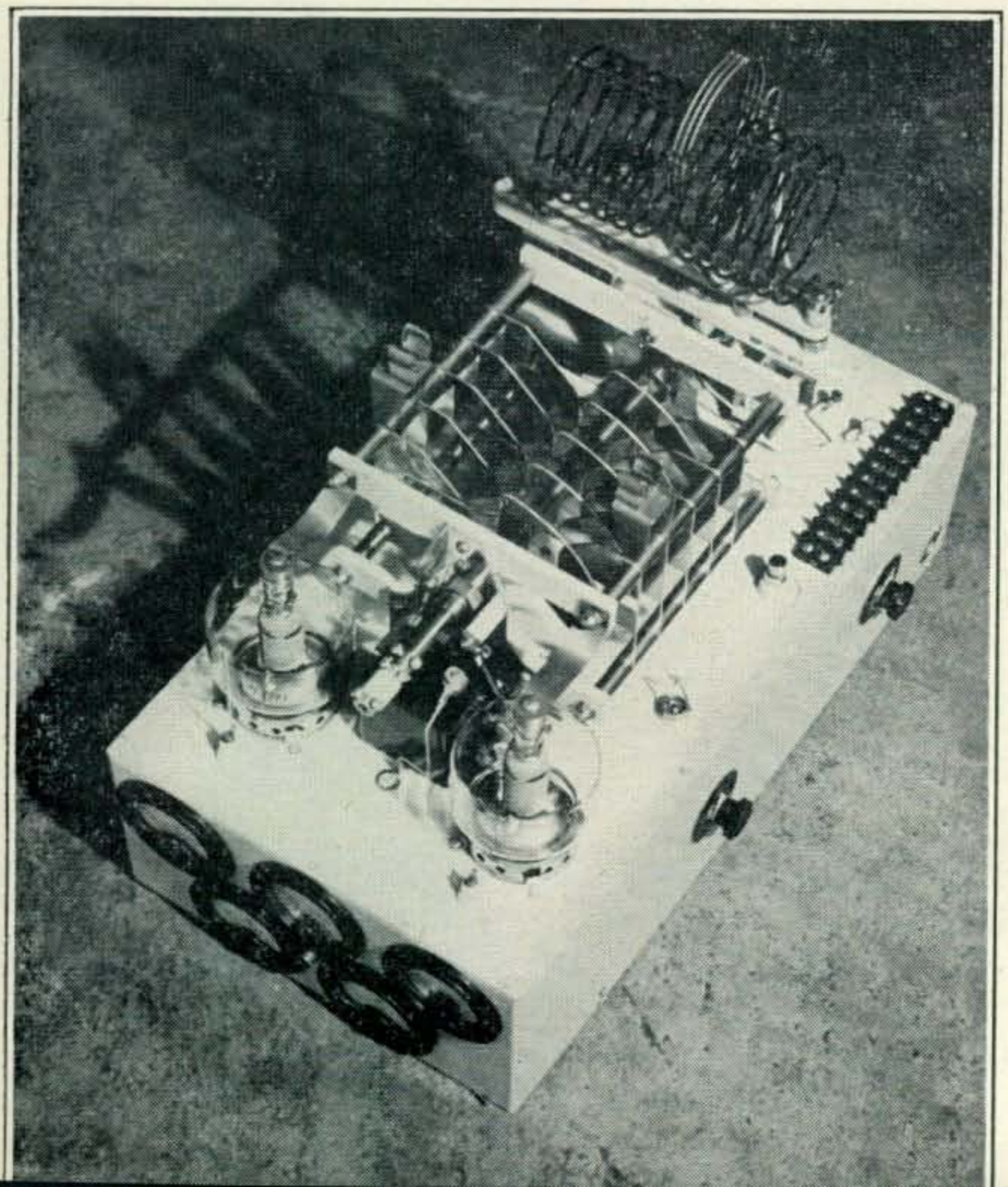
THIS IS THE STORY of a transmitter which is of interest because it was designed around the newest tubes, tuning condensers, inductors, and other components to make their appearance after the end of the war.

More than likely, the considerations that were of primary importance in the original design of the transmitter apply to nearly every amateur with a family. Four junior operators who are young enough to be more inquisitive than sensible dictated a completely enclosed and door-interlocked approach. Considering the fact that receiving and excitation equipment can also give a painful if not fatal shock, the power line is opened with a switch mounted in the bottom of the h-v power supply section. Everything on the operating table is on the load side of this switch so that when the transmitter is turned completely off at the end of a brass pounding session, every piece of equipment is dead. As a further precaution—even if the r-f final, modulator and rectifier filaments were turned off through operation of the latching type relays—the red pilot lights for those sections of the transmitter would still be on and power would be supplied to the receiving and excitation equipment.

*600 S. Michigan Ave., Chicago 5, Ill.



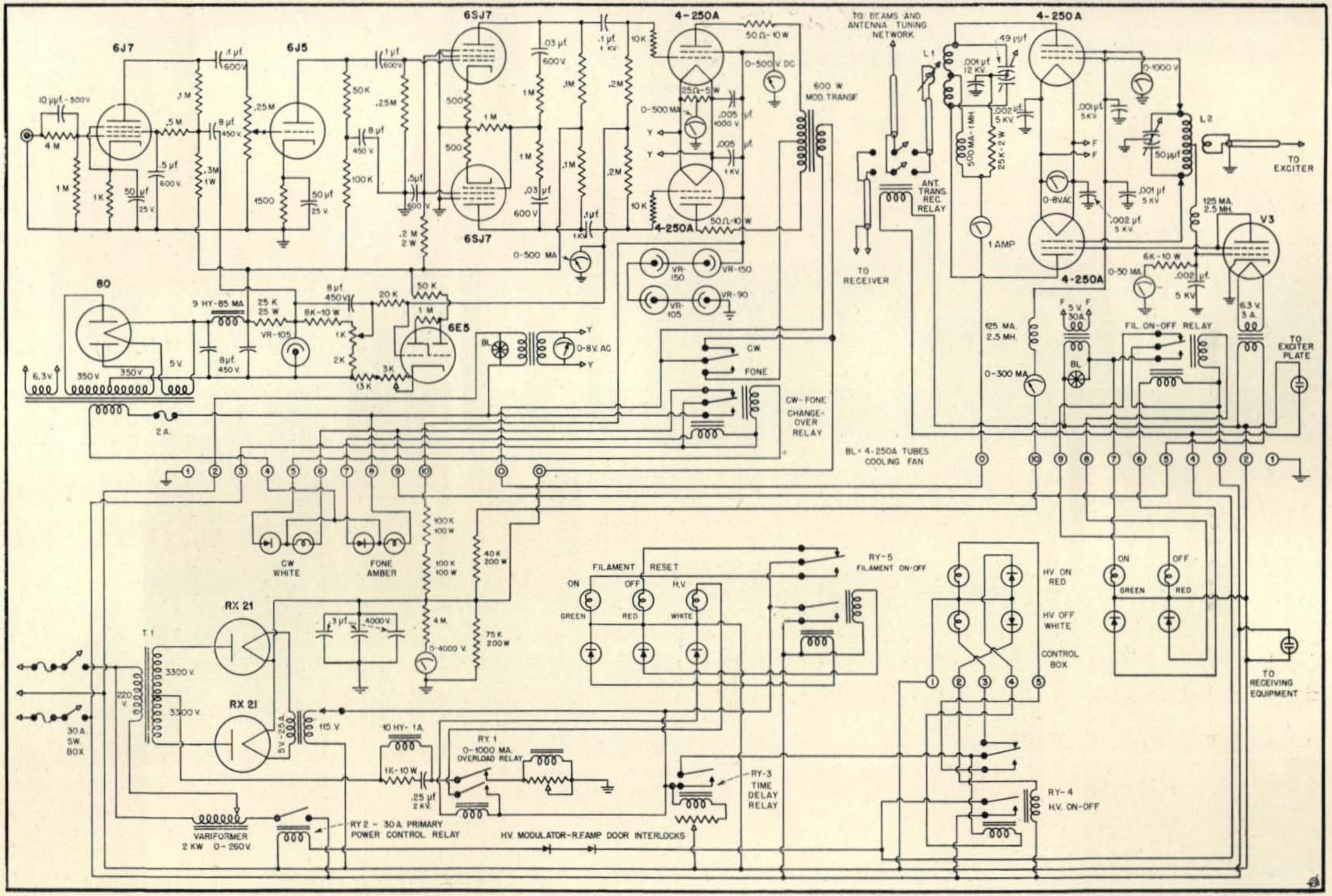
The complete transmitter. Right-hand cutout is for the r-f section. Left-hand cutouts are for the modulator and high-voltage power supply rectifiers. The cabinet is constructed from surplus equipment.



Top view of the r-f amplifier. Metering is provided for all pertinent circuits.

Before the equipment is completely disconnected from its power source, the power supply section door must be opened and the switch thrown. Subsequent closing and locking of the door pretty well remove the possibility of the youngsters getting tangled up with fatal high voltage. The sequential "Power—On" steps which have to be followed to put the equipment back in operating condition help prevent the OM from carelessly getting across 4,000 volts and working eternity on long skip.

Because of war shortages, suitable metal enclosures were not obtainable in the summer of 1946. One of the local manufacturers had bought a number of BC-435A Radar Modulator assemblies from the W.A.A. After the metal enclosures were stripped of their more valuable components, the cabinets


6J7
6J5
6SJ7
6SJ7
4-250A
4-250A
4-250A
4-250A
80
6E5
V3
RX 21
RX 21
T1
TO BEAMS AND ANTENNA TUNING NETWORK
TO RECEIVER
ANT. TRANS. REC. RELAY
L1
L2
TO EXCITER
600 W MOD. TRANSF
0-500 V DC
0-500 MA
0-8V. AC
VR-150
VR-150
VR-105
VR-90
9 HY-85 MA
25 K 25 W
VR-105
8K-10 W
20 K
50 K
1 M
2K
3K
13 K
6.3 V
350 V
350 V
5 V.
2 A.
C.W.
FONE
CW-FONE CHANGE-OVER RELAY
BL = 4-250A TUBES COOLING FAN
1 AMP
0-8VAC
0-1000 V
0-300 MA
125 MA. 2.5 MH.
6K-10 W
0-50 MA
5 V. 30A
FIL. ON-OFF RELAY
6.3 V. 3 A.
TO EXCITER PLATE
CW WHITE
FONE AMBER
100 K 100 W
100 K 100 W
40 K 200 W
75 K 200 W
4 M.
0-4000 V.
.3 µf 4000 V.
FILAMENT
RESET
ON
OFF
H.V.
GREEN
RED
WHITE
RY-5 FILAMENT ON-OFF
HV ON RED
HV OFF WHITE
CONTROL BOX
ON
OFF
GREEN
RED
TO RECEIVING EQUIPMENT
30 A. SW. BOX
220 V.
3300 V.
3300 V.
5V-25A
115 V
10 HY- 1A.
1K-10 W
.25 µf 2 KV.
RY. 1 0-1000 MA. OVERLOAD RELAY
RY-3 TIME DELAY RELAY
RY-4 H.V. ON-OFF
VARIFORMER 2 KW 0-260V.
RY 2 - 30 A. PRIMARY POWER CONTROL RELAY
H.V. MODULATOR-R.F.AMP DOOR INTERLOCKS

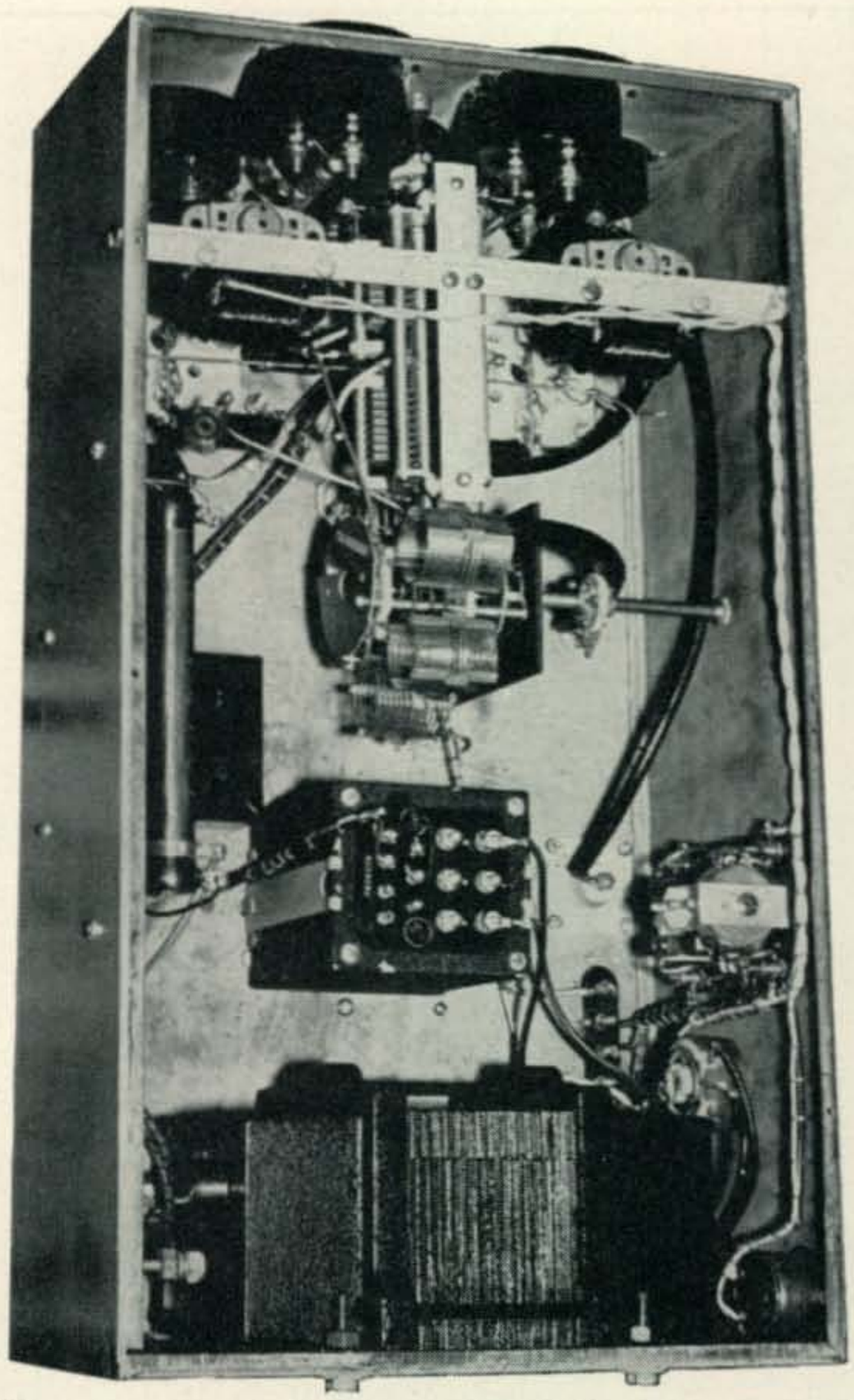
were available at less than the price of scrap steel. The lids (later to become the doors) were kept, but all of the other metal was removed from the frames and given to the local junk man. The two frames were then stood on end and bolted together through what had been their bottoms. The lids became doors and opened at the sides. Three pieces of cold rolled steel sheet cut to size made the top, front and back of the enclosure. The large openings were then cut in the front panel (and I might say laboriously, with a coping saw). Plastic-glass windows were bolted in place and the enclosure was completed.

Opening the doors works the interlock switches which in turn open the holding coil circuit on the primary power relay *RY2*. When either door is only partially opened, the primary circuit is opened and high voltage removed. Sure—it takes a little more time in making adjustments on the final to close the door before you can get high voltage, but you are sure to be there to see the final operate after the adjustmant has been made. All actual tuning condenser adjustments are made with controls which are completely isolated and project through the plastic-glass windows. It is comforting to know that kids, as well as grown-ups, can touch any part of the enclosure and not be shocked.

The R-F Final

After concluding that 1,000 watts input to the final ought to give a pretty good signal, the next step was to decide on the tube type to use. There were surplus and more surplus tubes from which to choose. Most of them were triodes, however, and the new Eimac 4-125A and 4-250A tetrodes were further investigated. These tubes offered not only the advantage of stable high-gain performance, but elimination of fussy neutralizing adjustments. An 807 running at only 20 watts output adequately excites the push-pull 4-250As that were finally chosen as the final amplifier tubes. A pair of them show no color at 1,000 watts input on c.w. and only a slight tinge when 100% amplitude modulated on phone. When running 20 and 75-meter NBFM tests since the first of the year, the stone cold appearance of the plates at 1-kw input makes it difficult to realize you're pouring that much power on the tubes.

The writer frequently has been asked what trouble he had in getting the final working. It seems that a lot of superstitions have grown up around the use



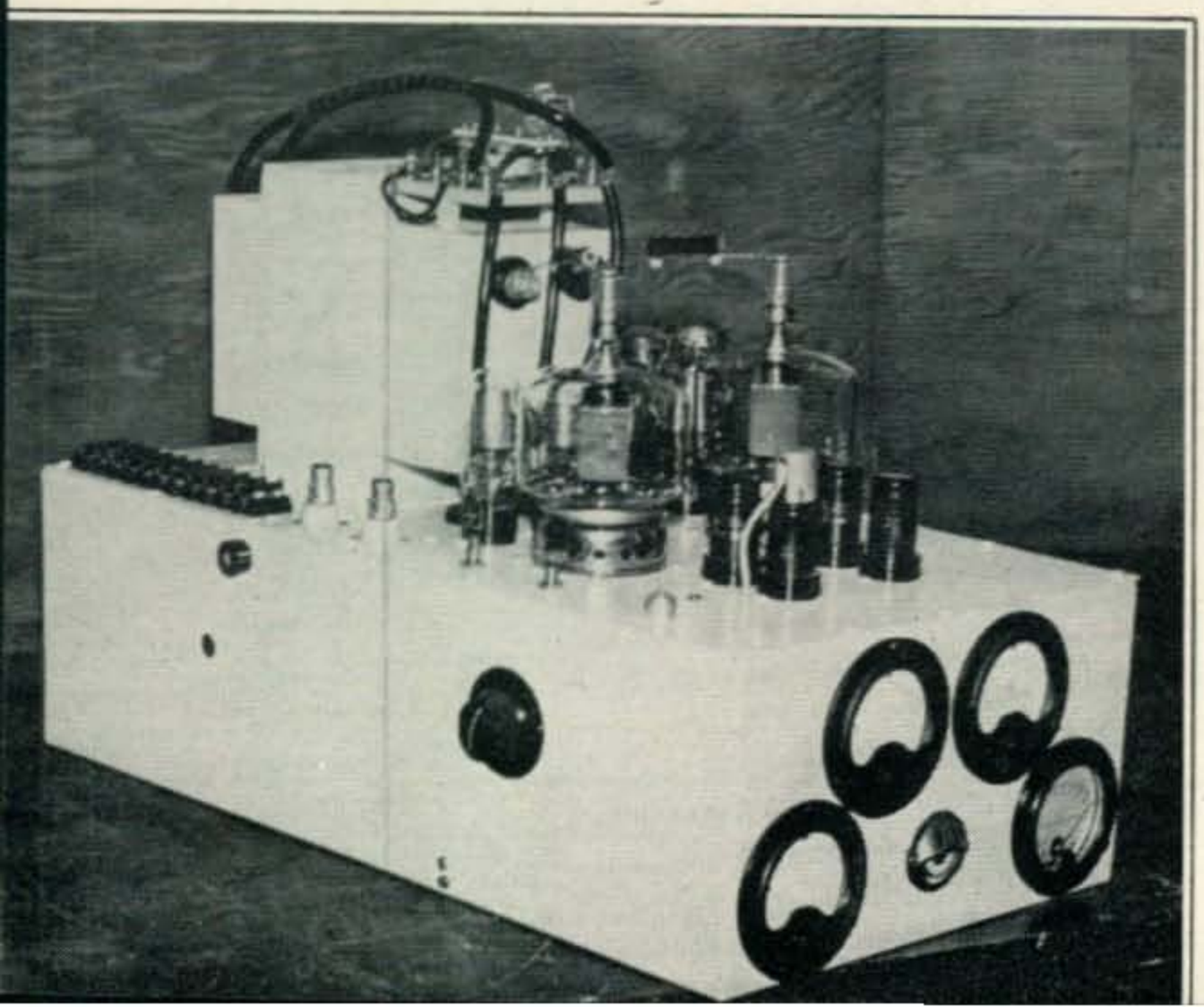
Bottom view of the r-f amplifier. Note the Barber-Colman blowers mounted directly below the 4-250A sockets on the aluminum crossbar.

of tetrodes. About the only thing you should remember is that you can't pull your triodes out of their sockets and replace them with tetrodes. Keep the tetrodes as close together as possible so that grid leads will be short and direct. Most important is to adequately isolate the high-gain grid circuit so that the generated r.f. in the plate circuit can't get back into the grid circuit.

If the recommendations contained in the data sheet accompanying all tetrodes (all tubes as a matter of fact—*Ed.*) are followed—before the layout of the final amplifier is frozen—no difficulties should be encountered. Remember the comments, like running all grounds to a common centrally located point, are made for a reason.

Operating Characteristics

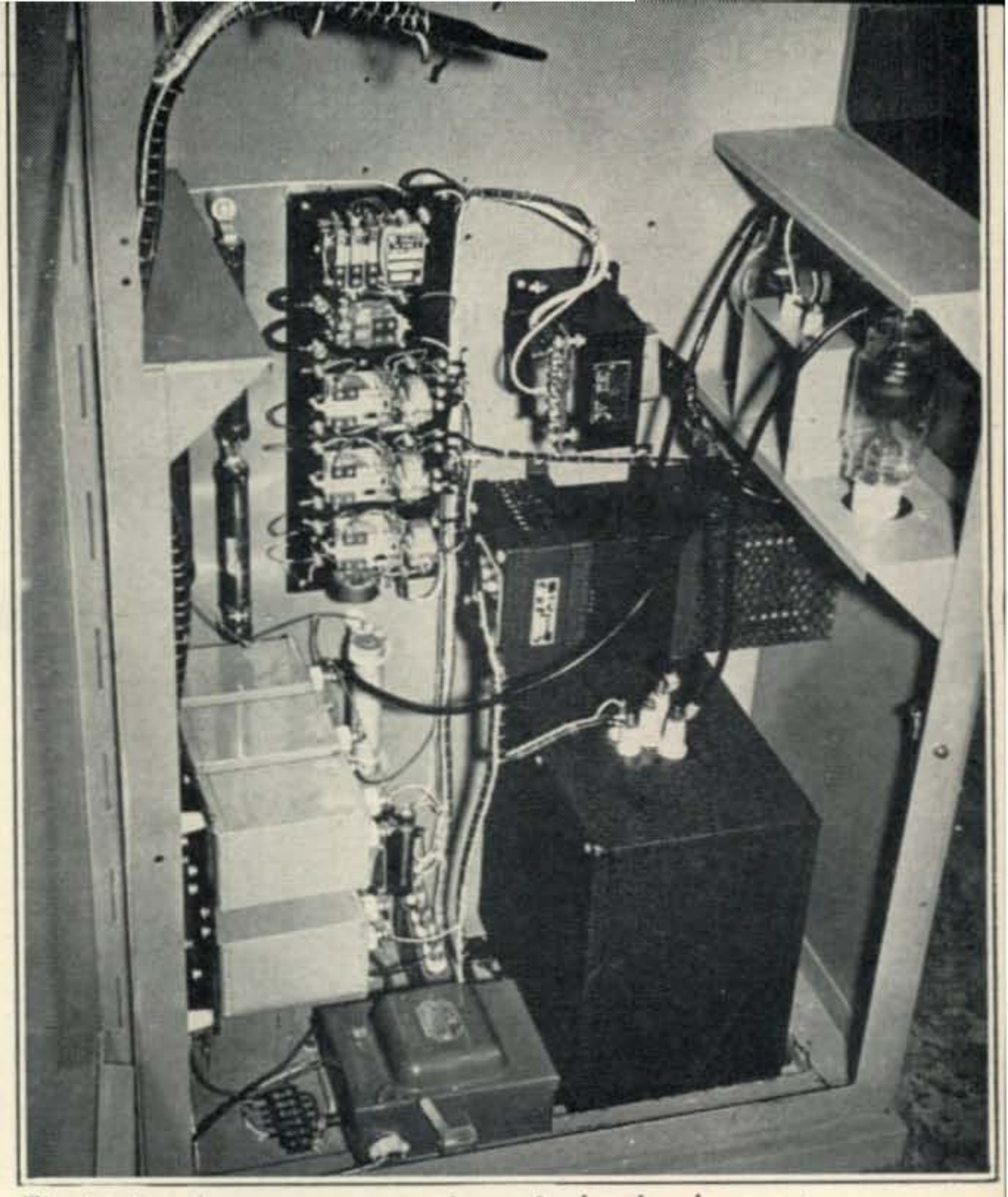
The final amplifier was put in operation and there was not a single "bug" to be eliminated. The accompanying pictures will do a better job of describing it than words. The use of tetrodes brings up only one point that should be considered depending on c.w. or phone operation. If you operate phone continuously, the screen voltage of 500, current of



The complete modulator and speech amplifier are mounted on one chassis which incorporates full metering of all circuits.

approximately 100 ma, can be obtained through a dropping resistor from your high-voltage plate supply. Control grid bias also can be obtained automatically through the use of a dropping resistor in the grid circuit. Normal control grid current should not exceed 20 ma regardless of the band used. Completely satisfactory operation can be obtained through a control grid current range of 10 to 20 ma at approximately 150 volts bias. But to get back to the screen grid. Some of the boys prefer to use a pair of 6Y6s in a screen triggering circuit which will keep the screen dissipation within limits without excitation. The fact that the tubes dissipate power key-up made me prefer the use of the 807 plate supply as a source of 500-volt power for the 4-250A screens. Considering the fact that the supply was available anyway, use was made of it. Control grid bias is also of a fixed and determined amount through the use of a 5Z3 low-voltage well-regulated supply to give 150 volts bias. A 5,000-ohm 15-watt variable in series allows additional but automatic bias under plate modulated conditions. The control grid bias supply is mounted on the chassis to the rear and left of the tuning condenser.

A question will undoubtedly be raised as to why the single piece of wire is mounted on a stand-off insulator in front of the left-hand 4-250A tube. You will notice that provision has been made (and this was done after the final had been in service for six months) to place a similar piece of wire opposite the right-hand tube. This step was the result of noticing a fraction of a mill variation in control grid current when checking the stability of the final by moving the plate tuning condenser through resonance. Cross neutralization, by adding a fraction of a micro-microfarad capacity between the control grid of one tube to the plate of the other, should eliminate it although the final worked perfectly, regardless. With two pieces of wire 3-1/2" long opposite each of the tubes, the fractional mill variation still showed. Removing one of the "condensers" completely removed and stabilized the fractional mill variation



The high-voltage power supply and relay bank mounts directly on the cabinet itself. This eliminates metal work and does not prevent easy access to all components for servicing.

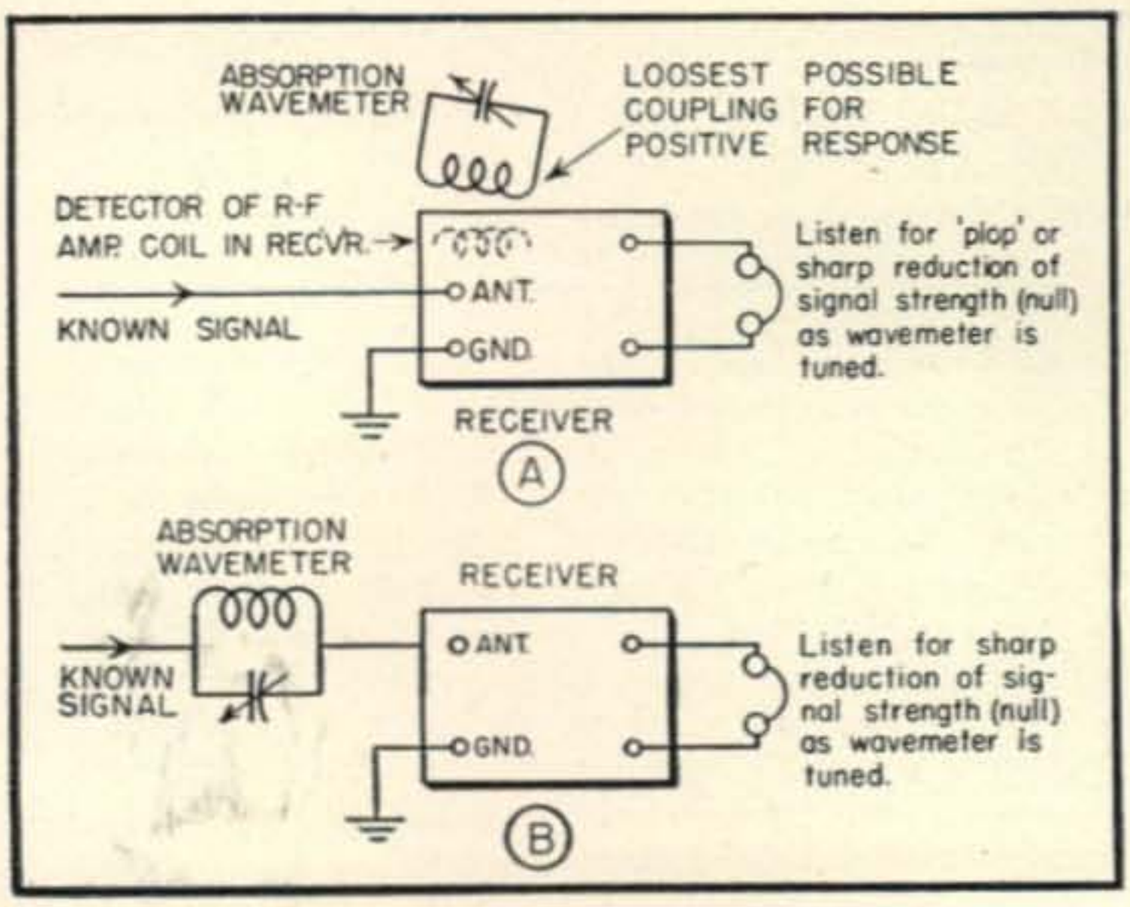
which indicated that there was some minor unbalance somewhere in the circuit through unequal coupling of some parts of the final with the enclosure. This condition never bothered me before I went looking for it, but when discovered, the small neutralizing condenser, which never has to be touched, eliminated the reading.

It might be mentioned that the most important, or informative, meter in the 4-250A final is the

(*Continued on page 60*)

Miniature Absorption Wavemeter

RUFUS P. TURNER, W1AY*



THE SIMPLE ABSORPTION WAVEMETER is standard equipment for radio frequency checking. The development of precise frequency measuring gear has never displaced it entirely. The wavemeter is a necessary part of the equipment of every ham who builds transmitters. Although it does not possess the accuracy of the heterodyne frequency meter, the absorption wavemeter has no substitute in certain checking operations at ordinary radio fre-

**P.O. Box 345, New Bedford, Mass.*

Two of the many applications of the simple absorption wavemeter.

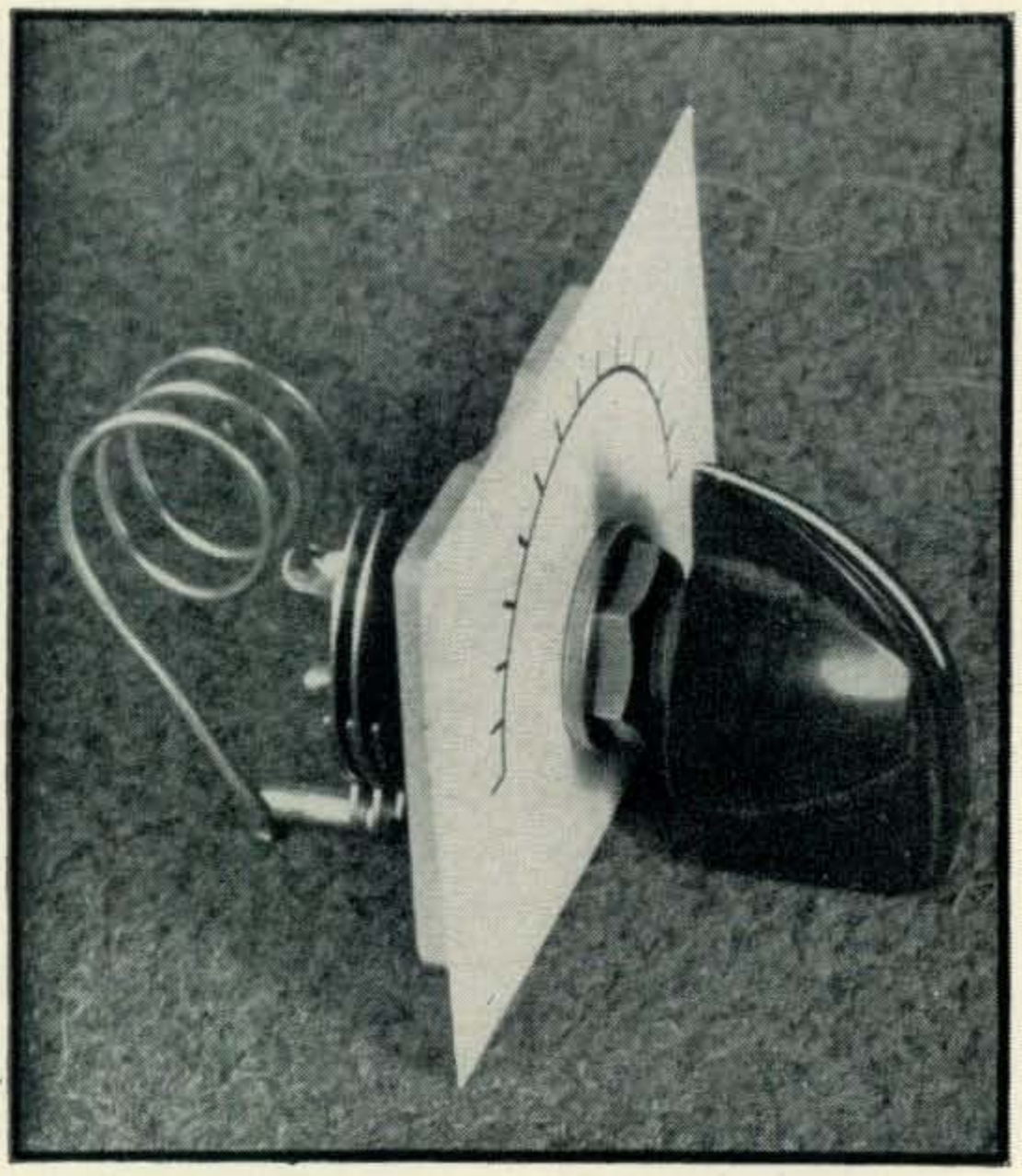
WAVEMETER TABLE

Tuning Capacitor	Maximum Capacitance	Frequency Range	Coil Data
Nat'l UM100	100 $\mu\mu$f	3500-14,500 kc	67 turns No. 26 enamelled wire. ½ inch diameter. 1 inch long.
Nat'l UM50	50 $\mu\mu$f	14-42.5 mc	19 turns No. 22 enameled wire. ½ inch diameter. ½ inch long.
Nat'l UM15	15 $\mu\mu$f	41-100 mc	11 turns No. 20 enameled wire. ½ inch diameter. ½ inch long.
Nat'l UM15	15 $\mu\mu$f	95-270 mc	4½ turns No. 20 enameled wire. ½ inch diameter. ½ inch long.

quencies. Such checks include identification of the harmonic at which a frequency multiplier stage operates in a transmitter, and determining the "order" of the operating frequency of a self-excited oscillator.

Miniature wavemeters may be constructed and calibrated easily by the radio amateur. The accompanying table gives specifications for coils which may be combined with small trimmer type variable air capacitors to make a set of useful wavemeters.

The National UM series of tuning capacitors is recommended, since these components provide low minimum capacitances, very small physical size, and have large flat ceramic bases. Variable air capacitors of other manufacture, having the same electrical and mechanical specifications, may be employed. Two type UM15, one UM50, and one UM100, with the corresponding coils (found in the table) provide four wavemeters which together will cover the frequency range 3.5 to 270 megacycles.



The simplicity of the absorption wavemeter belies its usefulness around the shack.

Each coil is wound on a plastic form which in turn may be mounted on the ceramic base of the tuning capacitor. The coil is connected by the shortest possible leads to the rotor and stator soldering lugs of the capacitor. A small panel, made of stiff cardboard or thin bakelite or fiber, may be attached to the front of the ceramic capacitor base, and the calibration scale may be drawn on this panel. A bakelite finger-grip knob may be used for tuning.

The wavemeter is calibrated best by tuning-in a signal of known frequency on a receiver, loosely coupling the wavemeter coil to the detector or r-f amplifier coil of the receiver, and adjusting the wavemeter until a sharp "plop" is heard in the headphones or loudspeaker—or until the signal is eliminated or sharply reduced in intensity. At this point, the wavemeter is set to the frequency of the test signal and the wavemeter dial scale may so be inscribed. Each wavemeter should be calibrated at as many points as possible throughout its tuning range. Another less accurate method of calibration consists of connecting the wavemeter temporarily in series with the antenna lead of the receiver (in the manner of a wavetrap), feeding a known signal into the receiver through the wavemeter, and adjusting the wavemeter for elimination or reduction of the signal.

A set of four wavemeters made according to the specifications given in the accompanying table will cover the amateur 1-, 2-, 6-, 10-, 11-, 20-, 40-, and 80-meter bands, as well as all of the territory between each band. Thus, they are invaluable for discovering such discrepancies in transmitters as accidental tripling in doubler or quadrupler stages, operation of harmonic-type (10, 11, and 20-meter) crystals on their fundamental frequencies, etc.

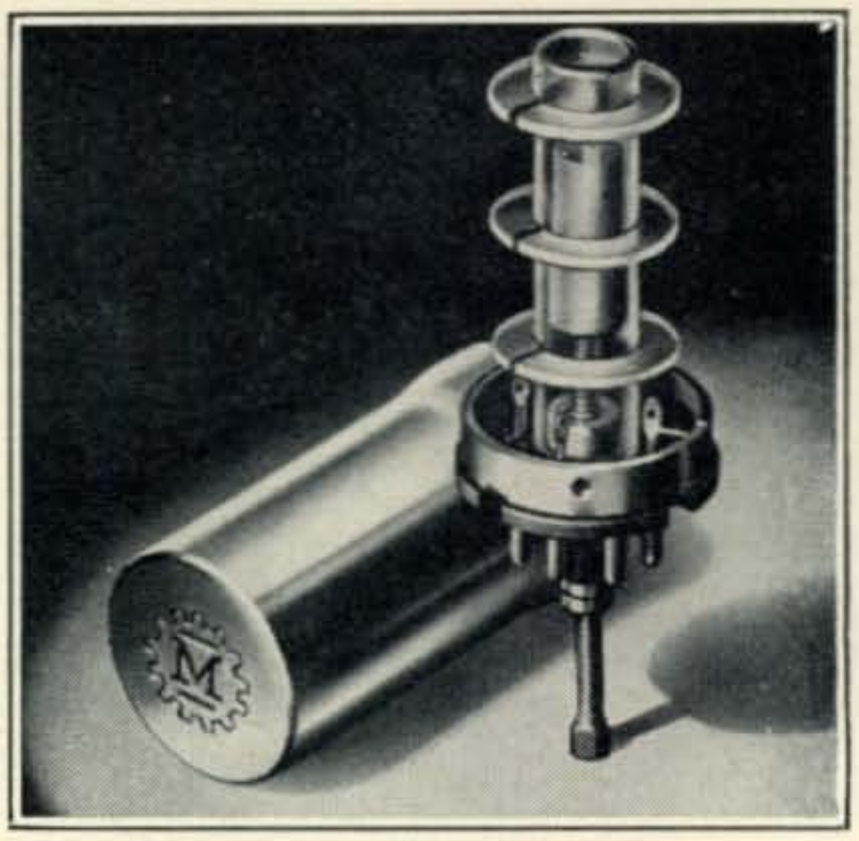
S & W is a department for the ham gadgeteers and workshop experts. All readers are invited to pass along ideas. Don't worry about literary form—just get your ideas down on paper and include rough sketches, diagrams or photos if you have them. Be sure to give your name, call and QTH. Send as many items as you choose and for each one published we will send along two crisp new dollars. Address all contributions to S & W Department, CQ, 342 Madison Ave., N. Y. 17, N. Y.

Applications of Slug-Tuned Coils

◆

Plug-in type slug tuned coil

◆



THE CHART presents in graphical form laboratory data on a number of sample coils wound on Millen 74001 coil form assemblies. These are the small slug-tuned coils which plug into a standard octal socket, and are suitable for use in receivers and low power stages of transmitters.

To use the chart, determine first the actual capacity which will appear across the coil at some frequency in the desired range. Apply these values of capacity and frequency to the graph and note the point of intersection. If it falls within one of the shaded bands, the coil data given in the table in the upper right-hand corner of the chart can be used directly. If the intersection falls between two of the shaded strips, the desired inductance can be made by using the table as a guide, and winding an intermediate number of turns.

EXAMPLE 1. A coil is to be made to cover 3.5 mc to 7.3 mc, for a preselector. The tuning condenser has a maximum capacity of 140 $\mu\mu$f, a minimum capacity of 10 $\mu\mu$f, the tube input capacity is 6 $\mu\mu$f and an additional 15 $\mu\mu$f is allowed for strays, socket capacity and the distributed capacity of the coil. This gives us a bit over 30 $\mu\mu$f minimum capacity in the circuit, and we may take our high frequency limit as 7.5 mc. Applying these last two values to the chart, we see that coil "C" should be suitable with no modifications, since 31 $\mu\mu$f will tune this coil to 7.5 mc with the slug at mid-position.

(*Continued on page 83*)

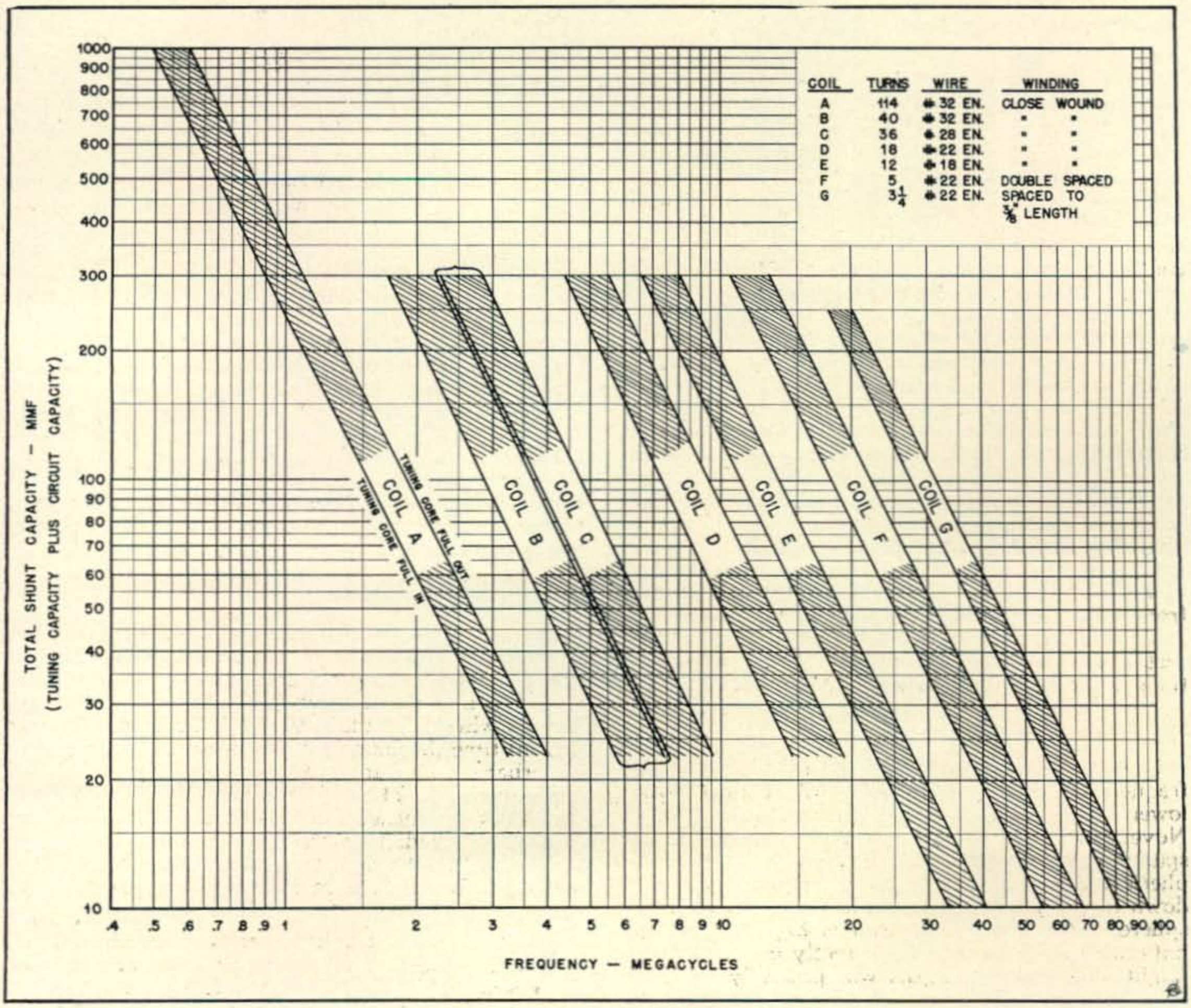


Chart to determine number of turns on Millen 74001 form to tune from .5 to 95 mc.

Monthly DX Predictions-November

OLIVER PERRY FERRELL*

THE PREDICTION GRAPHS illustrate the two most import parameters in regular F2-layer radio transmission. The variable line in each graph indicates the maximum usable frequency (MUF) between the two areas shown on the world map. The shaded sections or areas of the graphs depicts those radio frequencies which would be unusable for amateur communication at the indicated hours. The lowest usable frequency (LUF) is computed for 1000 watts of effective radiated power from the antenna. The receiver is assumed to have good sensitivity and the receiving location to be practically noise-free. In general the LUF depends upon the average absorption expected according to the position (hour angle) of the sun. It will be found that the LUF is slightly optimistic (i.e., should be slightly less) when c.w. is being used. It is also considered to be somewhat conservative (i.e., should be slightly higher) when phone transmission is attempted.

No Amateur Communication Possible

Graph 4, showing the average conditions from the W6 and lower W7 call areas to South Africa depicts the interesting condition when no amateur band is usable across this path. This may be noted when the lowest usable frequency exceeds the maximum usable frequency at 0100 hours PST. This condition continues until approximately 0600 hours PST when weak South African signals may be heard and worked on 10 meters. This situation arises from a combination of factors, including the low radiated power and the long range of the path illustrated. Since the LUF is based upon field strengths, a signal could be pushed across if a much higher effective power were to be radiated. However, under the arbitrary conditions assumed in calculating the LUF no amateur signals would be heard during these early morning hours. Although naturally, a highly directive, high gain antenna would alter the shape of this curve considerably. When the great circle path crosses in or near the auroral zones there is an additional absorption factor which is not included in the preparation of these graphs. The reason for this is two-fold, inasmuch as the character of high latitude absorption is not too well known from ionospheric observations and the amount of absorption appears to vary irregularly. Thus, on certain days we may expect to find rather wide variations in the LUF depicted in *Graphs 1 and 2*.

The General Outlook

It is to be expected that the maximum usable frequencies during December will be somewhat lower than those observed during the month of November. This results in a slight decrease in the span of the 10-meter openings. However, the atmospheric noise level on the lower frequencies is now down to the yearly minimum in the northern hemisphere. The absorption level is high but is only noticeable on paths passing directly under the sun. Night time field strengths will probably be quite strong with greater emphasis on working DX on 40 meters. In this respect the prediction graphs clearly illustrate the hours when the 7-mc band will be unusable over certain paths. Although 10 meters may not remain open as long as it did during October and November, 20 meters in contrast will probably remain usable throughout a large portion of the night.

WWV Storm Warnings

Although many operators are becoming familiar with the habit of checking the storm warnings broadcast by WWV they are being misinterpreted in certain circles. The "W" signals at 20 and 50 minutes past the hour mean that a radio propagation disturbance (i.e., an ionosphere storm with low signal strengths and rapid fading) is either in progress, or is expected within the next 12 hours. The method of ascertaining this information by the CRPL is to check the lateral angles of signal arrival over the North Atlantic Ocean. Because this path is partially within the auroral belt there will be a slight wavering of the signal arrival before and during an ionosphere storm. Also, the field strength of the BBC short-wave broadcast stations are constantly monitored and in this way a check on abnormal absorption is maintained. These checks are usually made in the afternoon and the usual daily time for changing the announced warning is at 1600 hours EST. Thus, a check on the storm warnings broadcast after this hour is generally an indication of the conditions expected until well into the next day. The warning is, however, changed at any hour when a disturbance becomes noticeable or is anticipated. If the no-warning signal "N" is transmitted it indicates that conditions are normal for the time and season of the year. It is particularly important that operators realize that the WWV warnings apply largely to those signals or paths across the North Atlantic. Although major disturbances are accompanied by world-wide fluctuations in the ionosphere, certain other minor disturbances affect only those signal paths in or near the auroral zone.

Forecast of Disturbances

Certain types of ionosphere disturbances appear to definitely reoccur in 27-day cycles. While this is not a foolproof system of prediction it does provide a certain measure of probability of possible future periods when communication will be poor. At the present time the most probable periods of ionosphere disturbances appear to be on December 8 to 10, December 20 to 23 and December 27 to 31. Neither the WWV broadcasts nor this extented forecast are capable of predicting the sudden ionosphere disturbances (SID) which are characterized by a complete short-wave fadeout over signal paths through the daylight zone.

The data for the graphs are drawn from the CRPL booklets, "Basic Radio Propagation Predictions for December". These are available on a subscription basis from the Superintendent of Documents, Washington 25, D. C.

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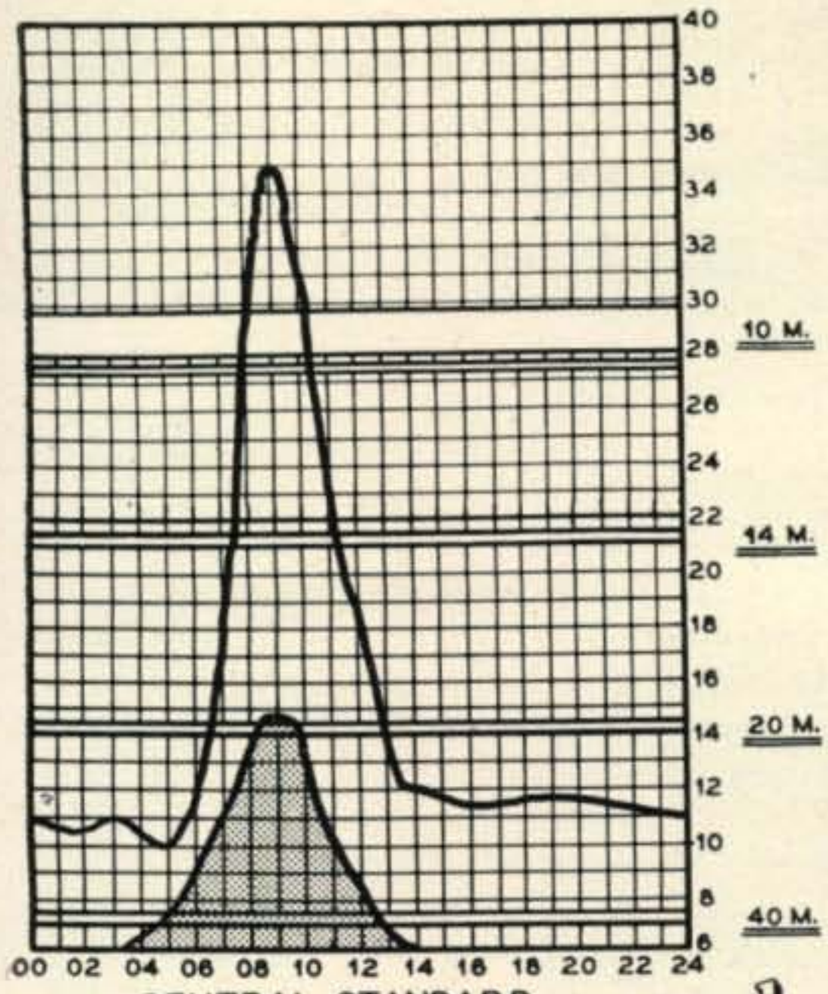
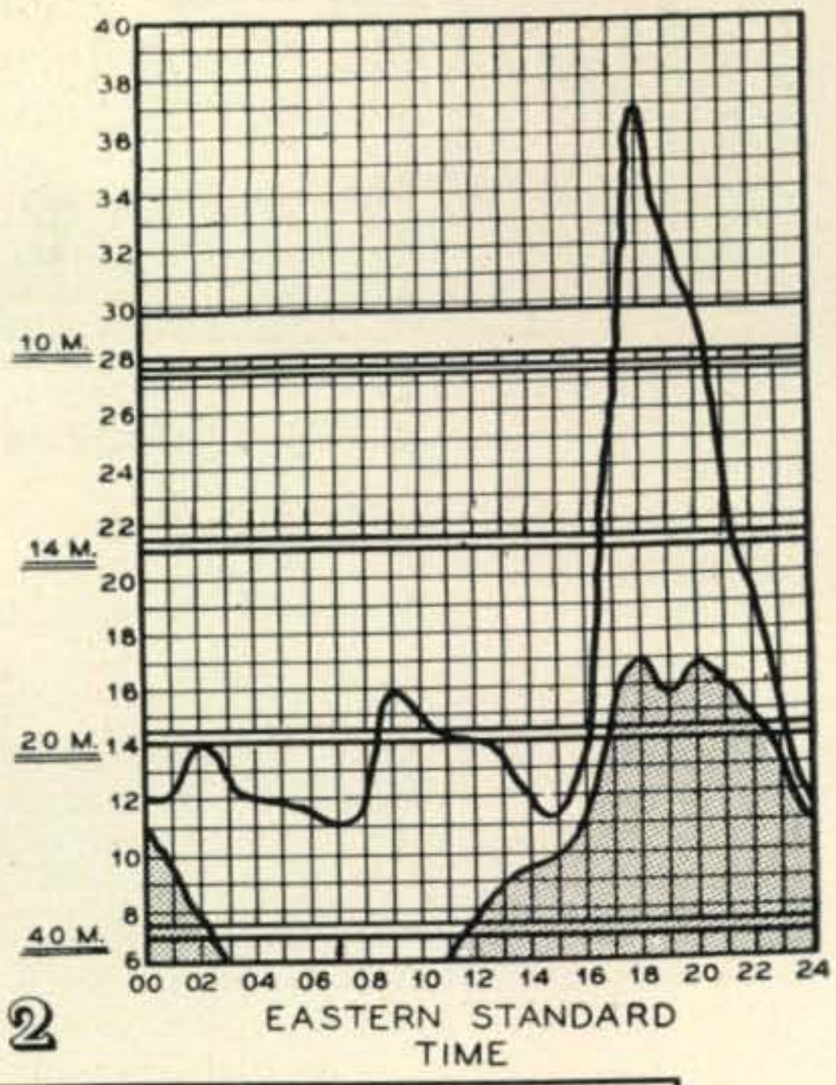
*Assistant Editor, CQ.

Monthly DX Predictions



1

Maximum Usable Radio Frequencies—Charts show the maximum usable frequencies propagated by the F2-layer over the paths indicated in the world map. The abscissa shows the local standard time at the point of origin of the path. The ordinate shows the frequency in megacycles. Amateur frequencies fall within the two heavy parallel lines that indicate the upper and lower limits of the principal bands.



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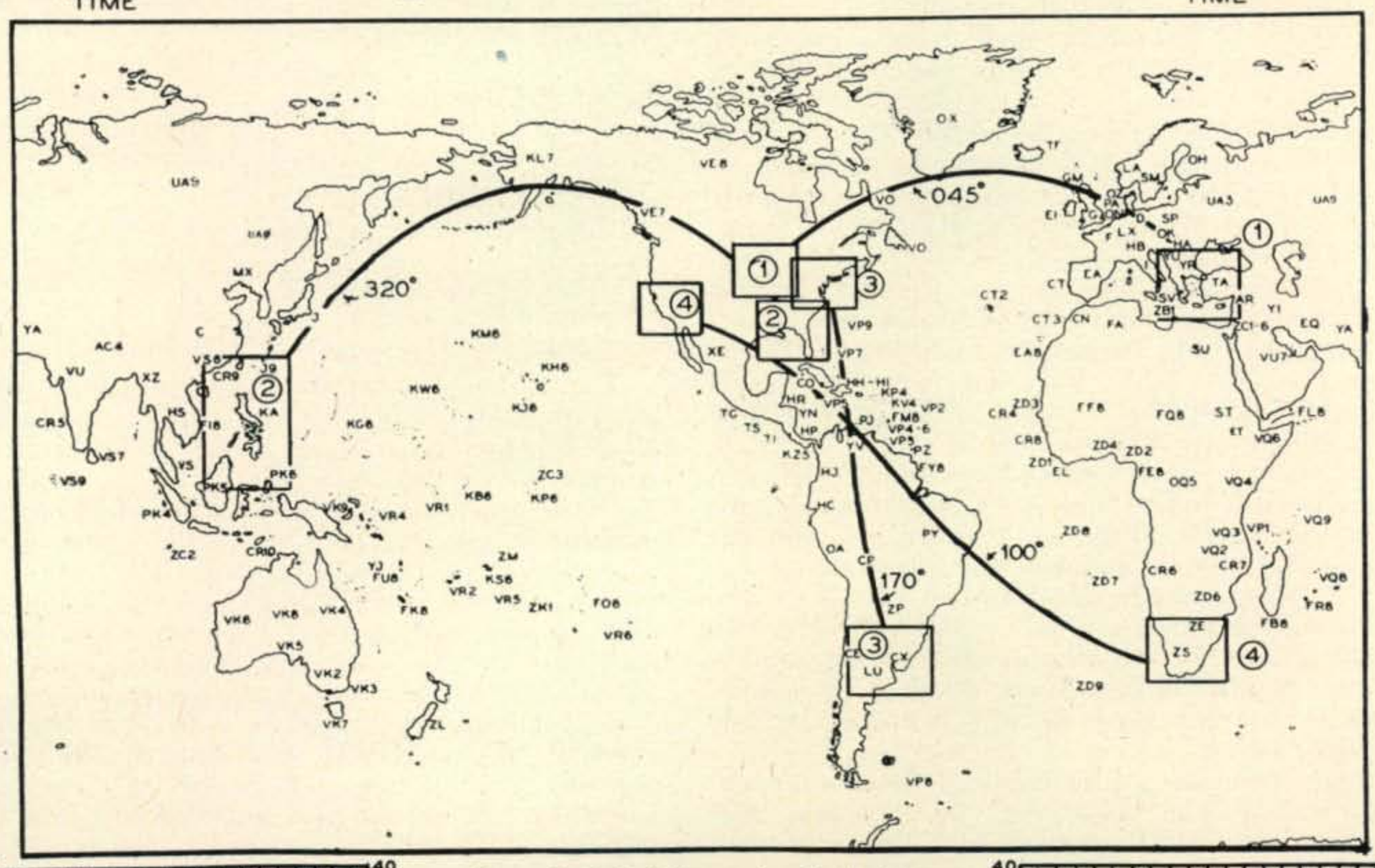
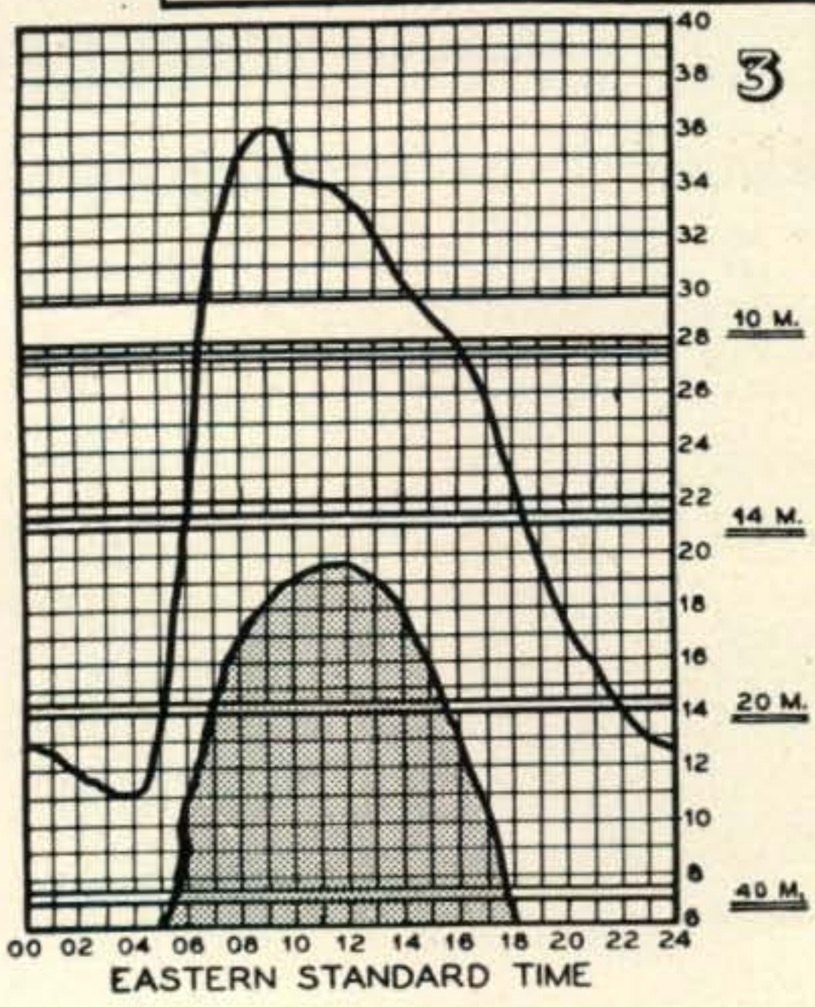


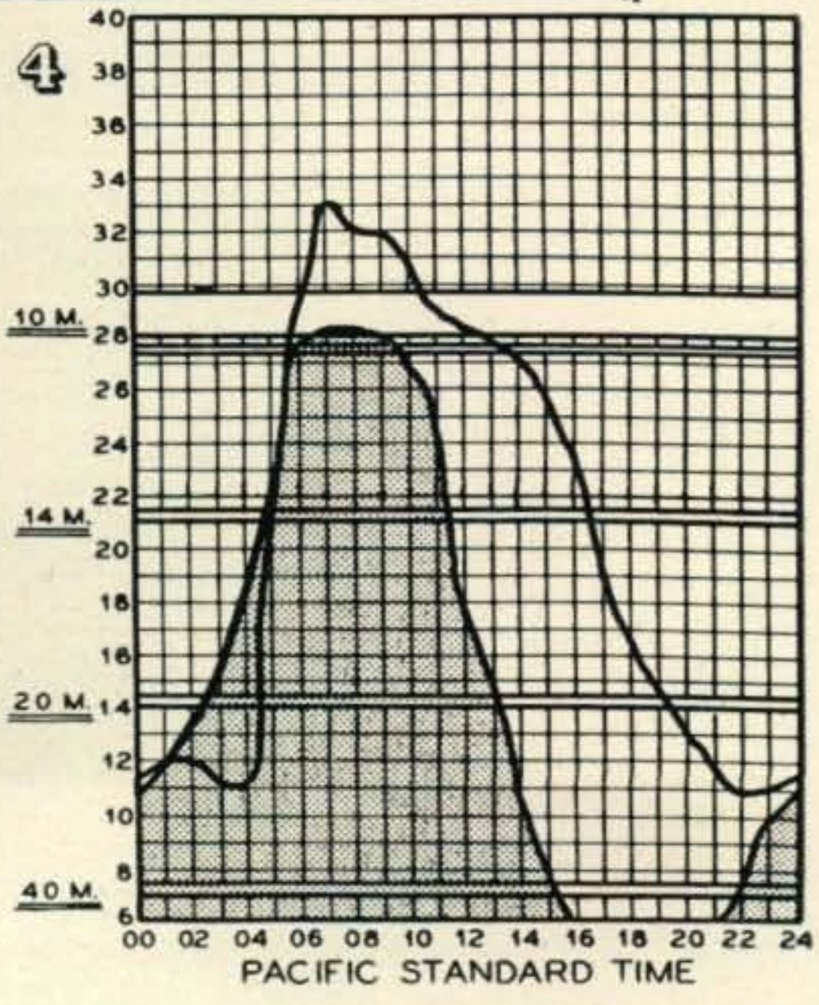


3

Lowest Usable Radio Frequencies—The shaded area in each chart indicates unusable radio frequencies for the illustrated path. The LUF is calculated for an above average amateur location using a good communications receiver. The effective radiated power is assumed to be 1000 watts. The LUF is based upon average monthly signal absorption and does not include the effects of abnormal or auroral zone absorption.

Azimuth—Radio transmission is known to vary considerably with geographic latitude and longitude. Each path MUF and LUF as illustrated is calculated for the "short-path". This is the path shown in the map.

Variations in Forecast—All graphs are monthly predicted average conditions. On ionospherically "quiet" days some variation amounting to less than 15% may be expected. However, a value representing 0.85 of the MUF will be exceeded over 90% of the total time. The graphs do not indicate radio propagation conditions during ionosphere storms or sudden ionosphere disturbances. They are not adjusted for the effects of sporadic-E layer formation or long and short scatter. Radio disturbances of the ionosphere storm type are the most severe for paths which pass through the auroral or polar regions, the effects gradually tapering off towards the equator.



4

Conducted by VINCE DAWSON, JR., WØZJB*

TO SAY THAT THE 6-METER DX situation as we go to press is sensational is an understatement. For the supposedly lonely W stations up on the East Coast it all began on October 25 when G5BY reported hearing W1HDQ for few minutes on 50 mc. While Ed at W1HDQ and Mel at W2BYM worked away at trying to get across it just was not in the cards for that particular day. Although conditions were erratic W6UXN heard PAØUN at 0800 EST about S3 to S7 on both phone and c.w. W2BYM had heard the harmonics of PZE at 0747 EST on 46.9 mc and SDM at 0848 EST on 47.5 mc. Thus, most of the East Coast gang was on its toes the following morning, October 26.

Around 0800 EST the trans-Atlantic carriers on 50 mc were heard again and before the band faded out at 0945 EST, G5BY had worked cross-band from 10 meters to 6 meters the following stations; W1LLL, W1CLS, W1HDQ, W2RGV, W2BYM, and W2-AMJ. G3BMZ was also on and reported hearing all of these plus W3CIR/1. W2BYM had heard some early morning harmonics including FZF9 on 39.1 mc. at 0703 EST, ORL on 39.5-mc at 0704 EST and PUC on 42.0 mc at 0706 EST. Both W2-BYM and Ferrell in Philadelphia heard the terrifically strong French radiotelephone station on 42.95 mc. Ferrell also heard the London TV sound on 41.5 mc and the video on 45.0 mc at 0950 EST. Later the same day the evening London TV transmission was picked up on 45.0 mc by W2BYM at 1250 EST and modulated carriers were noted by Mel and Ferrell on 49.2 and 47.9 mc. From all appearances the 6-meter band was open to the West Coast during a part of the afternoon although nothing was heard above the the 50-mc marker.

As might be expected, October 27 showed a great increase in both the MUF and v-h-f activity. W2-BYM heard the MUF go past 36.0 mc on its way up at 0700 hours EST. SDQ7 on 36.4 mc was heard at 0701 while FRD on 39.0 mc and PPX on 41.44 mc were noted within the next ten to twelve minutes. Meanwhile, in Philadelphia Ferrell had heard the S.B.A. aircraft beacons; MWC on 36.8 mc in Belfast Ireland, SY in Shawsbury, England on 39.4 mc and LR in little Rissington, England on 39.6 mc before 0730 EST. At 0731 the French radiotelephone on 42.95 mc was pounding in some 20 db above S9. Around 0750 EST the 50- mc signals started breaking through into Englend. G5BY worked cross-band W2AMJ, W2BYM, W3CIR/1, W1ATP, W1CLH and W8RLT. The latter had also been apparently heard the day before, but Hilton had not been too sure of the call. Several other British stations were on and were worked by the East Coast boys. The MUF continued up very high the remainder of the day with the CRPL reporting a 4000 km MUF of over 45.0 mc at 1000 EST. At 2100 EST, WØYUQ heard a Spanish speaking South American station (presumably amateur) on 50.2 mc, but was unable to identify or make contact with him.

The trans-Atlantic work continued on October 28 with G5BY working his first VE contact with VE1QZ who was putting a very strong signal into England. W3OR, W1CGY, W1PEA, W1KMZ/3, W1KCQ and W8MVG were also worked cross-band mostly on c.w., although W3OR whose 850-watt transmitter can be switched from 10 to 6 meters in about three or four seconds was still using phone. The intense high density F2-layer mass began to show up on this date and W2AMJ worked W8-MVG at 0902 EST via a 6-meter supplement of the scatter-rebound described by G6DH in the August issue of *CQ*. W2BYM also worked W8MVG by pointing his antenna towards the high density area while also hearing W8RLT and W8SFG. The CRPL 4000 km MUF was again over 45.0 mc at 1000 EST.

The 29th of October is the first date that we have reports of PAØUN actually engaging in trans-Atlantic two-way 6-meter contacts. W2AMJ was apparently his first W2 contact at 0814 EST while W3OR was his first W3 contact at 0816 EST. W2-AMJ also worked G5BD cross-band at 0829 EST. G5BY worked W3OR, W1HDQ (up on 51.1 mc), W3MKL, W3CGV, W8RLT and W8SFG. Hilton also heard W9ZHB and W9HGE.

On October 30th the 6-meter band entered another phase of the picture. With the MUF very high in the morning the trans-Atlantic opening started fairly early and G5BY had a field day working W3CIR/1, W1HMS, VE1QZ, W2BQK, W1PCE, W3CGV, W8RLT, W1KUD, W2EUI, W3HC, W1HDQ, W8PUK and W8SFG. Hilton also had cross-band contacts with two more Canadian districts by working VE2KH and VE3BQK. The heard stations this morning were W9AB, W9HGE, W2MKL, W9-

L. F. ZIMMERMAN, W7SP, Saltair, Utah.

**Send all contributions to Vince Dawson, Box 837 Gashland, Mo.*

ZHL, W1LLL, W1CGY, W1EYM, and W1CLS. G6LK was now on and worked a number of stations including W8RLT at 0822. G5ZT worked W3CIR/1 at 0744. W3OR at 0846 and W1HDQ at 0907 EST. W2AMJ and W2BYM also worked G5ZT the former at 0828 on both phone and c.w. W2BYM was again playing around with the rebound scattering effect and got W4HVV on c.w. for another 400 mile contact.

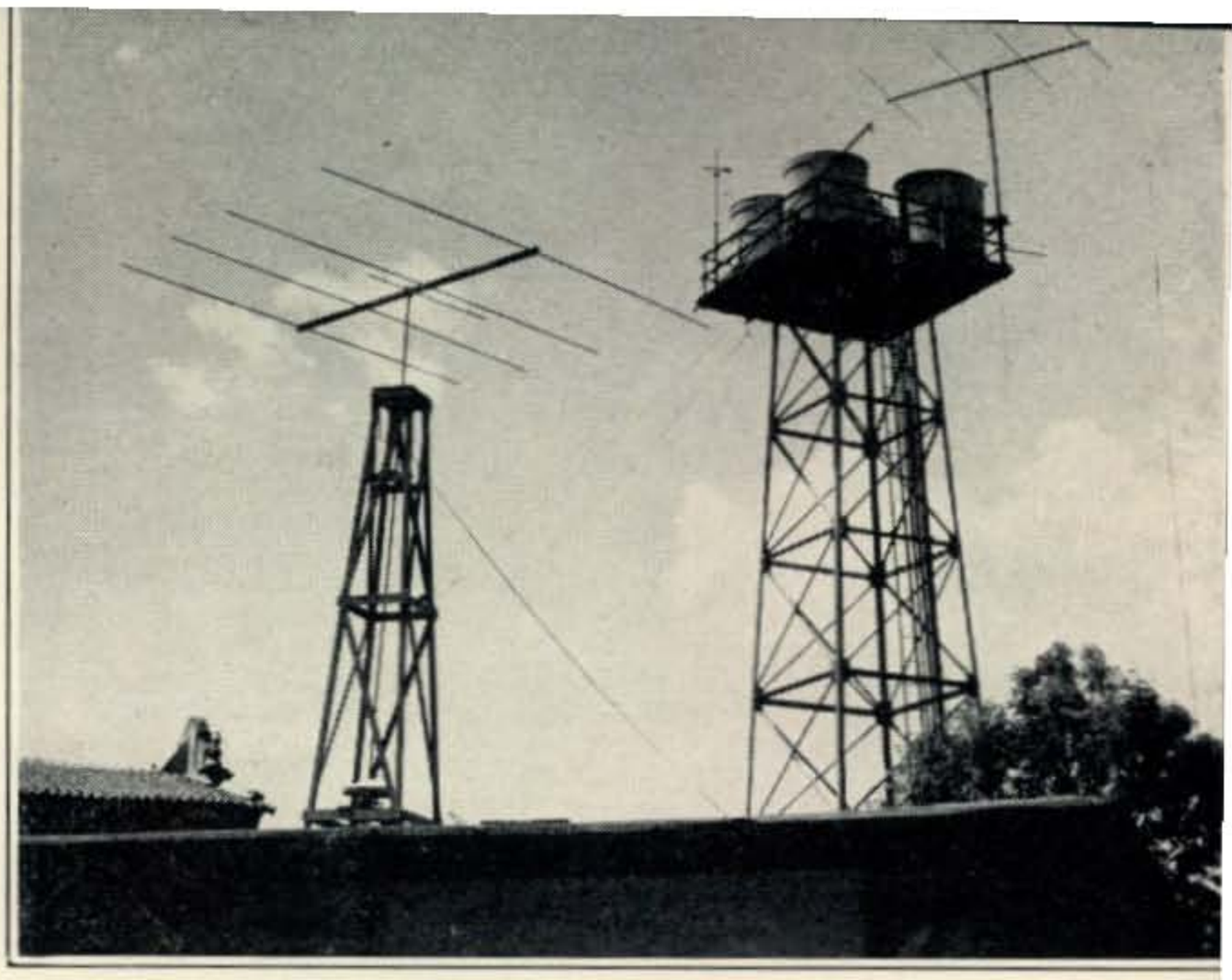
The high density F2-layer mass kept moving around the earth and by 1055 EST W2BYM called and raised W7BQX in Sequin, Washington, for the first cross-country F2-layer contact of the year. At this time the beam at W2BYM was pointed just a few degrees west of true north. Mel finally broke down and went back to work in the afternoon, but his XYL heard W7BQX until 1515 EST. Ernie, W7BQX, seems to have been the only station active at this time, no doubt the 6-meter band had been open to the northwestern section of the country on several previous days. Ferrell also heard only W7BQX and listened to the FM broadcast station KALW on 44.3 mc for over 5 hours in the afternoon.

The 6-meter band did not seem to make an appreciable effort to open towards Europe on October 31. The MUF was still climbing slowly after 0945 when the London TV video was heard by Ferrell in Philadelphia. Shortly after noon on the East Coast the cross-country F2-layer path reopened with considerable activity. W2BYM worked his first station at 1213 EST in the person of W7DYD; followed by W7DMN, W7HEA, W7JPA, W6EUL (making a WACA for Mel at long last) and VE7AHZ. W7HEA and W7DYD also worked W2PWP who hastily tore out his 20-meter rig to get back on 6. W7BQX worked W1NF, W2RLV, W1MWL, W1DJ, and W1KCQ. W7DMN worked most of these plus W1JLK. VE7AHZ who was home for a few days managed to get W1CGY, W1JLK. W2PWP, W1NF and W2BYM. Signals were unbelieveably strong and W7DMN with only 6-watts input to an MFB was running over S9 for several hours at Lakehurst and Philadelphia. The band faded slowly out around 1500 EST.

During the early part of this period several of the W6s worked into W1 and W6UXN heard VE1QZ. Later the same day around 1915 EST, W7BQX heard the keyed transmitter of J9AAO. W7QLZ also heard an S9 signal from VE1QZ but could not make contact. Biggest news of the day was the signal from KL7DY in Sitka, Alaska, who had tuned 6 meters faithfully since last July and this was the first date he had made any contacts whatsoever. He worked several of the mid-west gang including W9ALU at 1454 EST while hearing W2, W3, W8, W9 and WØ.

While again only scattered signals were heard in Europe on 6 meters the band really opened up Saturday afternoon November 1 between the West and Northwest and the East Coast. At 1514 EST when W3OR worked KL7DY as the band slowed faded out (KL7DY was on 51.1 mc) he told Alan that that was his 51st contact since the day before. The band opened al 1110 EST with W2BYM working W6BPT, W7CTY, W6UXN, W6AMD, W7FIV, VE7AEZ, W6UOV, VE7DU, W6ZDJ, W6ANN, W6FSH, W7HOL, W7ERA, W6CAN, W6IWS, W7FP and KL7DY. W3OR meanwhile worked W6AMD at 1115 EST followed by VE7AEZ, W7HEA, W6EUL, W6UOV, W6BPT, W6WNN, W7JFS, VE7AHZ, W6ZDJ, W6JRM, W7JRM, W7FP, W7HOL, W7BQX and KL7DY.

On November 2, G5BY reported the 6-meter band open at 0813 EST. He worked cross-band five



Antenna farm of XE1KE.

stations; W1HDQ, W2AMJ, W3OR, W1HMS, and W2BQK. Hilton also heard VE1QZ and W1NF. The 6-meter band died out at 0930. During this interval however, W2BYM was pulling a fast one and was working W5BSY/MM on 6 meters who was operating either in the Azores or in the Canary Islands. The definite location may have been withheld because of the location of the vessel in a foreign port. More details on this later. The time of contact was 0908 EST.

W2BYM and Ferrell heard the London TV sound the loudest heard in several years of listening. The cross-country paths open around 1145 EST with W2BYM working W6OVK, W6GGM, W6PUZ, W6QFT, W6UOV, W6FPV, W7EVO, W7FFE and W7BQX. W3OR worked W6OVK at 1200 EST. W6BPT at 1214, W6EUL at 1216, W6IWS at 1223, W7BQX at 1234, W7FFE at 1247, W7ERA at 1305, W7DF at 1324, W7DYD at 1330, W7BOC at 1345, W7BQX at 1424 znd VE7DU at 1427. W6OVK also worked W2QVH, W1HDQ, W1CGY and W1ATP. W7DYD got W4WMI and W6UOV got VE3AEW and W2IDZ. W7BQZ also worked W4HVT, W4EQM and W2AMJ. The band closed around 1500 EST on the East Coast.

November 3rd was the longest 6-meter opening to date across the North Atlantic path. The band opened at 0810 EST and closed approximately 2½ hours later. G5BM, G5ZT, G4NT and G5BY worked a record number of 6-meter W stations. W8NQD, W8RLT, W9HGE, W8SFG, W2AMJ, W1HDQ and VE1EA were all heard or worked by British stations. Numerous 6-meter contacts were made with a PAØ station.

6-meter band reopened at 1145 EST on November 3rd for the trans-continental path. Although the opening was not as long as those on previous days the MUF rose sharply to over 51.0-mc and W7DF, W7DMN, W7JPA, W7HEA, W7EUI and W7DYD worked a number of East Coast stations. Best DX of the day were the contacts by W7HEA with VE1QZ and VE1AYL. W7DF also worked VE1QZ.

From an ionospheric viewpoint these 6-meter openings were for the large part unpredictable and unprecedented. Although exceptionally high maximum usable frequencies were forecast for this period there were no earlier indications that an MUF of 50 mc would be exceeded more than once or twice during the entire season over certain paths. Unlike the long-range work between North and South America during September and early October, there

(*Continued on page 74*)

Conducted by HERB BECKER, W6QD*

THE DX Marathon of 1948 starts January 1st and judging from the reaction of most of you the year-long contest should prove very interesting. As I mentioned before, the Marathon, if continued year after year should set up the outstanding DX men of any one year. It does not have to be regarded as one of these breakneck DX contests where a guy feels he must spend every spare second chasing the stuff. It should be a lot of fun and if you miss a week or two without punching the key or making faces at the mike, you should not feel that you've lost your chance. For example, the 1939 affair was on the same basis and many of the gang devoted only two or three months out of the entire year going after new ones for the Marathon. These few months were quite intense. On the other hand, some of the other boys chose to let the DX fall where it would and at year's end they did a little concentrating to fill some of the holes. Please take a good look at the rules on the 1948 DX Marathon found elsewhere in this column . . . they're very simple . . . we require no fee, entry blank or box tops to enter. Just get out there and work the stuff and then you can send in your results each month. We'll list as many as we can.

ZS2X First Overseas W.A.Z.

ZS2X, Rex Bosman, is the first to W.A.Z. out of the States. Congrats, Rex! The fellow really went out and got them. His confirmations arrived via air and the stamps must have cost him a pretty penny. Rex will get certificate No. 8 and the Honor Roll finds him at 40Z and 142C. While we are talking about ZS2X, here is a little info he gives about a couple of stations on in Bechuanaland Protectorate. *ZS6NU* uses phone and 14,120 is the spot. QTH, ZS6NU, Palapye Road. Then there is *ZS6OL* who is mostly on 28-mc phone but does jump up to 14,130 once in a while for an hour or so around 1500 GMT.

The 40 cards from VE7ZM arrived too late for checking before this column had to be closed. But it is reasonably certain that he will be the first VE ever to make W.A.Z. More details next month.

Here's some bad news from WØNUC. It seems he worked VQ4MNS, or at least he thought it was VQ4MNS . . . and, as a matter of fact, it was someone signing the call. Anyway from VQ4MNS he received this information . . ."sorry to say it was not my station you worked in May, 1947. I was QRT at VQ4MNS in September, 1946, and returned to England as G2CKM. I left England in March again and did not get my present call, ZE2JO, until June 19, 1947. I have never worked a W on 20 meters." This was signed by Miles N. Salmon, now ZE2JO. Maybe some others had better start "uncounting" this one, too.

W1AKY spent 3 months in SM this summer and while there, in addition to being treated royally, some of the SM DX men brought up a point that

(*Continued on page 66*)

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

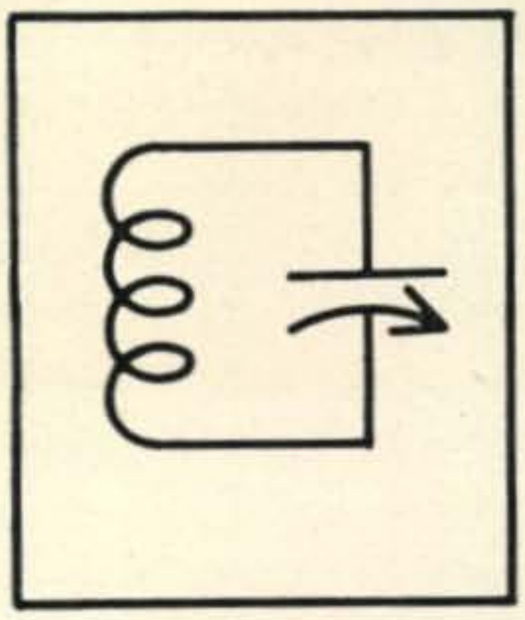
1948 DX Marathon

CQ is sponsoring a DX Marathon for the year 1948. Many of the DX men feel that by the first of the year a DX Marathon will revive some of the interest that has been lost during the terrific last two years of DX. A simple set of rules governs the DX Marathon:

1. The 1948 DX Marathon begins January 1, 1948, and closes December 31, 1948.
2. Competition will be worldwide and on a zone-to-zone basis. In other words, the high station in each of the 40 zones will be given an award as winner of his zone.
3. Classifications will be the same as in the Honor Roll, i.e., "C.W.—Phone" and "Phone only", thus actually making two winners in each zone.
4. In order to receive credit, claims sent to us for zones and/or countries must be postmarked within sixty days from the date of the QSO. This will assure listing the current monthly scores in CQ and eliminate last minute entries.
5. Due to the tremendous amount of detail work, please list all DX Marathon scores on a separate page from Honor Roll scores and other DX news, and mark plainly "DX Marathon". This will greatly assist W6DI and W6SA, of our committee, in tabulating the Marathon scores for you.
6. Zone and country lists must be submitted in the same manner as though they were for the Honor Roll: the zones listed in numerical order showing the call letters, date, and time; the countries in alphabetical order by country, followed by the call, date, and time.
7. The CQ DX Zones of the world, and the official DX Country list, will be used for the yardstick.

To many of you, the beginning of the 1948 DX Marathon may seem a long way off, but we wanted to get it published so the overseas DX men will have plenty of time to hear about it. The cooperation of all DX men in the states to help spread the word overseas is requested. We think that as the years progress, it will be interesting to see who the winners are from one year to another.

{Number three of a series}



The subject of our discussion this month will probably be of little interest to the amateur well grounded in tuned circuit theory; it should, however, be of interest to the newcomer in radio and also to the owners of strictly amateur band receivers such as the NC-101X and NC-81X.

Since it became apparent that the amateur 160 meter band was not likely to be reinstated we have received many letters requesting that we furnish coils for these receivers to provide reception of the standard broadcast band in place of the 160 meter range. Let us examine the circumstances which make it impossible for us to comply with such requests.

First, without going into the mathematical or theoretical considerations behind this statement, we wish to point out that the ratio of capacity change necessary to cover a given frequency range is equal to the square of the frequency change ratio. For example, several of our receivers provide a frequency coverage of approximately 2 to 1 in each tuning range and accordingly, a capacity ratio of approximately 4 to 1 is required. Specifically, frequency ranges such as 2 mc. to 4 mc., 3.5 mc to 7 mc., etc., represent frequency ratios of 2 to 1, requiring a 4 to 1 capacity ratio for tuning. Assuming that the tuning condenser's minimum capacity, plus stray circuit and trimming capacities, totals 75 mmfd., 75 mmfd. then becomes the tuning capacity for the highest frequency of the range under consideration. In order to tune to the low frequency end of that range, the required total circuit capacity is 300 mmfd. Deducting the 75 mmfd. figure mentioned previously, leaves a figure of 225 mmfd., which represents the maximum capacity of the tuning condenser alone.

The standard broadcast band lies between the frequencies of 500 and 1500 kc., (round figures used for the sake of clarity in presentation). Since this represents a 3 to 1 frequency change, a 9 to 1 capacity change will be required to cover the range. Suppose we have at hand a tuning condenser rated at 350 mmfd. maximum and 20 mmfd. minimum; this affords an actual capacity change of 330 mmfd. Perhaps a simple algebraic solution of the problem will be easier to follow:

Let A = maximum capacity of the tuning condenser plus circuit and trimming capacity

Let B = minimum capacity of the tuning condenser plus circuit and trimming capacity

Then A — B = 330 mmfd.

However, A = 9B

Substituting 9B for A, we have:

$$9B - B = 330$$

$$8B = 330$$

$$B = 41.25 \text{ mmfd. at } 1500 \text{ kc.}$$

$$A = 371.25 \text{ mmfd. at } 500 \text{ kc.}$$

It then becomes obvious that circuit and trimming capacities must total 21.25 mmfd., a condition easily fulfilled.

Getting back to the NC-101X and NC-81X receivers, in these the 160 meter band covered an approximate range of 1.7 to 2 mc., a frequency ratio of 1.18 to 1. Accordingly, the required capacity change ratio is 1.39 to 1. Comparing this 1.39 to 1 ratio with the 9 to 1 ratio required to cover the standard broadcast band, it at once becomes evident that the tuning condenser in these receivers is capable of tuning only a small portion of the broadcast band. It might be argued that if circuit capacities, trimming capacities and tuning condenser minimum capacities were held to extremely small values, a tuning condenser of given maximum capacity could be made to cover a greater range. This is quite true, but there are practical limits to such a course.

Before signing off, it should be pointed out that the figures given above are for purposes of illustration only. When making calculations of this sort in actual practice, it is wise to add a few kc. at the high frequency end and subtract a few kc. at the low frequency end of the range it is desired to cover. By so doing, the band limits will fall inside the limits of condenser rotation, assuring a satisfactory margin at each end of the dial.

SETH CARD, W1DRO

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W2BXA	**40**	**172**
W6PFD	**40**	**169**
W6ITA	**40**	**164**
W6MJB	**40**	**163**
W6SA	**40**	**161**
W6LEE	**40**	**150**
ZS2X	**40**	**142**
W6SAI	**40**	**135**
W2GWE	39	178
G6ZO	39	176
W3BES	39	175
G2PL	39	173
W8RDZ	39	172
W8BKP	39	170
W2HHF	39	164
W6ENV	39	162
W9ANT	39	160
W6ADP	39	154
G5DQ	39	151
W2COK	39	150
W6KRI	39	148
W8LEC	39	146
W6TT	39	145
W9IU	39	143
G2WW	39	143
G6QB	39	142
W9DUY	39	141
G5YV	39	141
W6SN	39	139
W7FZA	39	135
G8KP	39	135
G2AJ	39	135
W6RDR	39	134
W6WKU	39	134
WØYXO	39	134
G2CDI	39	132
G3FJ	39	132
WØGKS	39	131
D2KW	39	131
W9NRB	39	126
G5BJ	39	126
G5RV	39	126
G5VU	39	124
W6TI	39	122
G5WM	39	120
W6CEM	39	119
G6BS	39	117
W6LER	39	114
W6OMC	39	114
G3QD	39	114
G3AAK	39	114
G3AAM	39	109
W7GXA	39	106
OK1AW	39	106
W6UZX	39	104
W6QD	39	100
W3JNN	38	162
W2PEO	38	150
W2CYS	38	144
W3EPV	38	140
W2IOP	38	137
G3DO	38	134
W8FJN	38	134
W4BRB	38	133
W8NBK	38	132
W9RBI	38	131

C. W.-PHONE

W3IYE	38	130
W3GHD	38	126
W8CVU	38	125
W2RDK	38	124
G8IL	38	123
G2VD	38	122
G8RL	38	115
W6EAK	38	115
W5CPI	38	113
WØNTA	38	112
ON4JW	38	110
G3ZI	38	107
W6LEV	38	79
W4CYU	37	153
WØNUC	37	134
W2HZY	37	132
PY1DH	37	128
W3EVW	37	127
W1BIH	37	127
W4OM	37	126
W3JTC	37	122
W1NMP	37	119
WØSQO	37	117
W1KFV	37	116
W1JYH	37	114
G5CI	37	113
W4FPK	37	110
GW3AX	37	110
G3TK	37	109
G4AR	37	108
W4ML	37	107
W9YNB	37	102
W2BLS	37	100
W6ANN	37	95
VK2ACX	37	94
W5ASG	36	141
KP4KD	36	116
W2RGV	36	111
W6AM	36	107
VE1EA	36	102
G4CP	36	101
W9MZP	36	101
W9VND	36	100
G6WX	36	95
W8WWU	36	93
W8HSW	36	85
W2CNT	36	82
G6PJ	36	69
W2DYR	35	110
G2CNN	35	109
W8REU	35	104
W2CWE	35	100
W3ZN	35	93
W2TJF	35	89
W9FNR	35	85
W7ETK	35	84
G5MR	35	84
W9TB	35	82
W6DLY	35	82
G3BDQ	35	74
W6LN	35	63
CM2SW	34	117
G8QX	34	99
W3JKO	34	91
W4DIA	34	86
G2AO	34	84
D4ANM	34	77

C. W.-PHONE

G8RC	34	72
J4AAK	34	66
W7FNK	34	54
W2ZW	33	115
W3KDP	33	100
W4QN	33	94
G8KU	33	91
W6ZZ	33	90
W2PUD	33	89
G8IP	33	88
G2LC	33	85
GW4CX	33	84
G3AAE	33	82
WØAZT	33	81
W5BK	33	79
GM2UU	33	79
W9EMW	33	74
W2JA	33	74
W4MZ	33	68
G8VR	32	85
WØOUH	32	83
W2HY	32	77
W6AX	32	73
G3VA	31	101
W6YYW	31	81
W4HA	31	79
G5OQ	31	78
W6IFW	31	77
W6MI	31	73
W5LVD	31	71
KP6AB	31	70
G6BB	31	70
W4HXO	31	67
W9KMN	31	66
W1PQT	31	63
W6JFJ	31	60

PHONE

W6DI	37	123
W1HKK	37	122
W8BKP	37	113
G3DO	37	110
W4CYU	36	134
W1JCX	36	126
G2PL	36	113
W2BXA	36	111
G6WX	36	102
W3DHM	36	96
G3FJ	35	109
W8BF	35	108
W1MCW	35	105
GM2UU	35	97
W1NWO	35	92
W9HB	35	89
W6PCK	35	82
W2DYR	34	104
W7HTB	34	84
W6SA	34	74
W2ZW	33	113
W6PXH	33	96
W8BIQ	33	84
W5ASG	33	83
W9RBI	32	88
WØHX	32	80
W2HY	32	73
G6BW	32	69
W2NXZ	32	57
W5LWV	31	75

The YL's Frequency

Conducted by LOUISA DRESSER, W1OOH/2*

HAS ANYONE SEEN Josephine's balloon? Or, more correctly, we should say the Signal Corps' balloon, which disappeared so mysteriously the night of Sept. 26th at Asbury Park, N. J.

The occasion was the Hudson Division Convention; the helium-filled balloon was one used to support the antenna installation for the ham station in operation at the convention. And where does Josephine come in? Well, Josephine is W2QQH. She is employed by the Signal Corps Labs at Ft. Monmouth and works with the big balloons. This particular balloon (lent by the Signal Corps for the occasion) was a brand new one—so fresh the powder was still on it—when it was raised Friday, the first day of the convention. Having done its duty that day it was lowered to the beach and covered with an anchoring net weighted down with sandbags.

Came Saturday morning and Josephine was on the boardwalk bright and early, only to find to her dismay that her "charge" had disappeared — the sandbags neatly unhooked and the net thrown back on the sand. At first it seemed incredible—no one could have made off with the balloon, it was too big; but then it appeared that pranksters must have cut the balloon loose for the amusement of watching it float aloft into the moonlit sky.

Ada Garibaldi, I1MQ.

As she tried to figure out just what had become of the balloon, Josephine lamented, "It was such a wonderful antenna. We never before got out so well from Asbury Park; on our first call everybody came back to us . . ."

Early fall traditionally is get-together time and conventions and hamfests have been many and frequent. To name a few: the above-mentioned Hudson Division Convention at Asbury Park, N. J., Sept. 26-28; the New Hampshire State Convention at Manchester, Oct. 11; the Scuthwestern Division Convention at Phoenix ,Ariz, Oct. 18-19, and the New England Division Convention and 10th Annual Boston Hamfest at Boston, Mass., Oct. 18. You can be sure the YLs were active at all of them.

At Asbury Park a meeting of the licensed YLs was held under the direction of Frances, W2MWW, and the special program for YLs and XYLs, supervised by W2CZP's XYL, included a tea, fashion show and dance recital. There we met Josephine, W2QQH, of the ill-fated balloon; Charlotte, W2NSL; Mae, W3CUL; "Tillie," W3NHI; Frances, W2MWW; "Lil," W2QMZ, and Eunice, W1MPP, down from Boston for the event. Selma, W2PUY; Kit, W2TBU; Mae Gallop, and Ruth Schlitt, XYL of W2BBV, all of the N. Y. C. club, were there and Ruth won the prize of an electric blanket. The XYL of W3KI went home with a brand new Bendix home laundry.

We couldn't get to the N. H. State Convention but Dot Evans, W1FTJ, tells us it was a very nice affair. Says she, "The dinner was excellent. Best feed I've ever had at a hamfest—no exceptions. The gathering was not too large, but just right to really get around and see people.

"As to the YLs present, they were: 'Cookie,' W1FOF; Norma, W1MUW: Eleanor, W1MWI; Leonore, W1MIM; Charlotte, W1QJX; Olga, W1QJY; Alice, W1MJE; Eunice, W1MPP, and "Gene," W1KEP (better known by W1DQK, her OM's call).

"W1MPP volunteered to draw forth the lucky numbers. W1QJX received thanks and recognition for the time she had put in to make the Manchester affair the success that it was. She is quite a new ham, and both she and W1QJY are new members of YLRL also (how could I miss? Hi!)

"'Cookie,' W1FOF, won the contest conducted on phone procedure. It was a Millen 'scope!' I was lucky enough to win second place in the code contest—a nice hand key."

We'd have loved to attend the Southwestern Division Convention, but since we can't persuade W2IOP to move the office out there and expense accounts don't grow on trees, we asked Gertrude Pond, W7KOY, who was chairman of the YL and XYL activities, to tell us what happened in Phoenix.

Gert says the convention was a real success and adds, "At least everyone seemed to have a good time (especially me).

"The YLs and XYLs were entertained at luncheon at the Sun Valley Studios. The Studios are out in the desert and are very Western so the program was in keeping with the scene and included a square dance exhibition. Ruby LaRue, W7JZA, and Velma Hart, W6GGS's XYL, were the entertainment committee. The YLs and XYLs had held two rummage sales prior to the convention and the luncheon entertainment and women's door prize (won by W7IO's XYL) were paid for with the proceeds."

"There were nearly 100 YLs and XYLs at the

(*Continued on page 62*)

Assistant Editor, CQ. Send all contributions c/o CQ, 342 Madison Ave., New York 17, N. Y.

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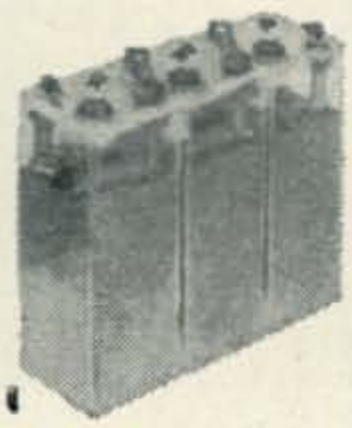

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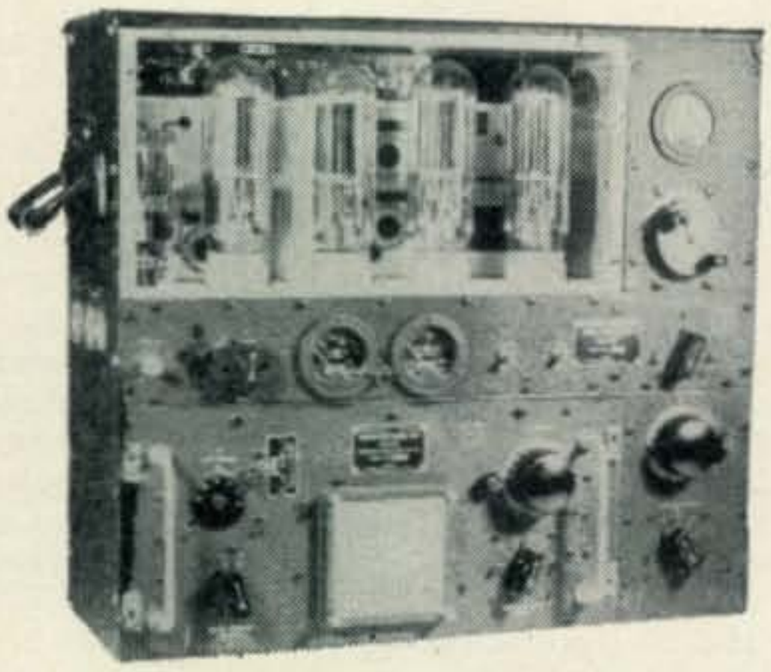
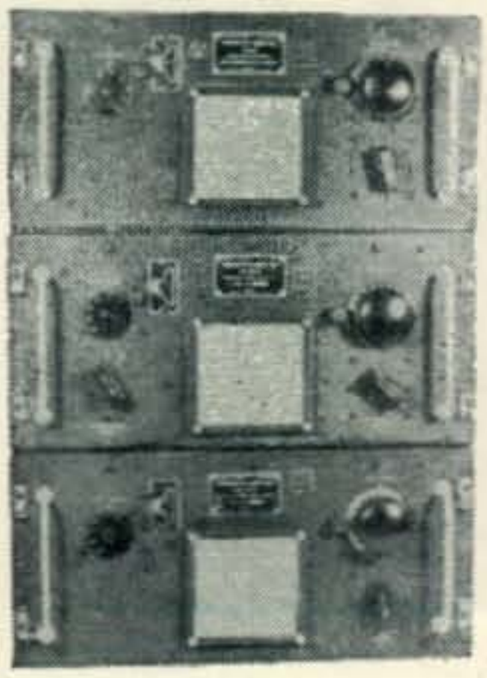
6 V. (New) (Dry-charged)..... 3.00
6 V. (In metal carrying case) (Add electrolyte specific gravity 1.625) (Drugstore)..... 4.00



BC-375E GE MOPA TRANSMITTER

With one tuning unit, choice.....17.50

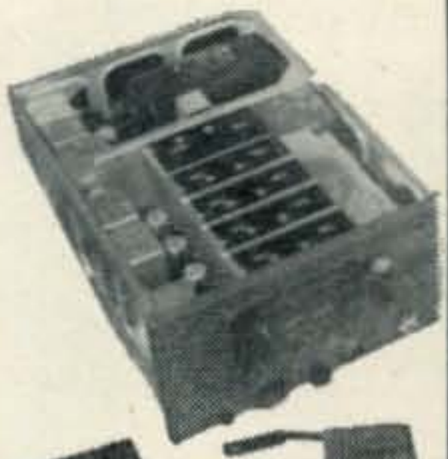


Tuning units TU-6B, TU-5B, TU-7B, TU-8B, TU-10B, TU-9B, TU-26B.....2.25

Antenna tuning unit BC-306A 3.95

Dynamotor PE-73C.....4.95

AIRCRAFT SUPPLIES

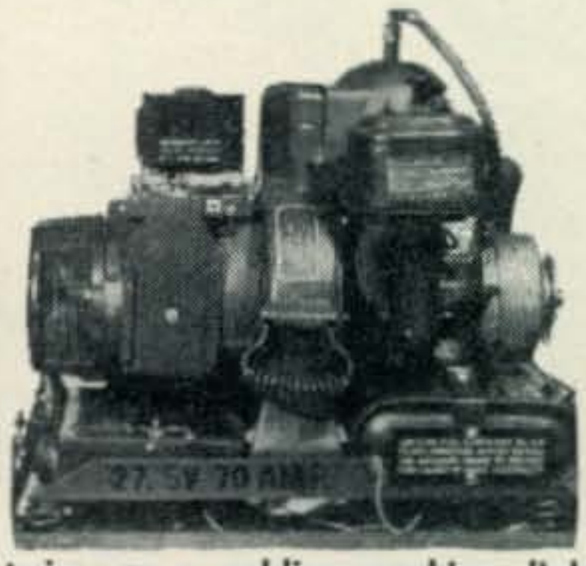


Sensitive Altimeters.9.00
Gyro-horizons.....7.50
Magnetic Compasses 6.00
MN-26 Radio Compass (New).....69.50
SCR-269F Radio Compass (New).....69.50

LANDING LIGHTS

24 V. retractable 600 watts.....3.95

(HRU) DC POWER SUPPLY



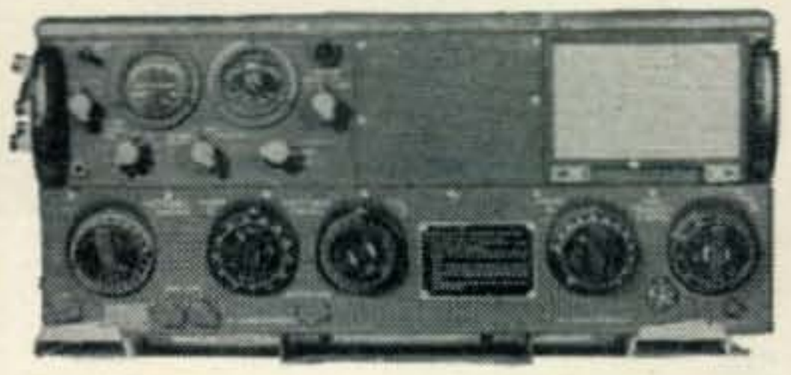
24-28 V. at 70 amp. 2000 watts gasoline engine generator with electric starter. Power supply which can be used to operate 24-28 V. equipment, start airplane engines, charge batteries, as a welding machine, lighting system, or for amateur radio station. 21½", 17½" x 24⅝". Wgt., 115 lbs. **59.50**

TELRAD 18-A FREQUENCY STANDARD $24.95

Checks signals in the range of 100 Kc. to 45 Mc. with a high degree of accuracy. Self-contained power supply for 110, 130, 150, 220, and 250 V. 25-60 Cy. AC. Complete with tubes, dual crystal, and instruction book. Brand new. One of the best buys on the surplus markets.

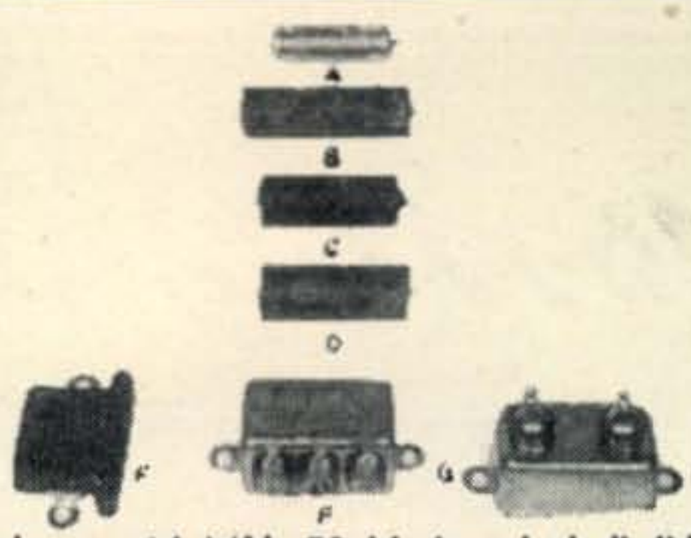
BC-348 COMMUNICATIONS RECEIVER $49.50

6 bands, 200-500 Kc. and 1.5-18 Mc. 2 stages RF, 3 stages IF, BFO, crystal filter, manual or AVC. Complete with tubes and 24 V. dynamotor. These receivers have been thoroughly checked in our work-shop and found in excellent condition.
BC-348, 110 V. AC power supply, including simple conversion instructions. Complete with tube. 8.95



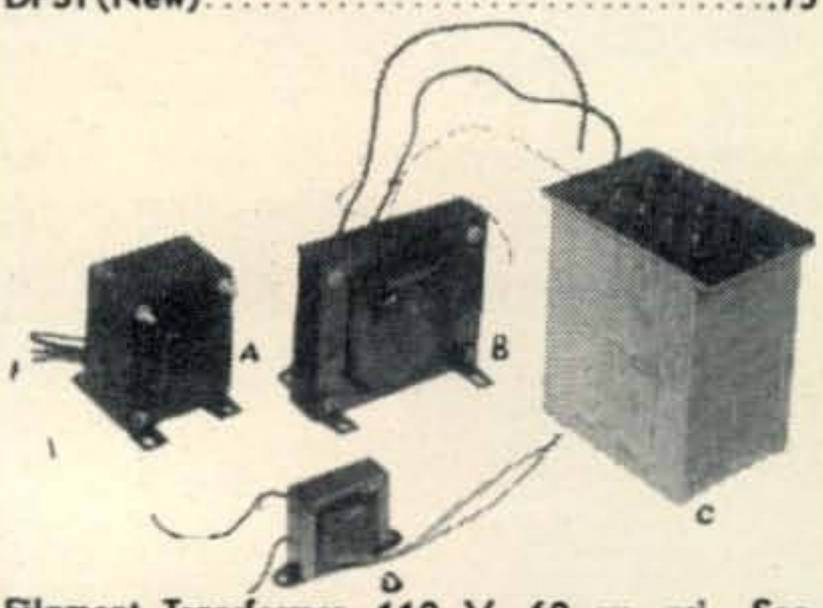
COLLINS AN/ART-13 TRANSMITTER

A compact, light-weight, modern, high-powered transmitter. Frequency range 2-18-1 Mc. on any of its 11 autotune crystal controlled or master oscillator channels. December 1946 "Radio News" gives conversion data for converting 24 V. DC operation to 110 V. AC. All of these are in exceptionally fine condition, tested in our labs. Weight, 67 lbs. (Dynamotor included.)..... **88.50**



Condenser, .14 Mfd. 50 V. (metal clad) (New) 100 ..... 2.50
Condenser, 16 Mfd. 150 V. (filter condenser) (New) ..... .20
Condenser, .05 Mfd. 400 V. (New) ..... .05
Condenser, .1 Mfd. 400 V. (New) ..... .05
Condenser, (Aerovox) .02 Mfd. 600 V. ..... .05
Condenser, 3 x .1 Mfd. 400 V. DC (Bathtub) (New) ..... .05
Condenser, .3 Mfd. 50 V. DC (Bathtub) (New) .. .05

Relay, (Leach) type 1253-DEW, 24 V. DC 160 ohms DPST (New) ..... .50
Relay, 110 V. 6 cy. AC plunge type for door interlock (New) ..... .85
Relay, (Clare) 50 V. .0045 amp. 11,300 ohms with 2 micro-switches. (New) ..... .75
Relay (RBM) 110 V. 60 cy. AC operated DPST (New) ..... .75
Relay, 6 meg. 5000 ohm DC resistance SPDT .... .85
Relay, (Leach) type 1127-FR 110 V. 60 cy. DPST (New) ..... .75



Filament Transformer, 110 V. 60 cy. pri.; Sec. 5 V. and 6 V. Center Tapped (cased) (New). .95
Transformer 110 V.-30 V. (New) Made by Esse for beam motor. 4.95
Power transformer completely cased. 110 V. 60 cy. pri.; Sec. has 600 V. CT 105 Ma. Also 5 V. at 3 amp. plus 2.5 V. at 5 amp. and a 6.3 winding. (New) 1.65
Transformer for Selsyn beam indicators 1.95

ARR-1 Receiver, 334-358 Mc. Ideal for mobile receiver or converter on 2 or 6 meter band. Contains 4-954 type acorn tubes, connectors, etc.

Sylvania Crystal type IN29 ..... .35

AN/PRS-1 Mine Detector (New) 9.50

SCR-625 Mine Detector (New) 67.50

R-89-ARN5 Glide Path Receiver

326-335 Mc. on any of 3 pre-determined crystal controlled frequencies. Contains 11 tubes, 6 relays & other valuable parts. For 24 V. DC operation. Size 13¾" x 5¼" x 6⅜". **79.95**

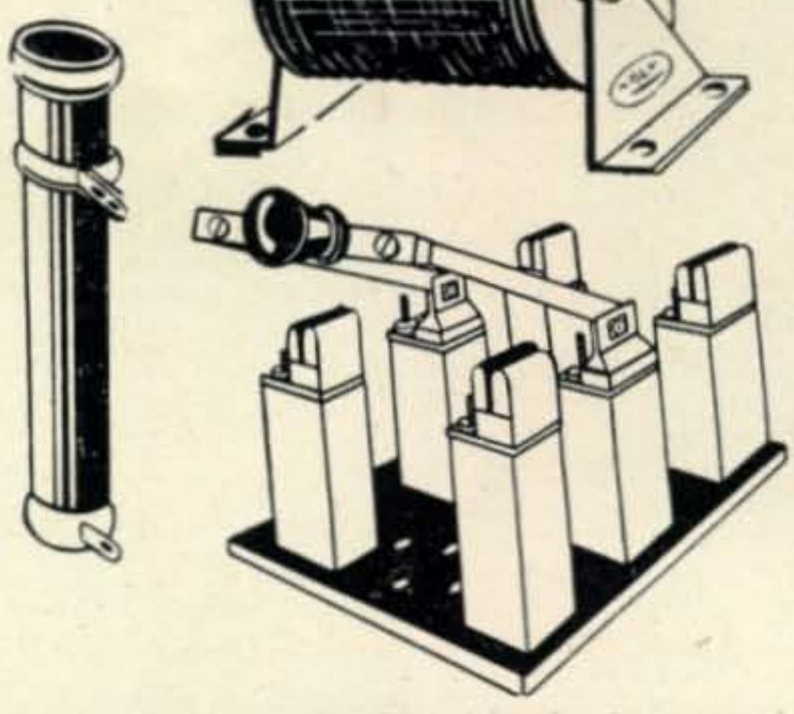
WALKIE-TALKIE

BC 222 and BC 322—Frequency 27.7-52.2 Mc. using 2 oscillator coils—52.8-65.8 Mc using 1 oscillator coil. Crystal calibrator used to select amplitude modulated channels at every 400 Kc of separation. Uses one type 30 and type 33 tube. **39.50**

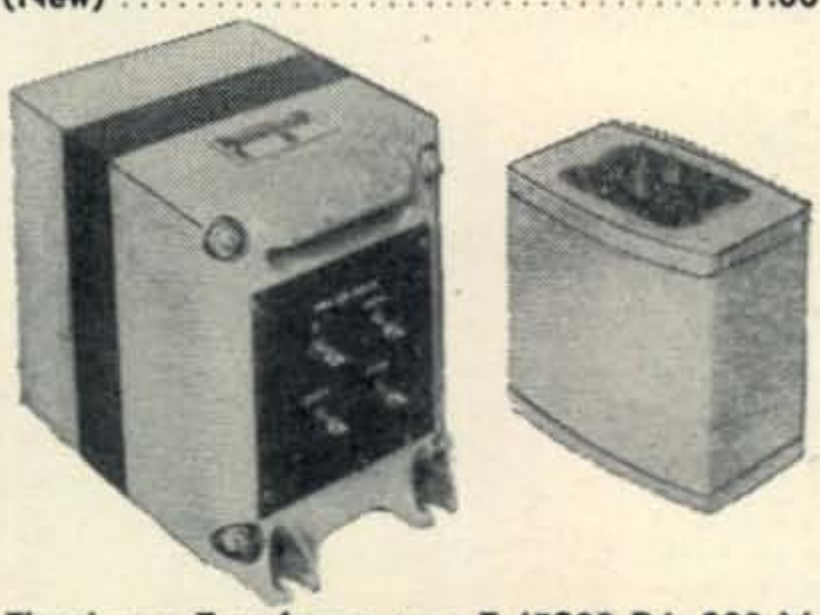
TURBO AMPLIFIERS

Used for parts or small phono amplifier, shipped complete with the following tubes: 2-705's, 1-7-Y4, 1-7F4. Sold in carton lots only. 10 per carton. Price ..... 75c ea.

Please remit 25c to cover the cost of handling on all orders less than $10.00.



Resistor Wire wound adjustable divider resistor. 100 watt, 5,000 ohms (New) ..... .40
BL-Selenium Rectifier 110 V. AC input; 110 V. DC output. .75 amp. rating 1.35
Antenna Switches, Double pole double throw, Size 8" x 4" x 2" (New) 2.00
Same as above except SPST, size 8" x 4" x 2" (New) 1.00

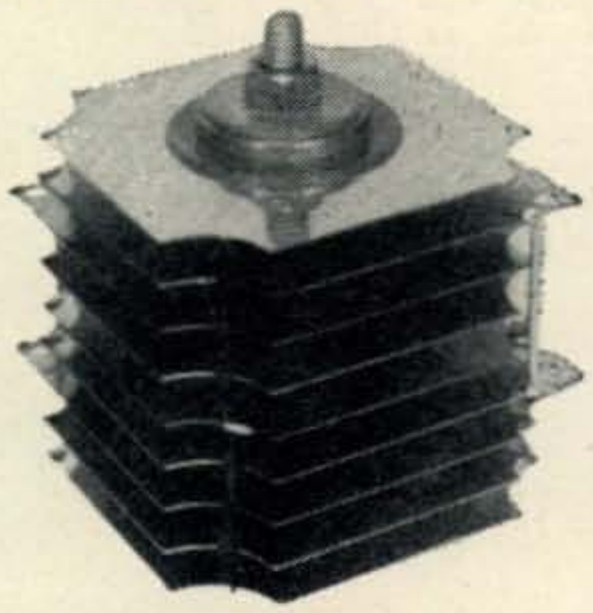


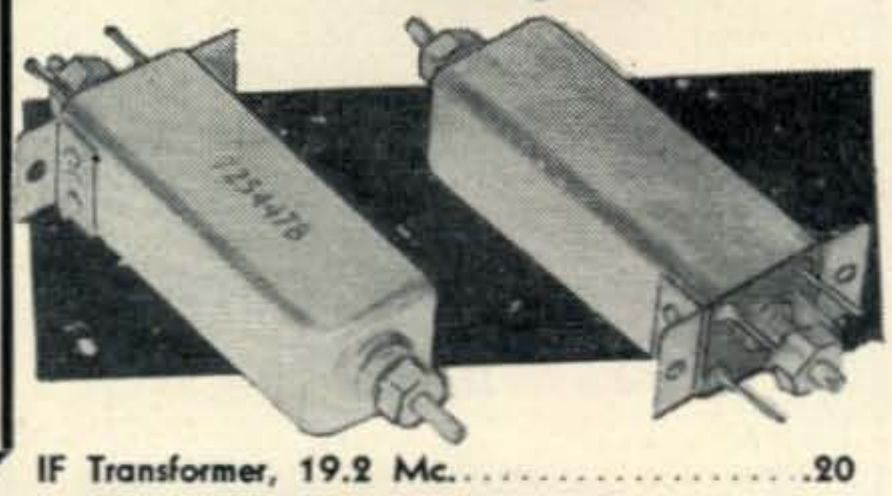
Thordarson Transformer type T-45920 Pri. 220 V. 60 cy.; Sec. 530 V. Center Tapped 4.95
Filament Transformer GE 7467175 110 V. 60 cy., Sec. 6.3 V. at 13 amps and 6.3 V. at 1.2 amp. 2.95

Rectox Rectifier

32 V. AC input, 24 V. DC output, 3 amps. (New) .....

3.75



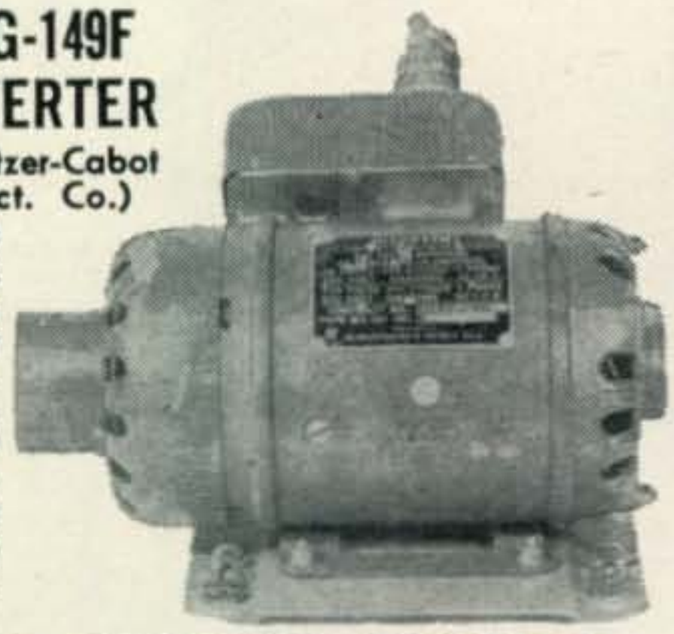


IF Transformer, 19.2 Mc. ..... .20

ESSE Specials!

MG-149F INVERTER

(Holtzer-Cabot Elect. Co.)

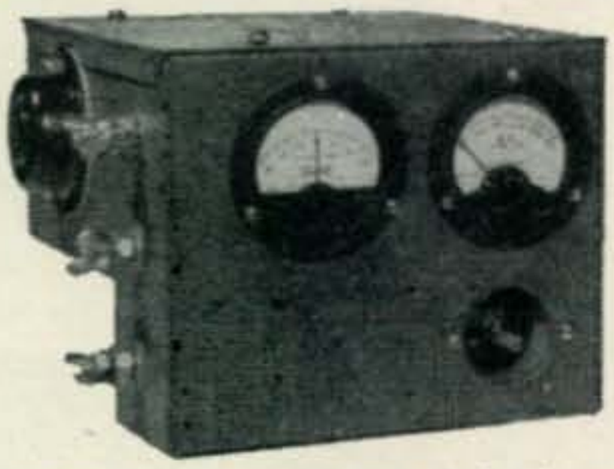


Input 24 V. DC 36amps. Output 115 V. 400 cy. AC, 500 V. A. Output at 90% P.F..... 5.00

ARB (CRV-46151) AIRCRAFT RADIO RECEIVER

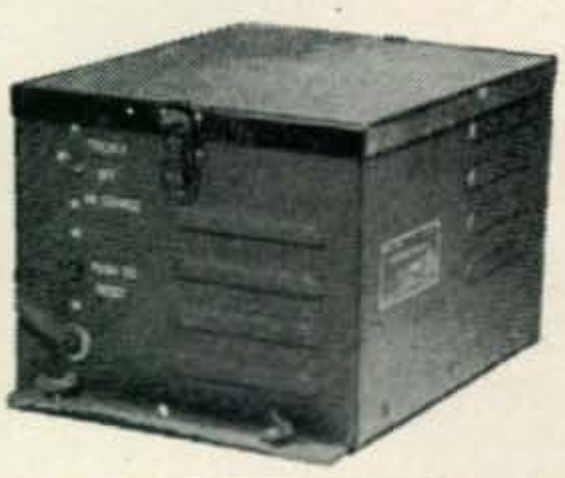
6-tube, 4 band, super-heterodyne receiver with built-in dynamotor. Designed for reception of MCW, (tone or voice) or CW within the frequency range 195 Kc. to 9.05 Mc. We bought a carload of these in order to sell them at this price. 16.50

GENERATOR CONTROL BOX

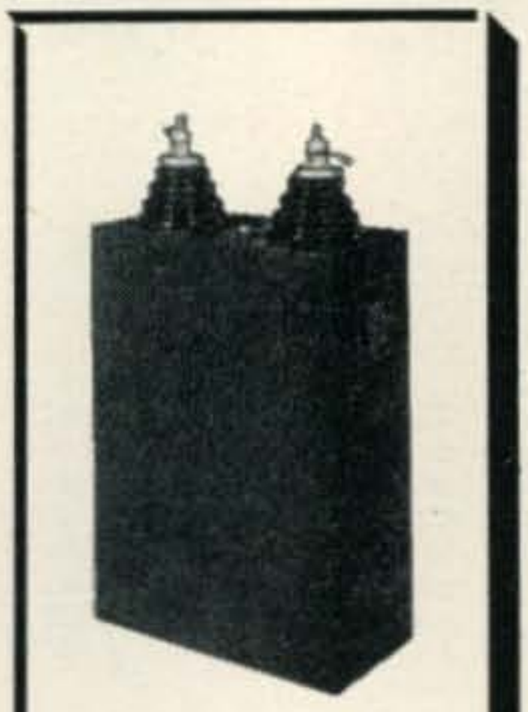


Contains one 2½" round 0-300 AC voltmeter and one 2½" round 30-0-30 DC ammeter. Also plug, switch, relay, condensers and choke coil. (New)..... 5.85

RECTIFIER RA-63-A



Battery charger or rectifier or power supply units. 110 V. 60 cy. input, 12 V. 8 amp. output. (New) 19.75



CONDENSER

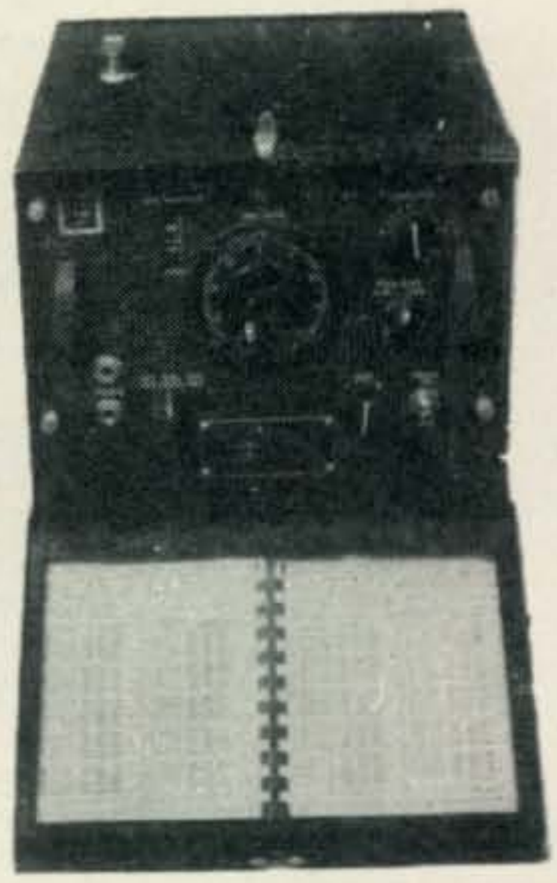
(Aerovox) 1 Mfd. 10,000 V..... 21.50

BC-357 Marker Beacon Receiver

Ideal for controlling remote circuits for model aircraft, boats, etc. Operates from 75 Mc. Signal easily altered to 2 meter band. Tubes used and included: 12C8 and 12SQ7. Also sensitive relay. Circuit diagram included inside case. Size, 5⅜" x 3⅜" x 5¼" For 24 V. DC operation..... 1.95

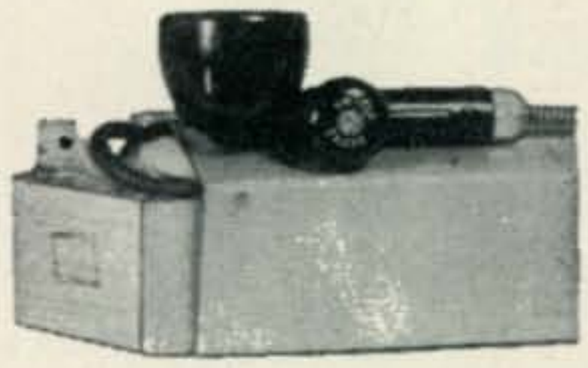
Please remit 25c to cover the cost of handling on all orders less than $10.00.

BC-221 Frequency Meter



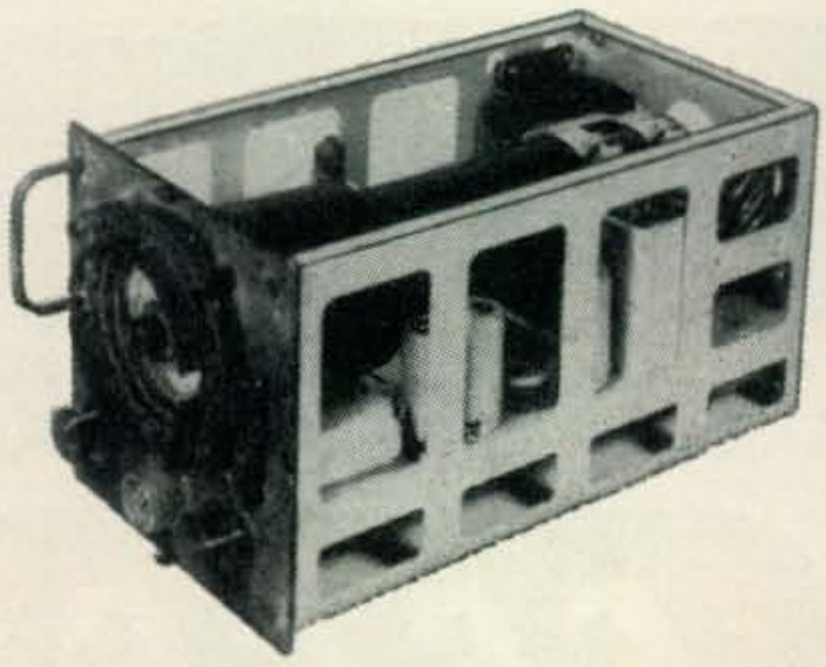
Covers 125-20,000 Kc. Battery or 110 V. AC, vibrapack operated. Beautiful equipment..... 39.95

HS-33 Headphones (New)..... 1.60
HS-30 Headphones with cushions. Low Impedance..... 2.25
Headphone Extension Cords..... .75



T-17-B CARBON MICROPHONES

(handmike) (New)..... 1.35



RADIO ALTIMETER INDICATOR

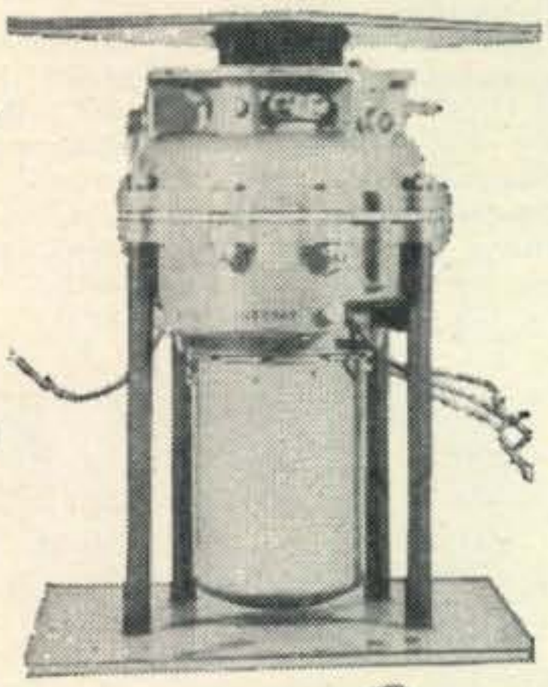
I-152-AM. Includes 3DP1, 2X2 and 3 type 6AG5. Powered by 110 V. 400 cycle..... 8.75

SELSYN INDICATORS

(operates from 15-25 V. 60 cy. AC supply)
5" model . . 2.85
3" model . . 2.85

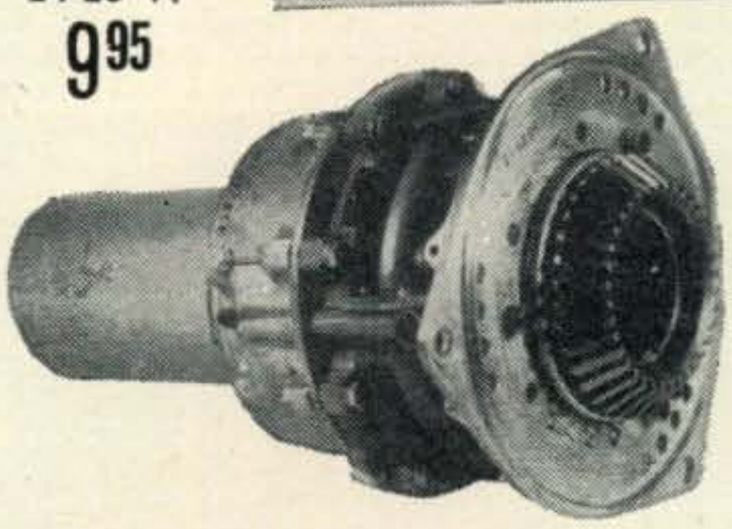
BEAM ROTATING MOTORS

Motor with mounting plates, etc.
14.50



Used to rotate your beam antenna

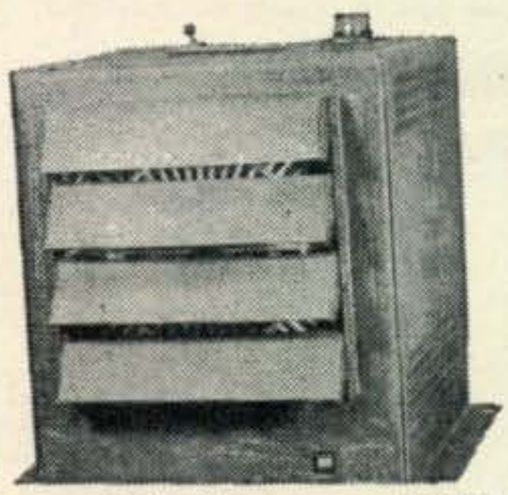
Motor only, 24-28 V.
9.95



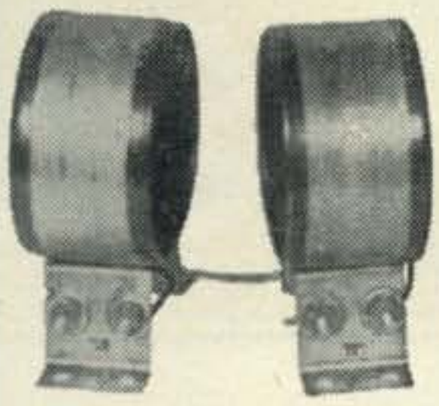
Transformer to operate 110 V.-30 V. (New) 4.95

ELECTOMODE HEATER

This is a heater used to heat the trucks of the SCR-299 mobile units—which proved highly successful during the war. Operates from 110 V. AC-DC, 1,500 watts. Contains blower unit for forced air heating which can also be used for fan during warm weather. Thermostatically controlled with motor protect Thermotron.

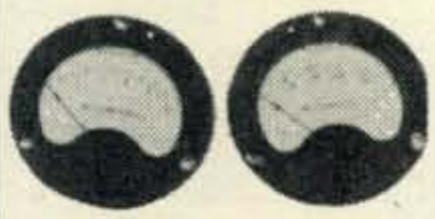


29.50



TUBE HEATERS

Can be used for various purposes. 75



Westinghouse 0-500 Milliamps or 0-10 Milliamps meters, choice 3.50

SCR-522 Transmitter and Receiver (Closing Out) 9.50

RCA AVT-12A Aircraft Transmitters (Closing Out) 3.00

BC-929-A (Closing Out) 4.00

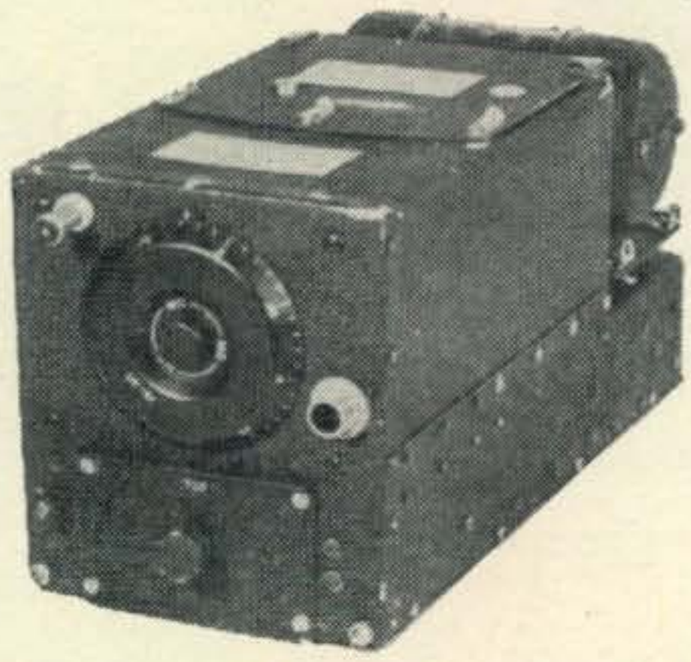
SETCHEL-CARLSEN RECEIVER BC-1206-C

24-28 V. DC. Tubes, 3-14H7; 1-4R7; 2-8D7; 195-400 Kc. Size, 4" x 4" x 6⅝" wide. 4 lbs. With manual (New, in cartons) 5.95

PE-103 GENERATOR

Dynamotor power supply. Operates from 6 or 12 V.; delivers 500 V. DC at 160 Ma. (Brand New) **8.95**

SCR-274N Command Set (ARC-5) components



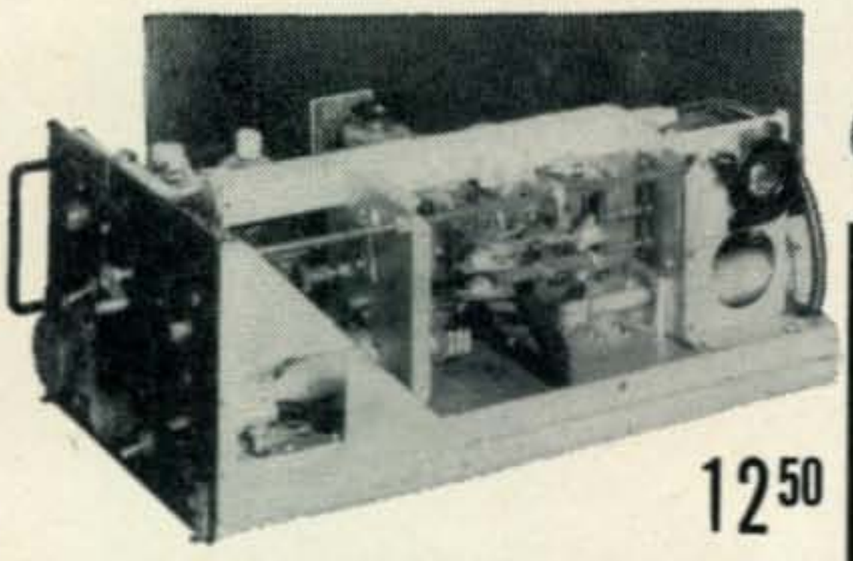
Modulator with dynamotor 2.75
Receiver, 190-550 Kc. (BC-453-A) 3.25

Transmitter, 3-4 Mc. (BC-966-A) 3.25

ADDRESS ALL ORDERS TO DEPT. E 12

ESSE Specials!

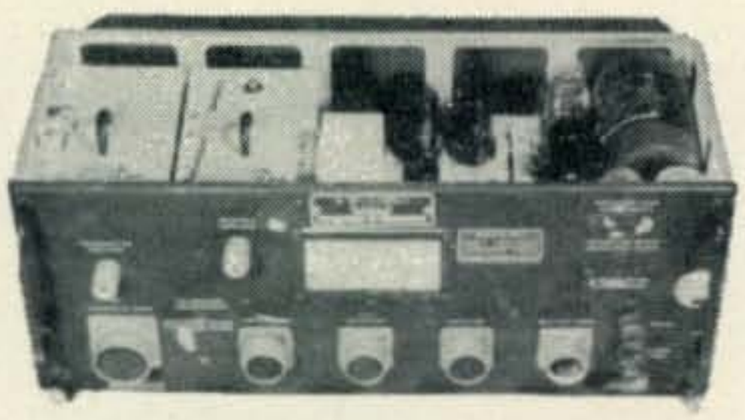
T-39/APQ-9 RADAR TRANSMITTER



12.50

Contains many excellent parts for the VHF experimenter such as a cavity oscillator using 2-RCA 8012 tubes rated at full output to 500 Mc. Tubes are forced air cooled by 24 V. DC motor, which is easily converted for 110 V. AC operation. Other valuable parts such as a pair of 807's, 2-6AC7, 1-931 and 1-6AG7 tubes; ceramic switch, potentiometers, gears, revolution counter, etc.

APN-1 RADIO ALTIMETER



A complete 460 Mc. radio receiver and transmitter which can be converted for ham or commercial use. Tubes used and included: 4-12SH7, 3-12SJ7, 2-6H6, 1-VR150, 2-955, 2-9004. Other components such as relays, 24 V. dynamotor, transformers, pots, condensers, etc. make this a buy on which you cannot go wrong. Complete as shown in aluminum case 18" x 7" x 7¼"..... 8.95

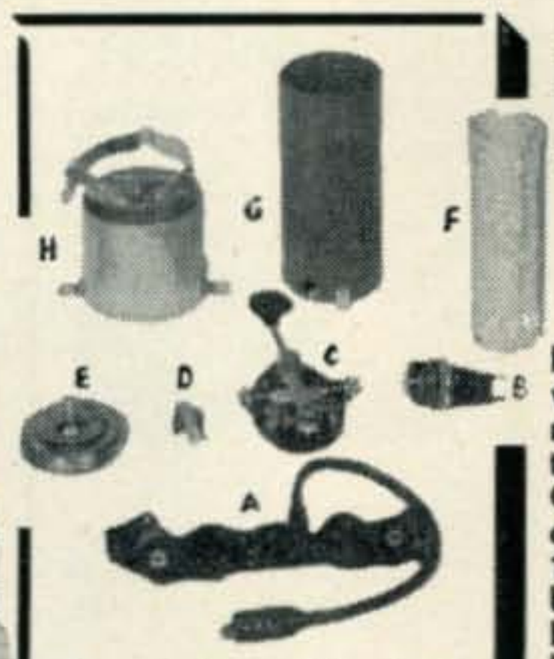
BUSS FUSES

Cartridge type, packed 10 to a box.

6 Amp. 250 V. Non-renewable —3 Amp. 250 V. non-renewable...Box .40

30 Amp. 250 V. Renewable — 3 Amp. 250 V. newable Box .75

Buss fuses type 3AG, 10 amp. glass fuses .02 ea per hundred 1.35



Throat Mikes..7 for 1.00

Jeweled Pillot Assembly. Candelabra, screw base for 110 V. lamp. Mounts in 1" hole. (New)....15

Telegraph key J - 37 (New) 35

Phone Jacks for PL-55 Plug..... 07½

National Velvet Vernier dial drive, 6-2 reduction ratio..... 75

Ceramic grooved coil forms. 5" length, 2" diameter, 30 grooves....15

Millen 807 tube shields 25

813 tube shields.....35

WIRE

3 stranded conductors inside of a shield, about 30" long .10 ea.

2 conductors of stranded wire, each strand about No. 8 guage rubber covered & cloth braid outercover .07 ft.

Heavy duty rubber covered 2 stranded conductors flexible. Ideal for 110 V. AC power leads to heavy electrical machinery .10 ft.

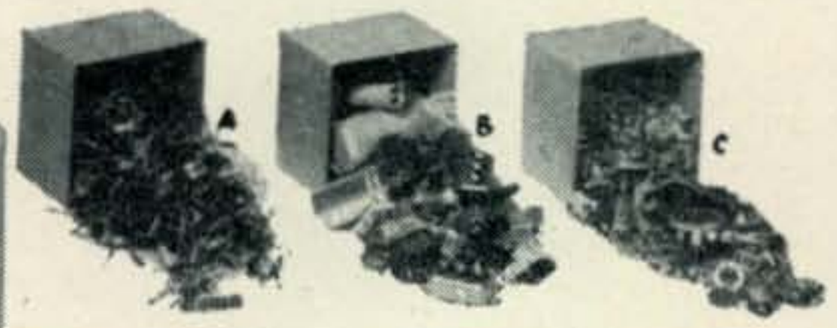
3 conductors of No. 20 enameled cotton covered wire, color coded, completely shielded, moisture & fungus proof. Ideal for Intercom work. 50 ft. & 250 ft. rolls .03 ft.

4 strands of braided wire, each rubber covered and color coded, one strand being shielded, cotton and cambric outer wrapping.....05 ft.

Same as above, except the complete cable shielded .07½ ft.

Minimum wire order 100 feet. May be assortment of above wire.

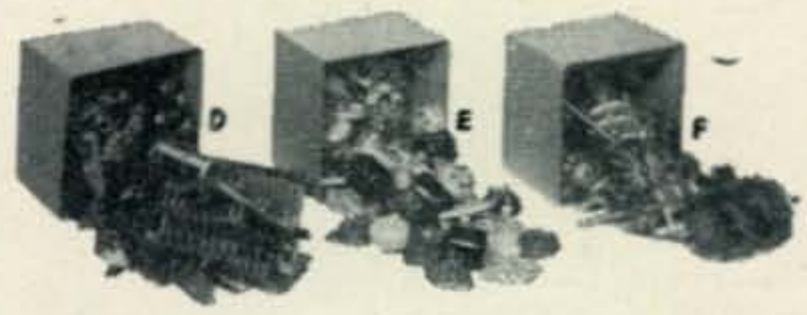
Please remit 25c to cover the cost of handling on all orders less than $10.00.



Resistor kit composed of 150 or more assorted wattages. Containing various resistors of up to 10 megohms. Many with gold bands. An honest-to-goodness bargain.....Box 2.65

Condenser Kit. Contains assortment of 25 various condensers including 2-2Mfd. 600 V. filters, 1-1000 Mfd. 15 V. filter 4-1 Mfd. 400 V. paper by-pass, 3-3 gang midget trimmers, etc.

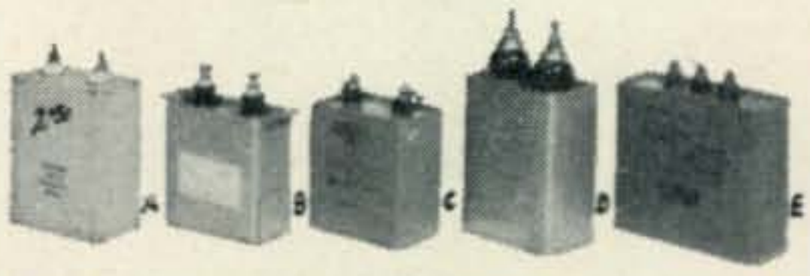
Hardware Kit containing about 5 lbs. of radio hardware including nuts, bolts. washers, shafts, gears, grommets, lugs, screws, spacers. It is a gold-mine of invaluable parts.....1.95



Resistor mounting lugs and terminal strip kit. Assorted sizes and shapes. Many, Many, Many 1.00

Tube Socket Kit. 25 or more assorted sockets having various usable sizes.....1.50

Switch Kit consisting of assortment of 10 rotary and toggle switches. Price 1.25



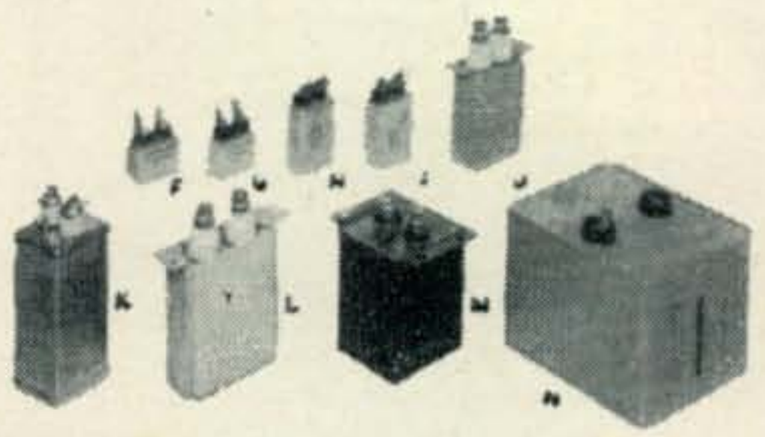
Condenser (Solar) 10 Mfd. 1000 V. (New)..2.00

Condenser (GE Pyranol) 8 Mfd. 1000 V. DC. (New).....1.75

Condenser (Chi. Ind. Cond. Corp.) 4 Mfd. 2000 V. (New).....2.50

Condenser (Cornell-Dubilier) 1 Mfd. 4000 V. (New).....3.00

Condenser (Chi. Ind. Cond. Corp.) Dual 8.5 Mfd. 1000 V. (New).....3.50



Condenser, .25 Mfd. 400 V. (New).....10

Condenser, .125 Mfd. 400 V. (metal cased) (dual condenser) (New).....15

Condenser, 1.75 Mfd. 50 V. (New).....15

Condenser, .5 Mfd. 600 V. (metal cased) (New) .15

Condenser, (GE Pyranol) 2 Mfd. 600 V. (New) .50

Condenser, 2 Mfd. 600 V. (Aerovox) (New)...35

Condenser, 4 Mfd. 600 V. DC (GE Pyranol) (New).....50

Condenser, 4 Mfd. 300 V. (New).....35

Condenser, 30 Mfd. 330 V. AC (GE Pyranol) (New).....3.00

OXYGEN TANKS

A

B

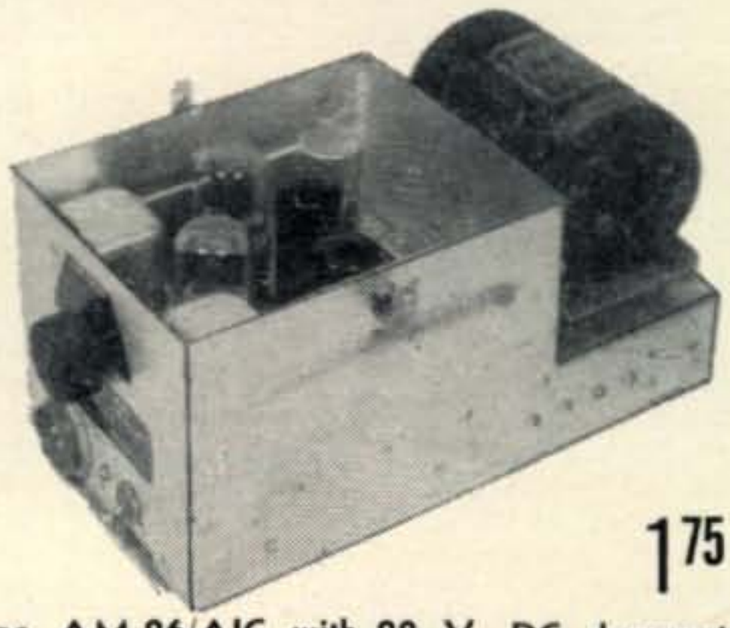
Aviators oxygen breathing bottles. Non-shatterable. Choice of two types.
(A) Withstands 2000 lbs. pressure.
(B) Withstands 500 lbs. pressure.

6.95

BC-1158 TRANSMITTER AND MODULATOR

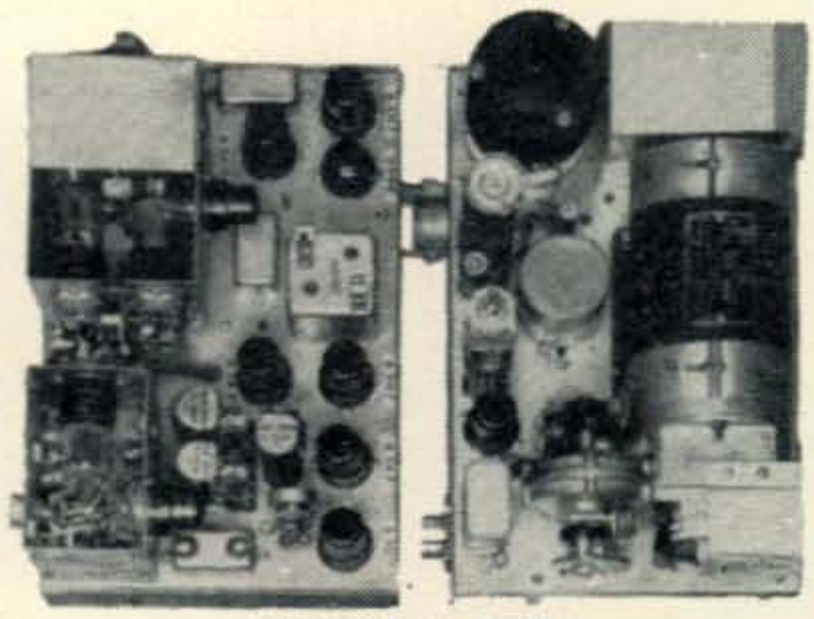
Made by Bendix for airborne operation. Can easily be converted to operate on several frequency bands. Size 12" x 8" x 18", 45 lbs. Limited quantity. 27.50

INTERPHONE AMPLIFIER



1.75

Type AM-26/AIC with 28 V. DC dynamotor. Contains 2-12A6 and 2-12J7 tubes. Easily converted for phonograph or inter-communication amplifier.



BC-966-A IFF

Approximately 2 meter frequency operation. 14 tubes, 350 V. DC dynamotor, 12 V. DC input. Contains voltage regulators and many other fine parts. Worth more for parts than price asked..... 4.75

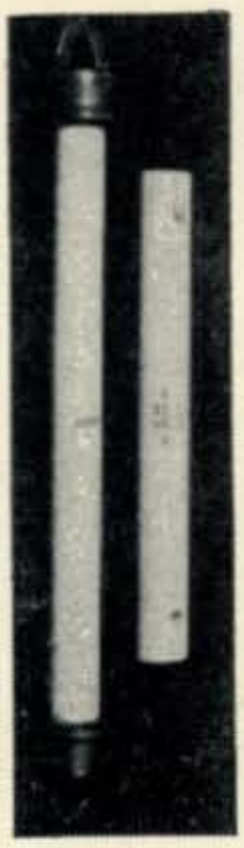
IF AMPLIFIER STRIP

19 Mc. contains 5 Western Electric 7-17A tubes.

3.95

Lapp 800 lb. safe working load insulators.

.95



Lapp heavy duty insulator with strap mounts.

1.65

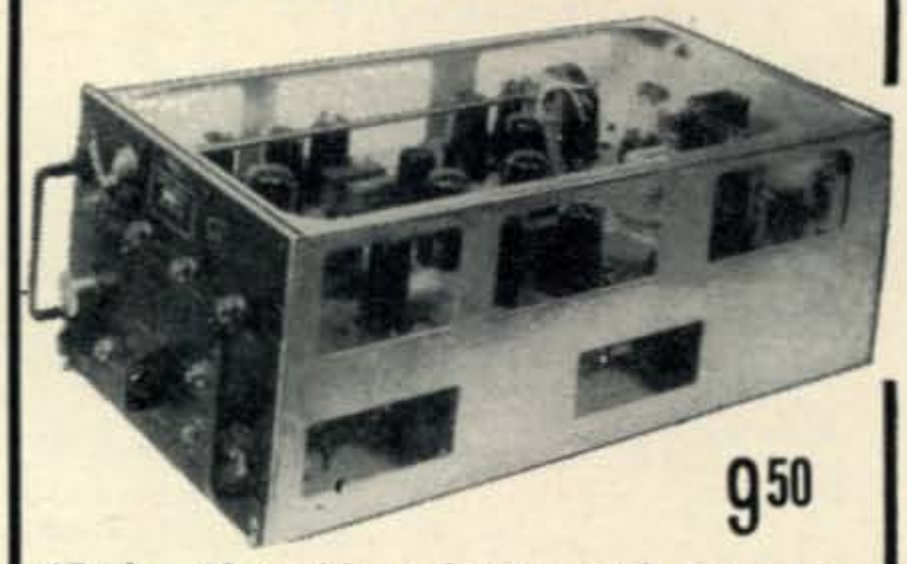
RADIO TUBES

7C5, 35c; 7F7, 35c;
7Y4, 35c; 6V6, 35c;
6L7, 35c; 3D6, 35c;
CW-931, 35c; 30, 35c.

All tubes were checked and found to be good but are not guaranteed. Cannot accept orders on less than 25 per type.

CP-11/APS-15 Contains following tubes: 13-GS-N7-GT's, 3-6S7-AGT's, 1-5Y3-GT's. 1—24 V. motor & blower. 4-1 meg. ohm precision wire wound resistors. 80-86 Kc crystal. Numerous other transformers, condensers e.t.c. Price $9.95

APQ-13 RECEIVER

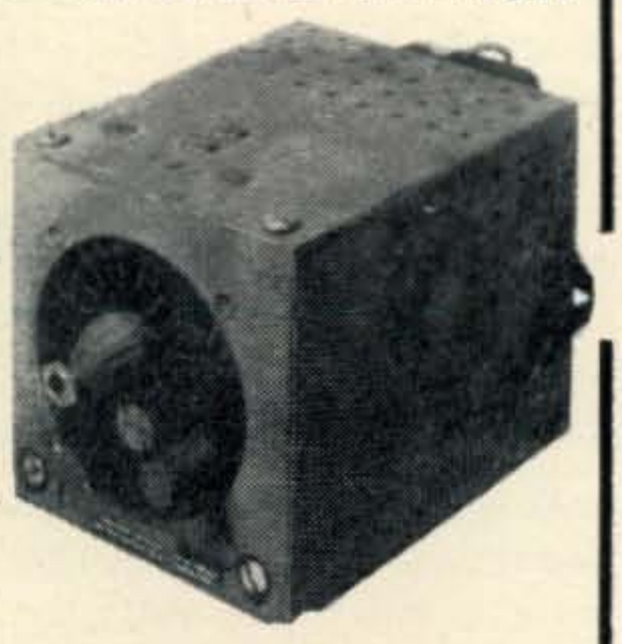


9.50

17 tubes, 13 precision resistors, potentiometers, condensers, transformer, knobs, switches, pilot light, fuses.....

Dynamotor unit MG-1A for SCR-522 transmitter & receiver.....3.75

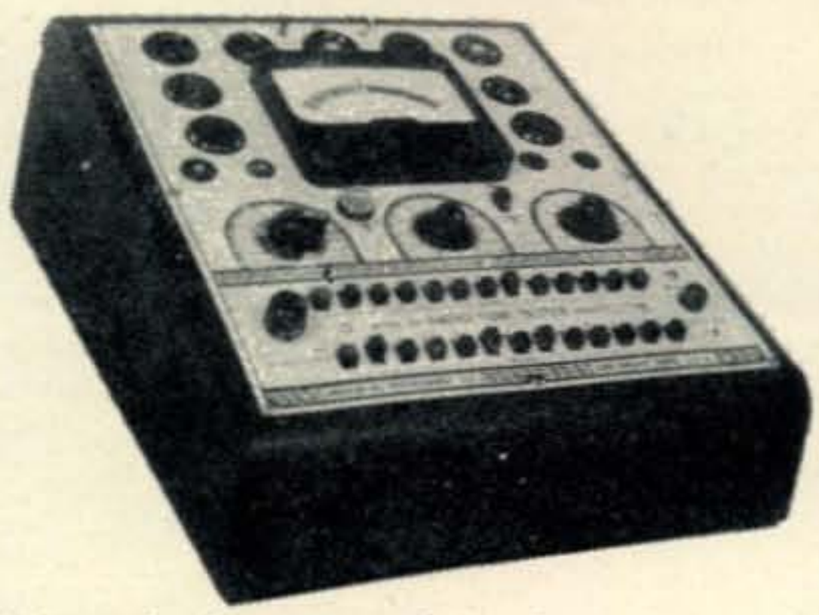
DETROLA AIRCRAFT RECEIVER



28 V.DC operated 200-400 Kc. Good condition.

3.75

TUBE CHECKER



(Universal Instrument Co.) Counter model 501. Brand new guaranteed. Tests all tubes in use today. with manual and factory 37.50

ADDRESS ALL ORDERS TO DEPT. E 12

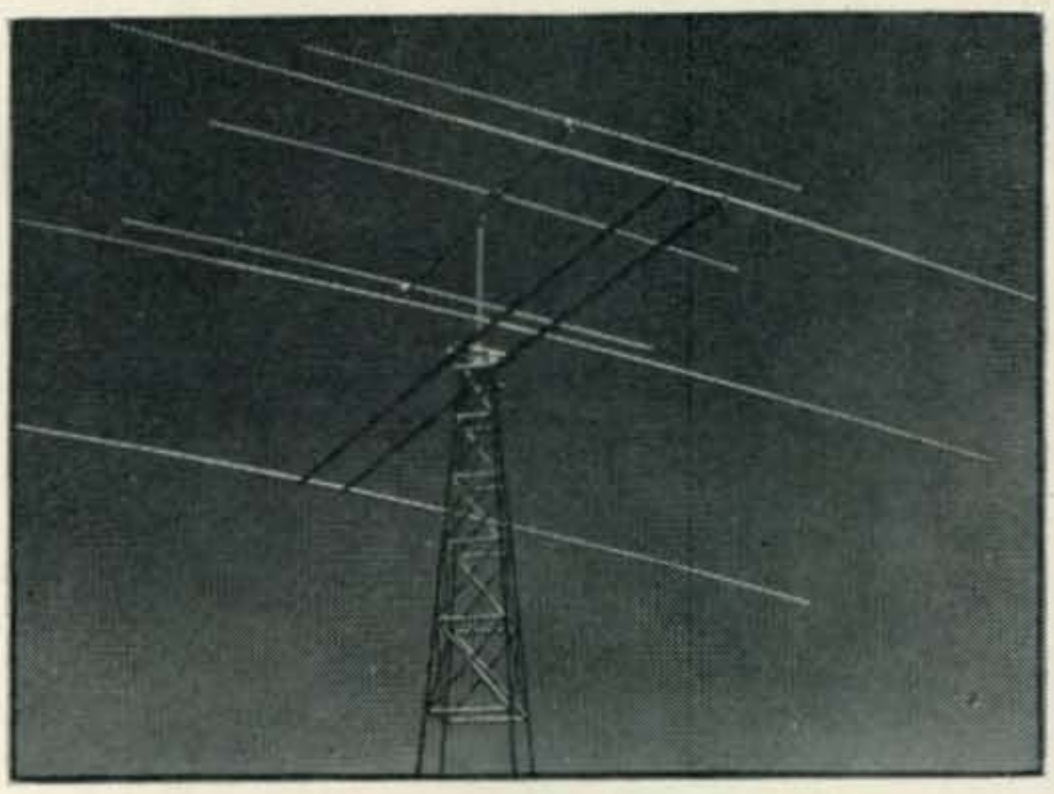
ESSE Radio Co
130 W. New York St.
Indianapolis 4, Ind.

Unless Otherwise Stated, All of This Equipment Is Sold As Used
CASH REQUIRED WITH ALL ORDERS
Orders Shipped F.O.B. Collect

PARTS & PRODUCTS

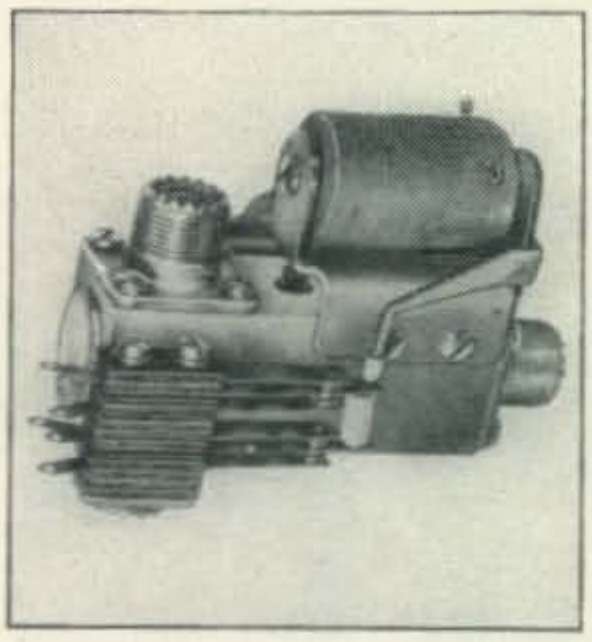
Dual Rotary

The Workshop Associates Inc., 66 Needham St., Newton Highlands 61, Mass., has announced a dual rotary built around the latest addition to their line, a 3-element close spaced 20-meter beam. Elements are supported by two duraluminum 2-inch diameter booms, and are designed for a minimum of sag and taper from 1¼" diameter down to ½" diameter. Element length and spacing are adjustable. Total assembled weight is approximately 55 pounds.



Coaxial Relay

Designed for switching of 50-ohm coaxial line, Advance Electric & Relay Co., 1260 West 2nd St., Los Angeles, Calif., is manufacturing series 7200 AC and 8200 DC SPDT switching relay. Features of the new series are an inspection port on top for easy access to the internal ¼" silver contacts and 3/16" silver external contacts for simultaneous control of indicator lights and other associated circuits. Using RG-8U cable, for which Amphenol fittings are provided, the S.W.R. is only 1.02.

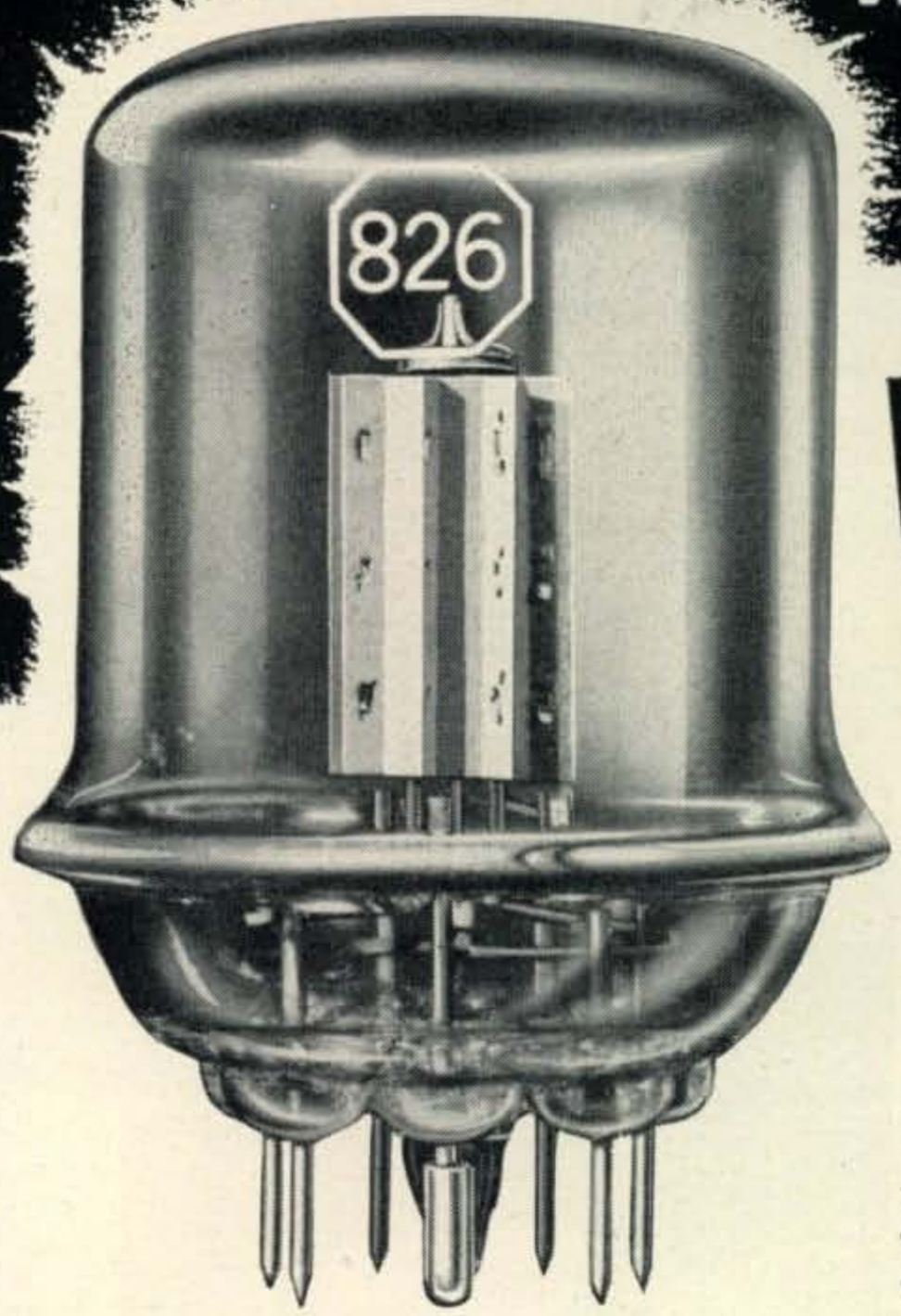


Small Variable Capacitors

Known as Type JCX, a new line of variable capacitors just introduced by Barker & Williamson, Inc., 237 Fairfield Avenue, Upper Darby, Pa., incorporate the same construction features, but with just 25% of the frontal area, that have made the large B&W Type CX capacitors popular for heavy-duty work. These features include opposed stator sections to provide short r-f paths, and butterfly rotor construction that permits grounding the rotor at the center of the r-f voltage point with respect to stators. Coils can be mounted directly on the capacitors for maximum efficiency.

The JCX units are designed especially for

WELLS' TUBE SPECIAL OF THE YEAR!



The 826—60 Watt UHF Transmitting Tube..... 49c

(LESS THAN THE PRICE OF A RECEIVING TUBE)

Accustomed as we are to excellent values in Government radio equipment, we were amazed at the remarkably low price at which we were able to get these 826's. The regular Amateur net price is $9.25 and worth it! So you can see why we're calling this the TUBE SPECIAL OF THE YEAR. Build your new rig around the 826. Order plenty of spares as we doubt if you will be able to duplicate this price when our stock is gone.

UHF Operation up to 250 MC.

The 826 will perform beautifully in your 2 meter rig as well as on the lower frequency bands. Use it as a final amplifier, modulator, doubler, buffer, or oscillator. In fact, the 826 is good for practically any R.F. or audio application.

826 Specifications

Max. Plate dissipation	60 watts
Filament volts	7.5
Filament amps.	4
Max. plate voltage	1000
Max. plate current	125 m.a.
Approx. grid drive	6 watts
Max. freq. full rating	250 mc.

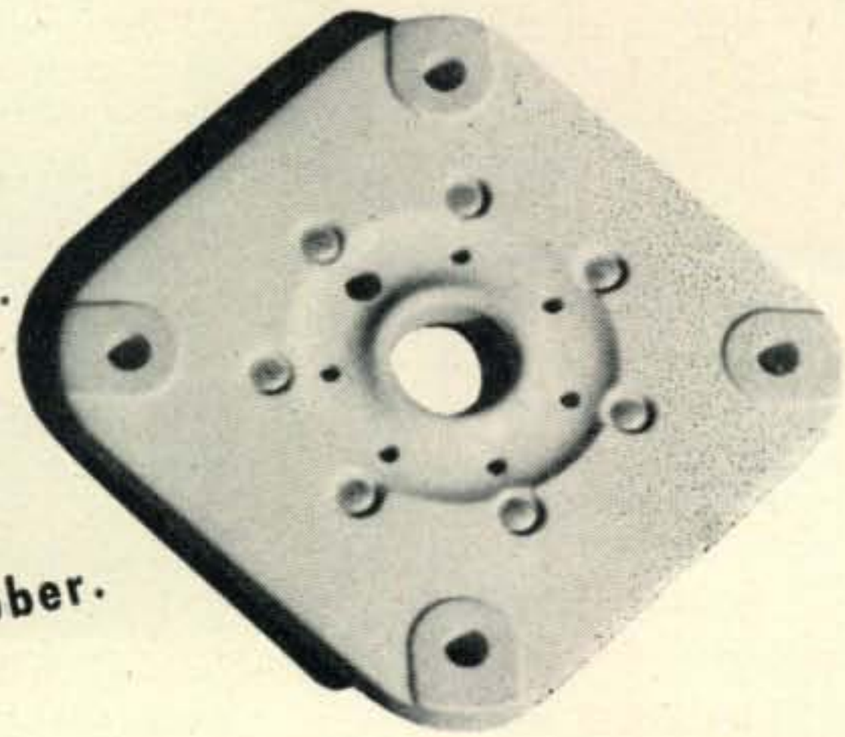
Power Output	Watts
Class C amp.	86
Class C plate mod.	53
Class B telephony	22
Grid modulated	25

These tubes are standard make, brand new, JAN inspected, and packed in their original cartons.

At our low price, 826's can be shipped only in boxes of 4 for $1.96. Add 25c for each box of 4 tubes for prepaid shipment to any part of the continental U. S.

Tube Sockets for the 826

Ceramic tube sockets for 826, 829B and 832 tubes . . . only 50c each.



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Containing Hundreds of Money Saving Values

320 N. LA SALLE ST., DEPT. C12, CHICAGO 10, ILL.

medium-powered triode or tetrode stage plate circuits where modulated plate voltage does not exceed 1250 volts and unmodulated plate voltage is not more than 1500 volts. The airgap is .125". Three standard types are available: JCX100E having a mounting length of 5½" and a capacity of 100 $\mu\mu$f per section; JCX50E, 3 3/8" and a capacity of 50 $\mu\mu$f per section; and JCX25E, 2 3/4" and a capacity of 25 $\mu\mu$f per section. Descriptive bulletin will be sent on request to the manufacturer.

Roll Top Carrying Case

Simpson Electric Co., Chicago, has developed a roll top safety case for its Model 260 volt-ohm-milliammeter. The instrument is permanently fastened into the case, which is made of heavily molded bakelite and is large enough to provide a

compartment for leads beneath the instrument. The front is covered by the roll top panel, a sliding cover of narrow bakelite segments on a cloth backing, which rolls up or down at the flick of a finger. A heavy leather carrying handle completes the assembly. The case is designed for ease in servicing for battery replacement.

A CHICAGO KILOWATT

(*from page 39*)

screen current 0—300 ma meter. It will not only enable you to accurately check screen dissipation but tell you more quickly of grid drive, resonance of grid and plate circuit, etc., than any other meter in the circuit. Typical final operating conditions are: E_p 3,000; I_p 330 ma; E_{gc}—150 volts; I_{gc} 20 ma; E_{sg} 500 volts; I_{sg} 100 ma.

The Modulator

The modulator consists of two 4-250As operated Class AB; at 2,500 volts on the plate. Static plate current runs about 120 ma. As indicated in the schematic, a 6J7 drives a 6J5 which in turn drives

two 6SJ7s as phase inverters which, at less than 1-watt output, adequately excite the 4-250A modulator tubes to approximately 500 watts output.

A 10-henry choke is inserted in series with the screen lead of the 4-250As in the final r-f amplifier—no audio is placed on the r-f amplifier screens since it is not necessary to have completely linear 100% modulation.

A lockup relay is used in a different capacity in this unit—locked in one position it turns on the modulator amplifier and rectifier filaments as well as removing the short across the secondary modulator transformer. When pulsed to the "c-w" position, the filaments are turned off and h.v. then goes direct to the Class C load.

While it was not the author's intention that anyone would duplicate this transmitter in its entirety, the over-all design has aroused considerable interest from all the hams who have seen it in operation. As a different approach to high-power design it should be of interest to anyone contemplating a kilowatt phone and c-w rig.

THE YL'S FREQUENCY

(from page 50)

luncheon, including the following licensed YLs: Lily May, W7KAE; Camille, W5NAF/7; Ella, W7LNV; Edith, W7SHR; Ruby, W7JZA; Eva, W7RIJ; Jessie, W7TBR, and, of course, W7KOY.

"We also made a table cloth, which everyone at the convention autographed, and which then was raffled off."

But if we couldn't get to New Hampshire or Arizona, we could and did attend the Boston Hamfest. And what a bang-up affair that was— 5,000 people attended the one-day meeting! Eunice, W1MPP, was the committee of one in charge of the program, and we think she did a grand job.

We were so busy taking subs to *CQ* we didn't get around much, but did attend the YLRL meeting presided over by Ann, W1OAK, where we met Dot, W1FTJ; Eunice, W1NJJ (better known by her OM's call, W1BEQ); Elizabeth, W1PQY; "Flo," W1OME, and Leonore, W1MIM. We also saw "Tillie," W3NHI, again and met "Cookie," W1FOF, and Louise, W1MDV.

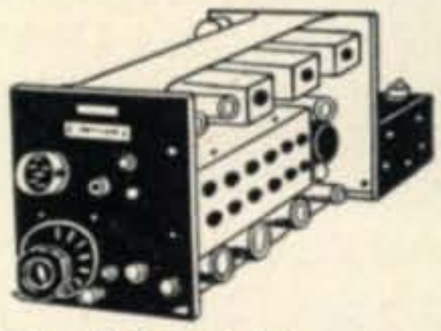
Bea, W7HHH, writes that on Sept. 27-28 she and the OM, W7GNJ, attended the hamfest held at Mt. Shasta City, Calif. "We had a wonderful time and I met Vida, W7LKG, and also saw Dot, W7GLK, of Ashland, Ore. Dot and I seem to meet at almost all the amateur get-togethers." Bea adds, "QSOd Virginia, W5LVT, of Texarkana, Ark. This makes my 64th YL contact."

The weekend of Sept. 27-28 was also the occasion of the first YLRL QSO Party of the season. From Leonore, W6NAZ, we learn that the winners are: first, Miriam, W7JFB; second, Edna, W6SLT, and third, Dot, W1FTJ. All three girls have the reputation of being excellent operators—and this is proved once more.

Dot, by the way, tells of an amusing QSO during the party. As she called "CQ-YLRL" an OM in N.Y.C. came back to her with, "I don't know what you're calling, but if you are in distress I'm right here in New York and can help you." Hi!

Joanna, WØJWJ, tells us that she, Leta, WØDBD; Marie, WØPFO, and Louise, W9JTX, finally got

"Communications" OFFERS



R4-ARR2 Receiver

UHF receiver, approx. 300 Mcs. With following tubes: 7-9001's, 3-6AF5's, 1-12A6. New..**$17.50**
W/dynamotor (28 VDC Input).....**$19.20**
Less Dynamotor, But W/Fil xfmr.....**$19.00**

OIL CONDENSERS	
5-5 mf @400 VDC	$.75
1 mf @ 500 VDC	$.75
.1 mf @ 600 VDC	$.35
4 mf @ 600 VDC	$.75
5 mf @ 600 VDC	$.80
8-8-4 mf @ 650 VDC	$1.45
.5 mf @ 1000 VDC	$.35
1 mf @ 1000 VDC	$.75
1.5 mf @ 1000 VDC	$1.00
2 mf @ 1000 VDC	$1.25
4 mf @ 1000 VDC	$1.00
1.5 mf @ 1500 VDC	$1.25
.1 mf @ 2500 VDC	$.60
.06 mf @ 15 KV DC PYR	$10.00
.25 mf @ 20 KV DC OIL	$17.50
1.5 MF @ 6000V	$12.50
ELECTROLYTICS	
25-25 mf @ 50 VDC	$.45
30 mf @ 50 VDC	$.30
100 mf @ 50 VDC	$.35
500 mf @ 200 VDC	$1.19
16-16-16 mf @ 350 VDC	$1.50
16 mf @ 450 VDC	$.95

Indicator I-221

Remote antenna direction controller & indicator, using 2 selsyn motors. Servo unit controls direction of antenna. 360 deg. rotation. Operates on 117 VAC, 60 cps. New, W/tubes.....**$50.00**
RACK, FM 79 For housing above 3 units. Has self contained blower, built-in cables & plugs, & interlocking devices. New.....**$35.00**

Control Unit BC 1073

Consists of pulse-generator and a wavemeter which measures frequencies from 150 to 210 mc. The pulse generator makes an excellent square-wave generator with variable pulse-widths. The wavemeter can be modified into a UHF oscillator. 117 VAC, 60 cps operation. W/tubes.....**$50.00**

Complete Set RC 148

Xmtr & Rcvr BC 1267 & power supply RA-105. Both units with tubes.....**$47.50**

Complete Transmitter-RC-145

BC 1267, RA 105 A, Indicator I 221, Control unit BC 1073, and antenna AN 128 A may be operated as independent units, or the complete set of components combined to form a unit may be purchased at this special price...With mounting rack. New.....**$190.00**
(Gov't cost...**$5000.00**)

Tuning Units

Ideal Basis for E. C. O. Rig

Tuning units for TCE & G P7 in the following frequencies: kcs; A-350 to 800 kcs; B-800 to 1500 kcs; C-1500 to 3000 kcs; E-4525 to 6500 kcs; F-6200 to 9050 kcs. Contains all coils, etc. for these frequencies.
Units C. F. Each..... **2.75**
Units B. E. A. Each..... **2.00**
Complete set of 5..... **11.00**

Headsets

Dynamic mike and headset combination. A high quality, efficient unit, used in B-19 tank Xmtrs. Mike & phones complete, new.....**$2.75**
R-15 headsets: 8000 ohms impedance, rubber cushions. Comes with 8" cord & plug PL 55. New **$1.95**
Used, in good condition .....**$ .60**
HS 30 headset. Insert type headset cuts out background noise, and low impedance (500 ohms) assures efficiency and high fidelity. A MUST for every ham at this price.....**$.85**
Xfmr to match 5000 ohms output.....**$.35**

Dynamotors

PE 73 CM(G.E) Power supply for BC 375 Input: 28 VDC Output; 1000 VDC @ 350 Ma. New.....**$4.95**
BD 77KM Power supply for BC 101 New, with spare fuse links, etc. 1000 VDC @ 350 Ma. **$5.95**
MFRS: Write for quantity prices and discounts on above items.
PE 101-C, Input 13/26 VDC @ 12.6/6.3 A. Output: 400 VDC @ 135 Ma., 800 VDC @ 20 Ma. 9 VAC @ 1.12 A.....**$3.49**
(Mfrs. write for quantity prices and further information.)
PE 86 N, Input: 28 VDC, Output: 250 VDC @ 50Ma.....**$3.25**
PC 77, Input 12 VDC, Output 275 VDC @ 110 Ma. 500 VDC @ 50 Ma.....**$3.25**
DAG 33A Input: 18 VDC @ 3.2 A. Output: 450 VDC @ 60 Ma.....**$2.45**
DM 33: Input 28 VDC @ 7 a. Output: 540 VDC @ 250 Ma. Power supply for SCR 274 modulator.....**$3.95**
DM 23350: Input: 27 VDC @ 1.75 A. Output: 285 VDC @ 75 Ma.....**$1.75**
DM 21: Input: 14 VDC, Output 235 VDC @ 90 Ma. Power supply for BC 312.....**$1.95**

Rotary Transformer-Type U

Complete power supply for SCR 522. Input 12VDC. With starting relay, blower, etc. Totally enclosed. Wood case.....**$4.95**

SPECIALS

RAK-7 RECEIVERS

15 to 600 kc, 6-tube receiver with: AVC, Band Pass Audio Filter, Noise Limiter, Precision tuning with Venier dial, Voltage regulated power supply with 3 tubes for 115 volts, 60 cycle. Can be battery operated. New. Comes in 5 cases with spare parts, extra tubes, auxilliary equipments, etc.....**$75.00**

MINE DETECTORS AN/PRS 1

Will indicate metallic & non-metallic objects. Includes detector unit & amplifier, all tubes, cables, etc. New, complete.....**$12.75**
With Batteries.....**$21.65**

MACKAY RADIO XMTR, 167-BY

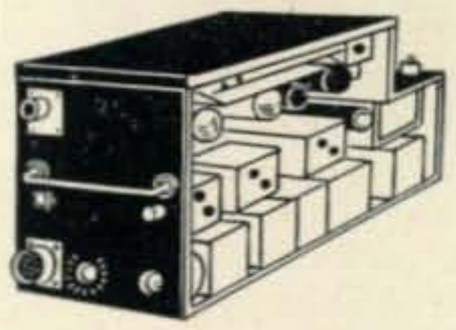
Freq. Range: 2-24 Mc., Power Output: 200 Watts from 2-16 Mc, 150 Watts from 16-24 mc. Comes with rotary power supply for use on 110 VDC New. In wooden crate.....**$350.00**

Coax Cable & Plugs

RG9/U 51 ohm silver coated. Min 50 ft. length .....per ft. .07½
RG8/U 52 ohm. Min 40 ft. length...per ft. .04½

Amphenol Low-Loss Series Connectors

83-1R Female	27c
83-1AP Rt. angle	27c
83-1F Junction	45c



BC 733-D Receiver

6 preset xtal frequencies from 108.6 mc to 110.3 mc. Will make FB receiver for 2 meters with little work. Has following tubes: 2-717 A's 2-12SG7, 1-12SQ7, 1-12A6, 1-12AH7, 2-12SR7. Less Dynamotor. New.....**$17.00**

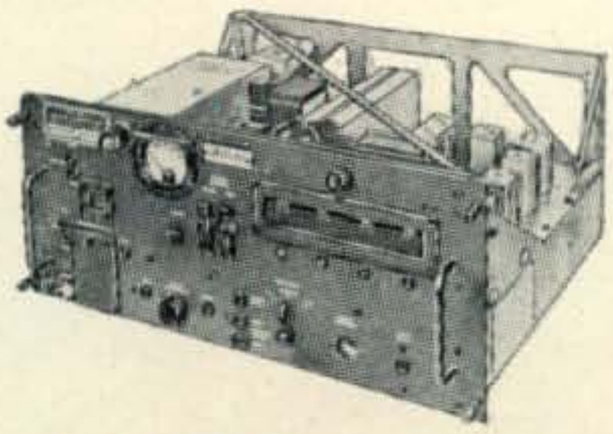
Transformers

(Filament Transformers)
All Primaries 117 V, 60 cycles

No. 5058: 6.3 VCT @ 2A, 6.3 VCT @ 2A, 6.3 VCT, @ 2A.....**$2.45**
No. 5126, 5 VCT @ 3A, 5 VCT @ 3A, 5 VCT @ 6A.....**$3.25**
No. 5100, 6.3 VCT @ 1.2 A, 5000 V test...**$2.45**
No. 5085: 6.3 V NCT @ 6 A, 6.3 V NCT @ 1.5 A.....**$1.85**
No. 5056: 6.3 VCT @ 9 A, 6.3 VCT @ 2.2 A, 6.3 VCT @ 2.2 A.....**$3.75**
No. 5057: 6.3 VCT @ 1 A, 5 VCT @ 3 A, 5 VCT @ 3 A.....**$2.75**
UX 6899: 5 V @ 5.5 A, 5 V @ 5.5 A, 29,000 Volts Test.....**$24.50**
Fil. Xfmr. to supply filament current to surplus equipments using 12 Volt tubes. Pri: 117V 60 cy. Sec: A wide range of voltages up to 26 V @ 2 A.....**$1.50**

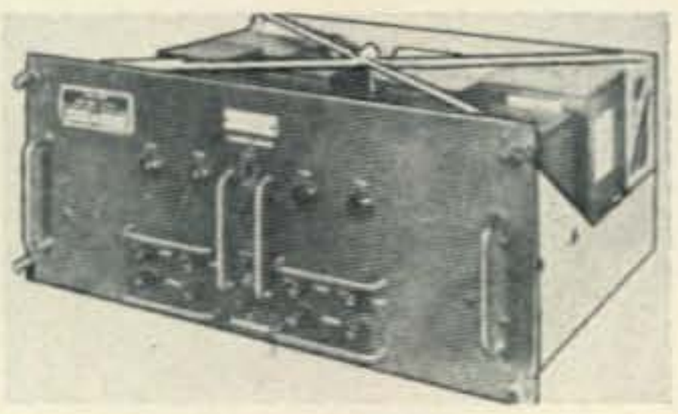
Power Chokes

6 Hy @ 150 ma	$2.00
6 Hy @ 300 ma	$4.50
1 Hy @ 800 Ma. 7.5 Ohms	$8.95
Dual Choke: 2-2 Hy @ 100 Ma.	$ .90
Dual Choke: 7 Hy @ 75 Ma. 11 Hy @ 60 Ma.	$1.95



BC 1267 Transmitter & Receiver

1 KW pulse oscillator on 154 to 186 mc. Can be converted to CW or Voice operation on 144 to 148 mc. band. Receiver is a superhet with 2 stages of RF, 5 stagger tuned IF stages. Plenty of room on chassis for additional stages & changes. New, W/tubes. In original crate**$75.00**



Power Supply RA105A

Input: 117 V, 60 CPS. Output: 2000 VDC, 2000 VDC, 610 VDC, 415 VDC, 300 VDC, 290 VDC, 160 VDC, and 6.3 VAC, 60 CPS. New, W/tubes.....**$40.00**

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together at a meeting of the local council of radio clubs in St. Louis. They've been hoping to have a luncheon together.

According to Joanna, Flo Hart, KL7CY, now in Pine River, Minn., says she is going to Honolulu the last of October to join the OM. She will be on 20 phone after they are settled there. Her inactivity is because of her 19-month old YL—*K. L.* Hart—born in Alaska.

Diana Tuck, ZS6GH, has been continuing her travels around W-land. Inez, W7JKX, and OM, W7BHE, met Diana at the depot between trains and had a very enjoyable chat. Diana has been visiting many of the Los Angeles YLs—staying with Helen, W6MWO; Clara, W6TDL, and Maxine, W6UHA.

We hear that Howy, W2QHH, of Hamilton, N.Y., is one OM seriously after WAS/YL certificate. His QSL notes 46 states YL-worked thus far and he needs only West Virginia and Nevada!

And speaking of WAS/YL, how about WAC/YL —or WAZ/YL—now that so many OMs have worked, or are about to complete, their 40 zones? That one would really keep the boys working for years to come.

YLs Overseas

Here is one YL who would be glad to cooperate with WAZ/YL seekers—Ada Garibaldi, I1MQ, of Diano Marina, Italy. Ada, because of her consistent activity with c.w. on the low end of 20 (14,010-14,050 kc) has given many Ws their first postwar Italian contact. She is a good operator—she has to be with only 10 watts—but we'll let her tell the story:

"Of my transmitter I can say very little. I work with a small Hartley of 10 watts input which, notwithstanding its modest power, has enabled me to work some fine DX: W-VE-VO-ZL-VK-KP-ZS-CM-NY-HP-PZ-OA-VU. Nearly every day I QSO W sta-

(*Continued on page 66*)

YLRL WAS/YL Contest

The following rules are a revision of those published in the February, 1947, issue of *QST*. Note that the "postwar" stipulation, as a result of many requests, has been eliminated.

The Young Ladies' Radio League offers a certificate to any licensed amateur who qualifies for its Worked All States-YL award. These rules apply:

1) All licensed amateur radio operators, OM or YL, are eligible.

2) All contacts must be with licensed women amateur radio operators, although not necessarily with members of YLRL.

3) Confirmation of two-way contact by amateur radio (QSL cards) with all of the 48 states in the U.S. must be submitted to Lou Littlefield, W1MCW, 19 State Ave., Queen Acres, Cape Elizabeth, Maine.

4) Contacts must have been made from the same location or within a reasonable distance in one city or residential area.

5) Return postage must be enclosed for return of QSL cards, and the YLRL will not be responsible in case of loss or damage to cards submitted.

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Ready now—the greatest, most complete presentation of radio, electronic and television equipment and supplies in Concord history! Packed from cover to cover with thousands of items—Radio Parts, Radio Sets, Amplifiers, Sound Systems, Test Equipment for every purpose, Record Players, Record Changers, Television Equipment, Ham Gear, Receivers, Transmitters—160 pages of everything and anything in Radio and Electronics, and featuring a special bargain section of hundreds of money-saving values in top quality, standard-make parts, including scores of new items from nationally-famous makers. Immediate shipment from CHICAGO OR ATLANTA. Mail coupon for your FREE copy at once. CQ-107.

SAVE MONEY . . . Trade in Your Old Receiver!

Your present receiver probably has a good trade-in value on a new set. Write, giving make, model and condition, for full information.

TIME PAYMENTS: Write us for details of time payment plan on Communications Receivers, Amplifiers, Test Equipment, Radios, Phono-Radios, etc.

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Panoramic Adapter
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C21000 Now Only - - - - - - $49.50

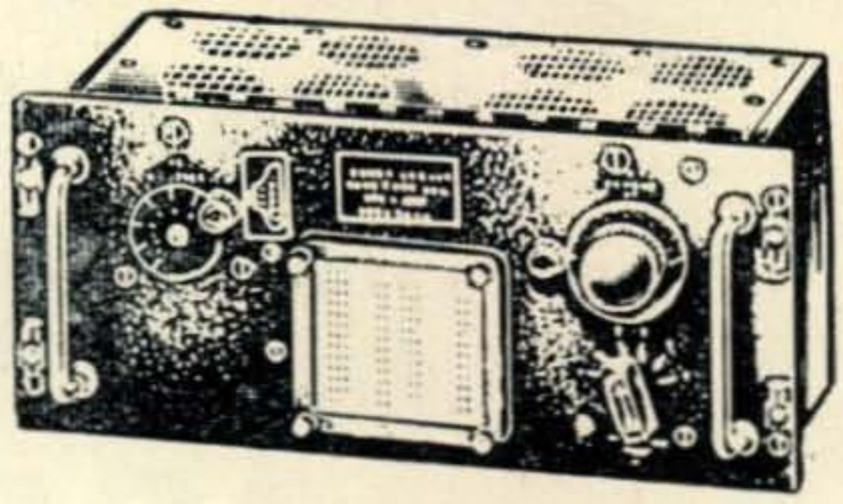
Hallicrafters
HT-18 EXCITER

Sensational V F O for CW-AM-NBFM

Power output from 4.5 watts at 80 meters to 2.5 or more on 10! Seven separate dial scales cover each ham band from 3.5 to 29.7 MC. Narrow band FM on all ranges with built-in pre amp for crystal and dynamic microphones. FM deviation is 1200 cps on all bands. Response flat from 100 to 5000 cps. 6 tubes, including rectifier. For 110 volt 50-60 cy. AC C21074—Your Cost..... **$110.00**

NATIONAL
NC-57 RECEIVER

Covers entire frequency spectrum from 550 KC to 56 MC in five bands. RF amplifier, converter, and CW oscillator have voltage regulator to insure peak stability. Nine tubes. Separate band-spread dial provides sharp tuning and accurate calibration. Grey finish cabinet with heavy duty PM speaker. Operates on 110 volt 50-60 cy. AC, with provision for battery operation. Size: 16½" wide, 11¾" deep, 8¾" high. C21266—Your Cost.... **$89.50**



TUNING UNIT T U-10-B

Frequency range 10,000 to 12,000 KC. Housed in aluminum case with removable top and bottom covers. Contains three Hammarlund double spaced condensers: one 27 plate 100 mmf., one 16 plate 35 mmf., one 7 plate 20 mmf., three 2500 VDC mica by-pass condensers tuning coils, terminal strips, stand off insulators, 50 to 1 right angle dial. Size: 7⅝" x 16¾" x 8¾". 5B9542—Your Cost..... **$1.95**

tions and with several of them (W4ML, W2GGL, W2HXT, W9FKS, etc.) I frequently find myself on the air. Perhaps I should say that the owner of the station is my father. Like me, he is devoted to c.w. and, in fact, we have never used phone. (In a note to W4ML, Ada commented, 'Often my father is on the key. Consequently, pay attention, dear Tom, and do not call him 'Ada.' Hi!')

"Official licenses for transmission in Italy are still not available, and we have received only one or two of short duration. However, our activities have been embraced by the proper authorities.

"I learned Morse and became acquainted with the key in 1937 when I was 13 years old (I was born July 9, 1924). At that time radio transmission by amateurs was prohibited and my father, for fear of being unpleasantly surprised, worked in my room at night behind a screen, and during the day he would hide the transmitter in the oven of a small stove. This will give you an idea of the dimensions of our old transmitter, similar in other respects to the one we use at this moment. So, despite two periods of silence—enforced by reason of two unsuccessful searches by the police— I can say that I learned c.w. in short order without any difficulty, and really by hearing papa tapping the key.

"Then came the war and, after a brief course to perfect my technique, I served as R.T., telegraphist, and aerologist at an airport in northern Italy. During that time I was in many bombardments (the 'G' and 'W' bombs were 599! Hi!) but by the grace of God I returned home safe. Now I live with my family which consists of my parents, two sisters and one brother— and to which must be added three cats, three hens, one rooster and five rabbits.

"I help my sister who is a dressmaker. To tell the truth, I very willingly leave needle and thimble for the key and, especially in winter, I spend whole nights at the transmitter, sleeping in the daytime, thus provoking my sister's anger, naturally! In summer this happens less frequently because I spend my leisure swimming in the ocean (we live in a small city on the Ligurian coast).

"With great regret I must say that in Italy there are very few YL operators, about five or six, and they work phone. I have never heard of any using c.w. and I have reason to believe that I am the only one. We have no society similar to your YLRL, and it seems quite remarkable to have two societies which foster the interests of the Italian OMs—the ARI and the RCI. My father is enrolled in the ARI, which is the older society, dating from 1937, and, as do all the Italian OMs, we should like to see these two associations become one.

"I send many affectionate 73s which may be extended to the YLs of the YLRL."

DX

(*from page 46*)

might be worth considering. They suggest that instead of calling "CQ DX" it be shortened to just plain "CX". Now don't start getting smart and yelling, "Hey, you can't do that 'cause CX is Uruguay." But the SMs thought of this one, too . . . and add this remark, "Who the heck would sit around calling Uruguay all evening". Well, that's what they said anyway. What do you think?

PK7, Netherlands, New Guinea

Our friend PK6HA, now *PK7HA*, passes along the news that Netherlands New Guinea is now PK7, and that the Celebes and Moluccas remain PK6.

Brand New Automatic Direction Finder

RADIO COMPASS

SCR-269F Complete with Component Parts Less Power Supply **$75.00**

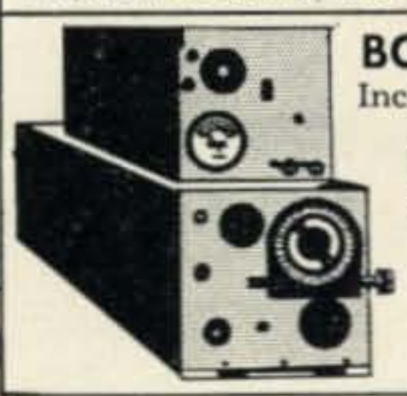
This equipment comes complete with 17 - tube superheterodyne receiver which is tunable from 200-1750 KC in three bands. A complete instruction book for operation and maintenance accompanies this equipment.

TRANSMITTER TUNING UNIT BC-375

Approximately 65 MMFD cond., coils RF chokes, dials, assorted mica condensers, 2500 WVDC. Over $50.00 parts! **$1.95**

DYNAMOTOR UNIT PE-101-C

Duo output Dynamotor, input voltage 12 to 24V., output voltage 400V. at 135 ma, 800V at 20 ma, and 9 V. at 1.1 amp. **$2.95**



BC-AR230 Transmitter

Including 4 tubes and Rf Amps. meter.

BC-AL229 Receiver

Including 6 tubes. Used in aircraft.

BOTH UNITS ONLY **$9.95**

1FF TRANSMITTER AND RECEIVER

$9.95

Successfully used as a television receiver. 30 MC I.F. channel and video amplifier; original diagram furnished. Less tubes and power transformer.

BC223AX TRANSMITTER

Complete with tubes and tuning unit covering 80 meter Ham band, including frequencies charts, less xtals. **$12.50**

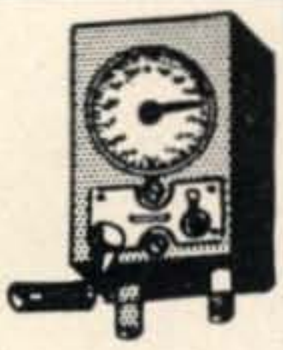
BC 433G RECEIVER

Complete with tubes, used, in good condition. **$29.50**

T-17 CARBON MICROPHONE 89c

Like new.

Azimuth Control 49c



Dial calibrated, 360 face, ideal for antenna rationalizing indicator.

Overload Relay

$1.95

Patter and Brumfield, Relay 1, 5,000 ohms, coil current 10 MA., Relay No. 2, 110V, 60 Cy, AC coil, S.P.D.T.

POWER TRANS.

$1.95 110V, 60 cy Sec. 1: 4V at 16 Amps, Sec. 2: 2½V at 1.75 Amps. Ideal for 2x2 and 826 tubes. Hermetically sealed, size 6" x 3½" x 4¼".

GEN. ELECTRIC METER

$3.95

Type DO41, 3" 0-1 MA, meter scale graduation 0-5 D.C. Kilo V and 0 10 MA D.C.

BK22K RELAY

$2.95 Used in conjunction with SCR269F, changeover contains 29V, step relay, 5 deck, 6 position switch. 12V D.P.S.

Variable Resistor

2500 ohm, 100 W. **49c**

IF TRANS. 95c

Mounted in aluminum shield can 1500 KC, with air trimmer, impedance coupled type.

5 GANG VARIABLE CONDENSER

$1.95

5 gang, approx. 50 M.M.F.D. per section with individual air-tuned padders. 18 to 1 vernier drive.

POWER TRANSFORMER

$1.95 110V, 60 cy Sec. 300V ea side of center of 125MA, 6.3V at 2.1 Amps, 5V at 3 Amps. Hermetically sealed, size 6" x 3½" x 4¼".

BC-654 Transmitter & Receiver

With tubes and xtals, used, in good condition. The frequency range of both transmitter and receiver is continuous from 3700 to 5800 KC; all stages gang tuned by anti-backlash worm gear dial mechanisms.....$12.50

FILAMENT TRANS FORMERS

110-V, 60-cy. Pri. Sec. 5-V, 3". Shelled case. **$1.49**

110-V, 60 cy. Sec.: 2.5V at 5.25 amps. Shelled case. **$2.45**

Toggle Switch 39c

D.P.D.T. 30 Amps, in black Bakelite case.

PYRANOL CAPACITATOR

$2.95

General Electric. 1 MFD. 5,000 VDC.

4" x 4½" x 3¾".

DYNAMOTOR DA-3A

$1.50

Input. 28 V.D.C., 10.5 AMPS Output, 300 V.D.C., .260 AMPS 150 V.D.C., .010 AMPS 14.5 V.D.C., 5 AMPS Shipping Wt. 25 Lbs.

FM Radio and Transmitter BC-620-A, 20 MC - 27.9 MC

$9.95

This Xtal controlled FM set has 13 tubes and has dual Xtal controlled channels. It also contains built-in Fil. and Plate Meter. Tubes used: (4) 1LN5, (1) 1LC6, (1) 1LH4, (2) 1291, (4) 1299, (1) 1294. Ideal for communication between Trucks, Boats, etc. Used, in good condition. Less power supply. Wt. 38 lbs. Complete with carrying case and diagrams.

30MC IF TRANSFORMER 29c

Slugged Tune.

Condensers

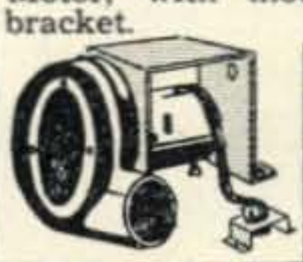
Cap. MFD	Working Volt	Your Cost
1	1000 oil	44c
8	600 oil	95c
2	600 oil	49c

Butterfly Condensers

Oscillator assembly 76 to 300 MC with acorn tube socket mounted on condenser.	$1.95
Type B, frequency range 300 to 1000 megacycles.	95c
antenna condenser 105-330 MC.	$1.95
Oscillator 105-330 MC.	$1.95

Squirrel Cage Blower $7.50

2" outlet, 110 AC, 60cy Silent Ball Bearing Motor, with mounting bracket.



Sockets for acorn tubes	$ .19
Powdered iron ⅜ slug	.10
Jacks, PL55, PL68	.15
Asst. mica condensers	1.95
3 lbs. asst. hardware	1.00
Pin straightener for min. tubes	.49
Ear phones, 2000 ohms, used	.95
Johnson sockets, No. 210, 25W	.39

CORONA BALLS $1.00 Dozen 10c Each

High-Speed Photo Flash Tube

10,000 Flashes

12,000,000 lumens light output. Stops all action. Ignition coil included on back of bulb. 10,000 flashes. Diagrams furnished.

$8.95

TUBES

813	5.95	872A	1.95
VR150	.69	9004	.49
955	.65	9006	.59
9002	.89	50B5	.89
RK60	.95	VT127A	2.95
9001	.89		
6J4	1.50	35W4	.69
5FP7	1.95	3AP1	1.95
7BP7	2.95	3BP1	1.95
9LP7	3.95	6J5	.49
6N7	.89	5BP1	3.95
		6H6	.59

1T4, 3Q5, 3S4, 5W4, 6SA7, 1G5, 12H6, 6SH7 — 6SN7 .59 — **44c**

89c

±1% 1 MEG.

General Electric 25 MFD Photoflash pyramol capacitator, 2000 VDC-INT	$14.95
SPST relay 24V, 528 ohm. coil contact rating 5 amp. Packed 2 to a carton.	2 for .49
Coaxial solid copper tubing, 30 foot	2.95
30-20 MFD Solar condenser, 150 V. tubular	.49
Assorted tubular oil-filled condensers, up to 5 MFD, 15 for	1.00
3 lbs. assorted hardware	1.00
Westinghouse oil 1MFD 6000V, WVDC	7.95
144 MC radar osc., uses 15E with variable coupling, complete less tubes	3.95
Assorted high frequency chokes, 25 for	1.00
Thordansen 300 MA power transformer, 110 or 220V, 60 cy. input, secondary 500/ct/100 tapped at 400/400 extra bias winding 200/ct/100 at 50 MA, 18 lbs.	4.95
Assorted resistors ½ watt fully insulated in popular ohmages, 100 for	1.49
Thordorsen T48003, 2H-7H 550 MA swing choke, size 4½x5½x5½, square black crackle case, 15 lbs.	5.95
Assorted mica condensers, per 100	1.95
Wafer sockets, 4, 5, 6, 7 and 8 prong, per 100	2.95
12" Utah PM speaker Alinco No. 5 with 6F6 output transformer	6.95
Assorted knobs, push on wood and plastic	1.95

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All Orders F.O.B. Detroit — **Minimum Order $2.00** — Michigan Customers Add 3% Sales Tax

This will clarify the situation in that area quite a bit. W6QL and W6GRL scooped up this dope via "short-wave amateur radio."

W2GUM sent a card to *TA1AD* but it came back. The notations on the envelope were written presumably in Turkish, and since my translating machine is "busted" I can only guess it meant . . . "sorry please, there ain't no TA1AD."

VK2ACX is now running 100 watts but isn't too hot about his present QTH, so he's moving. Says it should be a much better spot . . . and yet the guy is doing OK where he is. Yep, he has the DX germ all right.

WAZ No. 9 to W6LEE

Bob Turk, W6LEE, brought in his 40 confirmations just barely in time to get in this issue. Bob was one of the first W6s on after the war and plops himself into the Honor Roll with 150 countries. This is as good a place as any to mention that Bob's XYL is as DX minded as he is . . . her call, W6WZU.

G2PL says he has trouble getting his S3 signal into California . . . but that isn't quite the way we hear it. Think Pete's just fishing for something . . . don't know what unless it's for a pix of Jane Russell. He says he has permission from his XYL to have Jane's picture on the wall next to Ginger's. Pete's S3 signal seems to have collected 173 countries somehow.

I like this remark made in G6QB's column . . . see if you do. Says G6QB, "some DX men are perfect gentlemen when they don't have a v-f-o knob in their hands! V-F-O knobs and fast sport cars transform the most charming people into teeth-gnashing demons on occasions." More from QB . . . G6WW has gone QRO with parallel 807s. Look as his spot in the Honor Roll and then ask if QRO is worth while or not. G5MR worked a bunch of stuff including *LF2Z* near Oslo. Seems that the LF prefix is alloted to radio manufacturers as a special license and they can use the ham bands. In case any of you heard *G8XY/VO* or *G8XY/P* it was the Public Schools Exploring Society's Expedition to Newfoundland. Send cards to White Barn, Old Oxted, Surrey. G6ZO is top G with 39Z and 176C. Although there are nine Gs who have worked 40 zones none of them have gathered in all 40 confirmations, but it looks as though it won't be long now. Thanks to G6QB and *Short Wave Magazine* for plugging the 1948 DX Marathon. This will assist in spreading the word overseas.

TF3EA writes to say that Icelandic hams were licensed for the first time in March of this year. Prewar there were no licenses and some of the boys who are getting on now haven't discovered they must obtain a license. TF3EA says he QSLs 100% but also likes to get our cards. He sends his all direct to the individual district QSL bureaus. The rig at TF3EA has been limited to 50 watts, but now that he has permission to run 150 watts his signal should pick up quite a lot. His antenna on 10 is going to be a 3-element beam but will have to go along on 20 with a half-wave affair until materials become available. TF3EA has 24Z and 64C but I think his 150 watts will fix up that little deal. He is prexy of the Icelandic Radio Amateurs and they are trying to obtain more frequencies.

CP1AT has been slowed down somewhat of late. Reason . . . a YL, and that's not all . . . they're engaged. However, he does say he isn't giving up ham radio and will be on Monday nights starting at 0100 or 0200 GMT. He wants to give the Ws a break but expects them to use a little discretion in calling him. CP1AT has installed a system to record

his various QSOs and will QSL every contact. He expects to get a card in return. Have you sent him one of yours? Since it takes considerable time to make out and send cards and since he doesn't have as much time anymore (remember he's engaged) he is going to send his cards twice each month. One mailing will be on the 15th and the other on the 30th (except February, natch). They will be airmailed so you guys should be getting them from the Bureaus around the 5th and 20th of each month.

It's good to know old *OH3NP* is back on the air, and at the same QTH as prewar. He used to be one of the most consistent OHs. W3NIH got a bang out of working HB9EK on 40 c.w. with his antenna 10 feet off the ground, and his input about 35 watts. W9OOJ has an SWL card from prewar *OE3WB* who said all of his equipment and QSL cards were burned during the war and would greatly appreciate any of the old-timers, who worked him prewar, sending him another card. So, how about checking back in your old logs and shooting a duplicate card to OE3-WB, W. Blaschek, Kierlingerstrake 10/10, Klosterneuburg, Austria. W2AFU said he awoke to the fact that *C8YR* was in Zone 23 and as a result of discovering this . . . he searched farther and found

Frank Rabb, GI6TK, besides the Sterling on which he is chief RO.

cards for the other 39 zones . . . but we haven't seen them yet. W1AB is active again and has a new house as well as a new rotary beam.

KP6AB is a new one in the Honor Roll. He is Bill Fells and is on Palmyra. Until July, Bill was running 50 watts but he now has an 813 with about 230 watts into it. Antenna is two elements while a Zepp is used on 40 and 75. Bill will be on Palmyra for another year. He passes along a little info re *VR3A* on Washington Island. Several months ago KP6AB picked up an ART-13, a BC-312 and a BC-348 and shipped them to his friend Ron Garrett on Washington Island. He is on 20 phone at the moment. Receiver is an HQ-129X. VR3A gets his power from 24 volts of batteries and they are charged by a gasoline generator, so you can see his problems. Mail should be directed to him: VR3A, Washington Island, via Fanning Island, Central Pacific Ocean.

W6YYW finds business is picking up since he increased power from under 100 watts to 500 watts. Yep, somehow power does seem to do that very thing now and then! W7FZA went hunting for deer instead of DX. He returned with bruises and a sore

back, remarking, "Getting a buck is much like a rare piece of DX." Anyway Dick managed to grab off four new ones including LU1ZA, TA3SO, VP8-AI and FI8PF. Speaking of LU1ZA . . . as far as I know, he's where he says he is.

Someway, somehow W6ADP still piles 'em up . . . he now has 154 . . . some that helped are *ZS6NU*, *FK8AN* (28 mc), *CR4AX* (28 mc), *UH8AA*, *YU7BX* (28 mc). *TA3SO*, *ZB1AH*, *OE7CP*, *AR8NUR*, *UC2CD*, *CT1A*, and others . . . but go on. W6ITA is up to 164 with *XAMC*, *VR3A*, and *TA3SO*. I suspect a couple of these were done on phone . . . and by the way, have you heard ITA's phone? Or maybe I had better close my big mouth.

W8HYC is now W9ANT in Fort Wayne and has added a new one already . . . *YU7KX* making 160. W6PFD says *UA1KEC* is a land station on Hooker Island in the Franz Josef group. This was confirmed by RAEM/MM. *FI8PF* says he will not QSL but will send a log to ARRL . . . or I guess it was the IARU. He's just outside the low end of 20. Along comes W2IOP with his two-bits worth and says *UA1KED* is on Rudolph Island, also in the Franz Joseph group. Incidently, Larry has just moved into a new QTH and before long expects to become a DX man again. He'll probably have rotaries whirling all over the place.

OK1AW is up to 39 and 106. He needs only Zone 23 now. WØNTA wants the W6s to give the WØs a break so they can work some stuff like HS, VS4, XZ, etc. Maybe we should set aside a day each week as "W6-less days for WØs." WØNUC wants the the dope on *AC4YN*. Well, he's on so infrequently that his guess would be as good as mine on when to expect him again. He used to come in around 1500 to 1600 GMT, T9 signal not too strong, in fact most of the time it was rather shaky. Don't know what frequencies he might choose now, but he did have crystal around 14,080, 14,106, 14,160 and I think one in the phone band.

PY1DH hasn't been letting any ice form on his antenna and is up to 37 and 128 . . . the new zone being *UAØKFC*. W7GXA says he's going to have to lay off DX for a while and spend a little more time on his studies. While he is studying his totals will "rest" at 39 and 106. W2PEO appears a bit irked that he can't add a zone every time he punches the key . . . but he does have 150 counties, zones 38.

WØYXO says *CT1A* will QSL through W1AZW. . . better work him, you won't be sorry. W6TI digs up a little dirt and this is it . . . *G3CN* was XAEG, Trieste, CN8EF was and is W7IEO and is now back home in Everett, Wash., with his new bride. Well, he *was* a DX man. *SU1HF* is W6IAQ and of course *J9SIR* in the Marshalls is now signing KX6AF.

W3KDP let the painting of his house interfere with putting up a new rotary for 14 mc. But he did try an unterminated rhombic, which Ren says, is no world beater. *KP4KD* says his Jr. op, *KP4BJ*, has his p.p.813s perkin' and he's gonna have to watch out for his laurels. KP4KD is still chasing a VK9 but he's at least temporarily pacified because in the chase he landed a VR2 and a ZM6.

It's good to see VE1EA in the Honor Roll with 36 and 102 . . . we don't have enough VEs. I hope W8RDZ hasn't minded being a W9 for a couple of months because that's just the way the Honor Roll had him listed. He's back in the right district now and we'll blame that on the printer. It looks as though W6VFR is leading off the Honor Roll this month with 40 and 175. Some of Marv's newest are *CR6AI*, *YA3B*, *ZS6OL*, *YU7LX*, *TA3SO*, *XAMC*, and *LU1ZA*. Says he is now building up his phone totals.

(*QSY to page 72*)

Again at Surplus Radio--

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Conversion Kit- **Converts any set to a large 10" Size.**

From THIS TO **THIS**

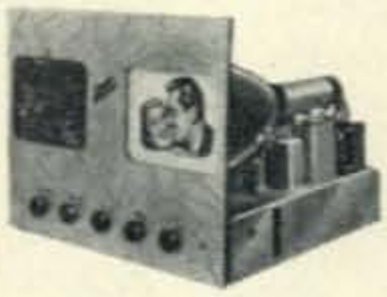
Includes new Sylvania developed all electrostatic Kinescope.

FEATURES;

Correcting optical plastic window. Modernizes your present receiver with less than 1 hour's work. May be located 6' from main set. No additional controls used. Kit is complete in all respects. Each 93.50

HERE'S THE KIT THAT TOPS THEM ALL

Kit TL-4



$165.00 complete

The kit comes complete. There is absolutely nothing more to buy. You get a di-pole antenna, 60 ft. of lead-in cable, all 20 tubes (including the 7" picture tube), sound section, front panel, and all components down to the smallest nut. Look over these outstanding technical features: 5 channel RF unit, prewired and 3 channels tuned to your specific locality • A DC restorer circuit for clearer pictures • pretuned slug IF's for high gain and greater stability • 20 tubes total. • FM sound channel 3.5 MC bandswitch • 110 volts, 60 cycle.

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MODULATION TRANSFORMERS

225 WATTS Audio Max. Kenyon T478Pri. 16,000 ohms ct. Plate Plate.
Sec. 7000 ohms—270 Ma.
5000 ohms—320 Ma.
3500 ohms—400 Ma. **15.95**

200 WATTS Audio Class B 811's to single 813. 2½ : 1 Ratio Each **6.95**

Input transformers to match. Pri. 6 V6 to PP Grids. Permaloy Core. Hermetically Sealed..... **2.65**

125 WATTS Audio. Thordarson CHT Series Multi-Match Pri. and Sec. Matches Any Tubes. One of the finest transformers on the market. Our Price Only..... **14.50**

63 WATTS Audio 6000 ohms Pri. for 6L6's PP, AB2 to 807's etc. 3000 ohms load Each **3.89**

PP AB2 Matching driver. Pentode 7C5, 6F6 etc. to PP Grids class AB2 Each..... **2.35**

SURPLUS RADIO, INC.
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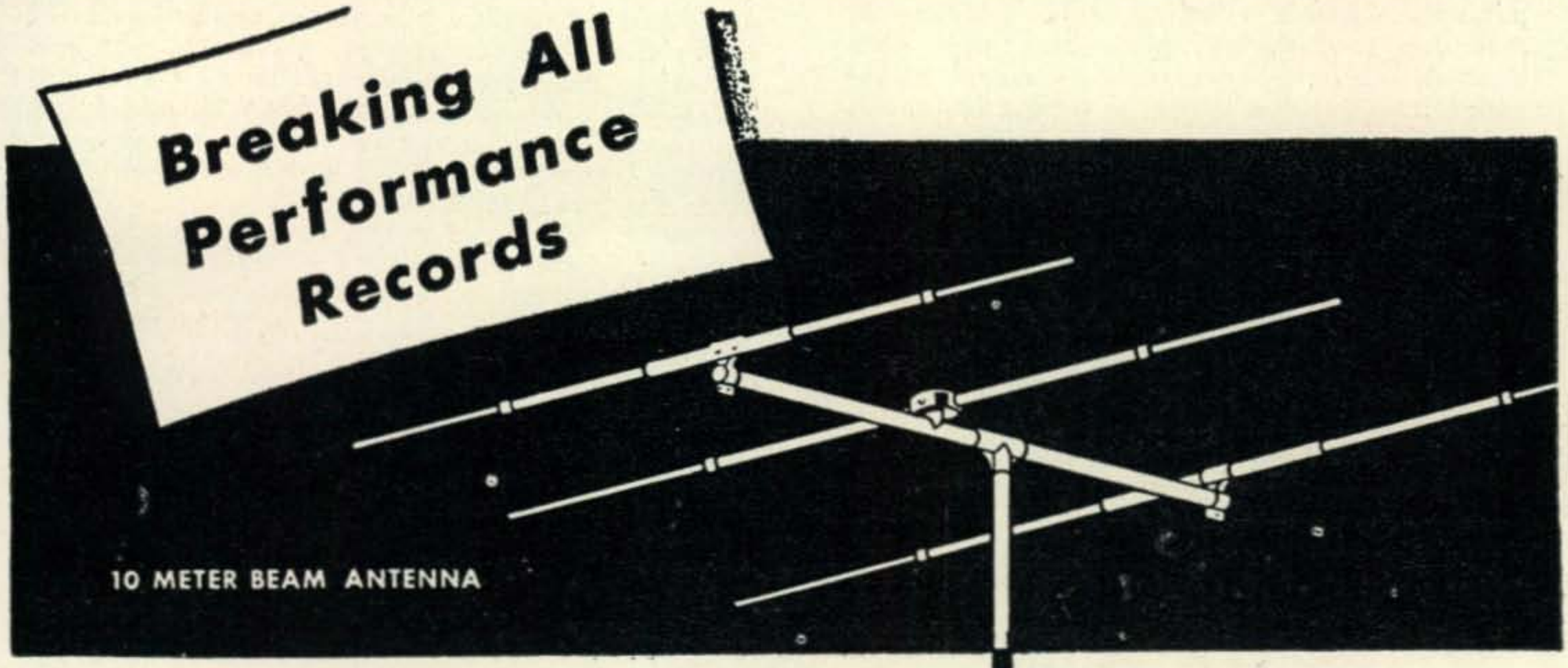
Breaking All Performance Records



..."increase in DX is terrific
— far ahead of all beams in my previous experience
— clean-cut design, easy to assemble
— worked all continents."

These enthusiastic comments from owners of Workshop 10-meter beams are the result of many months of painstaking research and testing to obtain *constant* gain, impedance match, and "front-to-back" ratio over the entire band. For structural strength, clean-cut design, and maximum performance, you cannot equal the Workshop 10-meter beam antenna. Model #29, price $39.50

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Workshop Antennas and Equipment

2-Meter Beam Antenna #146AB	$21.50
6-Meter Beam Antenna #52AB	$9.00
10-Meter Dipole Antenna #29AD	$8.00
10-Meter 3-Element Beam Conversion Kit #29B	$31.50
20-Meter 3-Element Beam Antenna #14	$120.00
Antenna Mast Kit #AM	$8.25
Model #AM1	$1.30
Rotating Accessory Kit #AM2	$5.00
Workshop Rotator	$157.50

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WØHX has picked up a few like *KJ6AA*, *HR1CE*, *HI6EC*, *VP7NH*, *KH6KH/KB6*, and *VQ4ERR* giving him 32Z and 80C. G3DO adds *UA9CB* for his 37th zone on phone while his countries are 110. W6DI, one of our effervescent committee members, is on top of the phone section of the Honor Roll this month with 37Z and 123C. He is closely followed by W1HKK with 37 and 122. Watch out Dennis . . . Atchley is after you. With 48 watts to an 809 W6HG had 63 foreign QSOs in 22 countries during the month of September. HG has worked all his DX with low power. His antenna is a 3-element rotary. W6KPC, while operating 10 mobile, worked *VK2-KZ* with both of them getting a big bang out of it.

Again on c.w. we have a report from KH6KL that there is a station signing *RV2*, 7103 kc, and located on the island of Raivavae. To save you a little time prowling around your globe looking for this one it is in the French Oceanic group, but more specifically near Tubuai. Or better yet, south of Tahiti and just about on the Tropic of Capricorn. If you work him here's how to send your pasteboard. Roland Dasseqnies, Raivavae Island, Austral Paren, Tubuai, via Tahiti, French Oceanic State. He came in around 0500 GMT with a 120-cycle note (?) put out from a rig using a 6L6 with all of 10 watts "poured" into it.

As you probably have noticed in this month's column I've omitted practically all direct mention as to the number of zones and countries worked by you fellows. Reason being that they are all in the Honor Roll and why fill up space and bore you with 'em here, when you can gaze at the whole flock on a single page. Any objections? We aim to please, you know!

Activity at W6QD is still at the same low level. In other words, nothing new. It's pretty well established in my mind that you can't work new ones if you're out of town. Some of the boys around here don't think I should let business interfere with DX. Every time I take a jaunt up to the San Francisco bay area I hear how swell conditions are from guys like W6TT, W6CEM, W6SC, W6WB, and a flock of others. Yeah, they even report several Zone 2 stations coming through . . . which is the only one I need. Oh well, one of these days . . .

This is a short session this month . . . a sort of a Readers' Digest idea of a DX column. We'll try and cook up a larger batch of DX scandal for January. It's getting late, I'm tired so will sign off. But . . . before I do, I want all you *DX*ers to be "nice lil' boys (even if you are big lugs) or Santa Claus won't bring you new zones, countries and QSL cards." Seriously, here's wishing a Merry, Merry Xmas to the whole gang.

QTH's

C7OK	c/o VS2AL
C7US	John Hoffman, c/o American Consulate Changchun
C9JW	Wei Tsu Ye, Bank of China, Moukden, Manchuria
CN8EE-ED-EG-EH	NAS 214 Box, FPO New York, N. Y.
CR4AX	Box 61, Praia, Cape Verde Islands
CR7AY	V. P. Garcez, Box 812, Lourenco Marques, Portugal Colonial, Mocambique
I6ZJ	Via R.S.G.B.
J2RKD	Via W2RKD
J8AAI	Walt Burt, c/o RCA, APO 235, c/o P.M. San Francisco
J8AAW	111th Signal Service Company, APO 235, c/o P.M. San Francisco
J8ASC	Seoul, Korea. APO 235, c/o P.M. San Francisco

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1—6SH7	Speech Amplifier
1—6SA7	Voltage Amplifier—Compression Mixer
1—6SQ7	Compression Amplifier—Compression Rectifier
1—6SN7	Driver
1—6SN7	Phase Inverter—Modulation Monitor
2—807's	Class AB_2 Modulators
1—6X5	Bias Rectifier
1—6X5	Over-Modulation Indicator
2—5U4G's	High Voltage Rectifiers
1—5U4G	Low Voltage Rectifier
1—117Z6	VFO Rectifier

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December, 1947 **73**

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

(from page 45)

W5VY in San Antonio, Texas, is now leading the North American 50-mc stations with 6 countries worked in two-wav contacts. They are VE, XE, LU, OA, W and KH6.

The first big highlight of October was on the 12th from 1435 to 1535 PST, when W7ACS/KH6 at Pearl Harbor worked into the W5, W6 and W7 call areas. The first signal heard by Gene Piety, W7ACS/KH6, signed with the call W5AQK. While Gene called him, W7QAP cranked up his gasoline engine and got his 70 watts on the air. Bud, W7QAP, gave W7ACS/KH6 a short call on c.w. at 1434 PST which was immediately answered, and thus the first North American to Hawaii contact on 50 mc went down in history. After signing with W7QAP, Gene went on to work W6KD, W6FSH, W6NAW, W5VY (on c.w.), W6JRM, W6UXN, W6QG, W6SSK, W6QHM, W6CLO, W6QXB, W6TBS, W6BWG W6NXJ, W6QVK, W6BPT, W6OB, W6BOS and W7OWX. Gene says that W6BPT had by far the outstanding signal, meaning that it was a steady 40 db over S9. Almost all the fellows were surprised at the very strong signals on both ends for even the 3 watts input to an MBF mobile transmitter and a vertical whip antenna resulted in an S9 report. W7ACS/KH6 also heard and called W5FRD, but according to later reports W5FRD had been looking for South American DX and did not hear Gene call him. The distances involved are about ideal for a regular F2-layer reflection. From Pearl Harbor to Los Angeles it is about 2700 miles. The path length to W5VY is 3495 miles and if W5FRD had been worked it would have stretched out to 3575 miles.

Just prior to the opening in Hawaii, W5VY had worked LU9EV in Buenos Aires, Argentina. This established the first W5-LU contact at 1500 CST on 6 meters. The distance involved here is 5110 miles. LU9EV also heard W8ZVY, but no contact appears to have been made.

XE1KE in Mexico City is well on his way toward working all LUs on 50 mc. There has been a slight tapering off of openings toward the South American continent, but those that have occurred have been very strong. Just what part sporadic-E played has in making these openings possible has still to be solved. A considerable amount of scattering has been noticed over several paths. One pronounced case was observed on the 14th of October when XE1KE overheard W5VY working OA4BG. At this time XE1KE found it necessary to keep his beam pointed to the south to hear W5VY. Probably this is an instance of *long scatter* coming back to Mexico City after being reflected from the top of the sporadic-E mass over South America. After W5VY signed with OA4BG, he was worked by XE1KE who reports the contact as only "poor to fair" in quality. This is the type of signal to be expected from scattering. The study of propagating 50-mc signals over these distances is very complex, but we are very glad to report that all of your reports are being carefully analyzed and summarized accounts of 50-mc transmission are being sent to all the interested agencies working with or in the radio propagation field. Reporting forms are available from the V.H.F. Editor and a card sent to us will bring you a supply.

Openings

Sept. 10—LU5CK says that PY2QK and OA4AE were both heard in the Buenos Aires area between 2100 and 0125 EST. This appears to be strictly a

ocal sporadic-E mass.

Sept. 11—LU5CK heard OA4AE from 2200 to 2215 EST.

Sept. 12—OA4BG worked LU7AZ at 1825 EST. LU5CK heard OA4AE and OA4BG from 2250 to about 0030 EST.

Sept. 13—Nothing reported.

Sept. 14—Some aurora appears to have been present around the country with WØYSJ hearing and working W5FSC, W5LBG and WØQIN.

Sept. 15—XE1KE worked LU9AX, LU1AM, LU3DD, LU9AS and LU9EV from 1820 to 1915 EST. Later in the evening LU5CK also heard OA4AE.

Sept. 16—Nothing reported.

Sept. 17—XE1KE worked LU9AS, LU1AM, LU6DR, LU3DD, LU8BQ nad LU8DJE from 1830 to 1900 EST. TG9JW was also on the air and appears to have worked several of the Buenos Aires gang.

Sept. 18—This was a very strong opening with OA4BG working LU5CK, LU6DO, LU4DT, LU1CC, LU8DJE (on 51.2 mc) and LU1AM from 2018 to 2150 EST. Meanwhile XE1KE was working LU8DJE, LU1CC, LU5CK, LU3BAC, LU7AZ, LU9AS and LU6DO from 1940 to 2100 EST. PY2QK, TG9JW and OA4AE were also on, while several of the LUs heard a station signing TG9JE on exactly 50,000 kc. This is one of the many instances which indicate the presence of both sporadic-E and F2-layer formations.

Sept. 19—XE1KE was on again and worked LU6DO, LU9AX, LU4CD, LU3EL, LU4DT, LU1CC and LU9AS from 1847 to 2100 EST. OA4AE and OA4BG were once again heard and worked by the Buenos Aires gang from 2220 to 2300 EST.

Sept. 20—This was the first day that conditions really began spreading out. OA4BG heard at 1518 EST an S3 to S4 signal from W5VY who was using c.w. At 1747 EST W4EID was heard on phone about S3 to S6. This was followed by XE1KE who was also S3 to S6. XE1KE was also heard in Buenos Aires after 2000 EST. LU5CK says that CE1AH and PY2QK were heard from 2020 to 2100 EST.

Sept. 21—XE1KE was heard again by the LUs from 2000 to 2100 EST, while CE1AH was heard and worked from Buenos Aires until 2120 EST. Earlier in the day, OA4AE heard W4EID at 1400 EST with an S6 signal. Shortly after that W4HVV was heard and W5LCZ in Benton, Arkansas, and W4EID in Jacksonville, Florida, were worked by Buz. W5FSC was heard about S8 and W5VY about S6 at 1425 EST. Sporadic-E was also noted in the evening up north when WØYSJ worked W8RLT, W8KNF and W9LMX from 2052 to 2125 EST.

Sept. 22—OA4BG stepped right out and worked LU6DO, LU4CD, LU9AX and LU5BT from 2039 to 2248 EST. XE1KE was on again and worked LU9EV, LU7AZ, LU3EL, LU4CD, LU1CC, LU9AX and LU6DO from 1920 to 2240 EST. LU5CK worked CE1AH around 2030 EST.

Sept. 23—OA4BG was back on during the evening and had an hour roundtable with LU6DO and LU1CC. He also worked LU9EV and LU9AS. XE1KE got LU8DJE, LU9AS and heard LU9EV and LU6DO, all stations with a fast flutter fade from 1855 to 2030 EST. CE1AH worked PY2QK at 2145 EST with both stations being heard in Buenos Aires.

Sept. 24—LU4ME in Mendoza, Argentina, which is over near the Chilean border, got on the air and was heard and worked by the Buenos Aires gang from 2115 to 2145 EST. Some aurora was observed

over North America with W7HEA working WØYSJ WØDZM, W7DMN and VE7AEZ. WØDZM also worked W7FLQ with the antenna beamed to the northwest at 2211 EST.

Sept. 25—Nothing reported.

Sept. 26—There was some sporadic-E down south with LU5CK working PY2QK, OA4BG and CE1AH from 2020—2200 EST. OA4BG also worked LU6DO at 2031 EST.

Sept. 27—XE1KE had a nice opening by working LU6DO S9, LU1CC S9, LU4AK S8, LU9AS S6, LU9EV S3, LU9AX S8 and LU9EV S9. The first contacts were made about 1608 EST. The LU9s faded out at 1715 EST and came back in again after 2000 EST. The MUF of the F2-layer was pretty high and possibly the first set of these contacts was via the regular F-reflection. W7QAP and W7QLZ heard harmonics and police signals up to 44 mc from the East Coast.

Sept. 29—LU5CK worked XE1KE and CE1AH and also heard, along with a number of the other Buenos Aires gang, KP4AL. If the latter is really on the air it is apparently the first KP to get out. XE1KE was up to his old tricks and knocked off LU9AX, LU3EL, LU6DO, LU4DT, LU5CK and LU4CD from 1930 to 2105 EST. The band was still open to South America when XE1KE had to QRT at 2124 EST. W7QLZ and W7QAP again heard signals up to 44 mc. During the evening there was a good sporadic-E opening with WØDZM working W3OR, W8CEQ, W2AMJ, W2PZK, W2IDZ, W2RGV and W4JCV from 1754 to 1847 EST. W8QYD worked VE1QZ, VE1QY, W1CAU from 1940 to 2047 EST and finally W5JLY at 2153 EST. W7HEA worked WØYSJ. W7JRG (in Sheridan, Wyoming), WØSV, W8RLT, W5WX, W5ELL and W7NCR from 2210 to 0000 EST. WØYSJ worked W2RND, W3OR, W8MXL, W8RLT, W8ALT, W8NMU, W8CEQ, W9ZHL, W7HEA, W7DYD, VE7AHZ and VE7DU. W2AMJ worked WØDZM, W9ZHL, W9RGH and W9ZHB.

Sept. 30 to Oct. 3 appears to have been fairly quiet. Some aurora DX was worked on the 30th when W2AMJ worked W8LEC and WØYSJ worked W9QUV. More aurora was noted on Oct. 1 and W2AMJ finally got VE3AJJ. Frank also worked W8ZVY, W9ZHL, W8QYD and heard many others. W8QYD also hooked W1KMZ/3, W9QKM, WØKYF and W9ZHB. Some more aurora appeared on Oct. 2 with WØYSJ working WØUSI and WØNFM.

Oct. 4—G5BY worked ZS1P in a crossband contact from 10 to 6 meters at 0905 EST. W6QG, W7QAP and W7QLZ heard harmonics and FM broadcast stations up to 45 mc. XE1KE was at it again and worked LU6DO S5, LU9AX S6 and was hearing PY2QK about S2 from 2100 to 2142 EST.

Oct. 5—Although the MUF was about 42 to 44 mc, no 6-meter DX was reported.

Oct. 6—OA4BG heard LU stations weakly from 2040 to 2200 EST, when they faded out completely. At 2248 EST the band suddenly reopened and contact was made with LU1CC S9, LU9AS S9, LU4DT S9, LU6DO S9 and LU4AK S8. Most of the time the beam was pointed to the north and the LUs were still coming in when OA4BG had to QRT for the night. The F2-layer MUF was rather high and G6DH says it was about 52 mc to the southeast of England at 0830 GMT. W7QLZ heard the Canadian FM broadcast on 44.7 mc over S9.

Oct. 7—W5LCZ heard an S4 signal on 50,930 kc with speech and music from 1140 to 1300 EST. W7QLZ heard the London television sound on 41.5 mc peaking S9 at 0945 EST.

Oct. 8 to Oct 10 was fairly quiet because of the ionosphere storm that apparently seemed unable to

produce either sporadic-E or aurora DX.

Oct. 11—At 0700 EST PAØUN made contact with the brothers ZS1P and ZS1T for the first European—South African 50-mc contact of the season. The very high F2-layer MUF was prevalent throughout the world and OA4BG worked W4GJO, W4EID and W4QN from 1348 to 1827 EST. W5FSC W5FRD, W5JLY and W9ZHL were also heard. W4GJO seems to have had the outstanding signal since he was S9 or over for about *5 hours!* W6QG heard signals on 49.5, 47.2 and 46.2 mc, while W7-QLZ heard the harmonics of WWV on 45 mc between 1530 and 1640 EST. W7QAP heard the FM broadcast stations up to 46 mc from 1120 to 1200 EST.

Oct. 12—The high F2-layer MUF continued right around the clock and at 1600 EST W5VY worked LU9EV. Later LU9EV was heard calling W8ZVY at 1615 EST. The W5, W6 and W7 contacts to W7ACS/KH6 were made in the afternoon. W5LCZ heard many harmonics throughout the band, including a Spanish-speaking station on 49.8 mc coming from the southeast at 1118 EST. Between 1230 and 1245 EST a weak m-c-w signal was heard on 50 mc flat, which is OA4AE's frequency. At 1720 another weak c-w signal was heard but remained unidentifiable. OA4BG worked W4QN, W4GJO, W4JEP, W8ZVY, W5FSC and W5EEX. John also heard W9LMS, XE1GE, W5FRD, W5JLY and W5VY. The W5 area signals were mostly around S5 on c.w., while the W4 area signals were mostly over S9. W4GJO was in again from 1215 to 1838 EST. The band at OA4BG appeared to be open above 54 mc and was extremely noisy at times with something like our old friend the solar static.W7-QLZ heard WWV harmonics at 40 and 45 mc after 1130 EST. Clyde also heard a signal on 58,800 kc about S3 which was unreadable. W7QAP heard the FM stations quite strong after 1115 EST with the antenna pointed to the southeast. W9ZLU heard the same broadcast signal that W5LCZ was hearing on 49.8 mc which peaked up to the southeast but couldn't be read because of the QSB.

Oct. 13—The MUF still had no appearance of ever abating and in the morning XE1KE heard a broadcast station's harmonic on 47.5 mc which was transmitting in French. It peaked up on the azimuth from Africa and might have possibly been one of those 100-kw transmitters in the Belgium Congo. W7QLS heard the band open early above 40 mc with the 45-mc signals coming in before those at 35 mc. XE1KE heard W5VY and LU9EV working at 1600 EST. XE1KE also worked LU9EV at 1615 EST. W7QAP heard numerous harmonics downward from 50 mc after 1620 EST with most of the stuff coming in from the southeast. W5VY was heard at 1630 EST which is a good indication of sharp angle scatter (short scatter, but more like the "rebound" type described recently by G6DH).

Oct. 14—The highlight of this day was the reception of ZK1AA on Cook Island by W6UXN in Englewood, Calif., at 2212 EST. The signal peaked S4 on c.w. Unfortunately, ZK1AA has his converter apart and could not listen for W6UXN. XE1KE heard the French-speaking broadcast station on 47.5 mc sign off at 0854 EST. At 1315 the band opened from XE1KE to OA4BG and OA4AE who were worked with S8 and S9 reports, respectively. The band closed down at 1345 EST, but reopened at 1640 EST when OA4BG was again worked. W5VY was heard from XE1KE with the Mexico City beam to the southeast—indicating another rebound from the F2-layer or long scatter. Around 1800 EST the LUs started to come in and XE1KE worked LU4DD and LU6DO until he had to QRT for dinner. At 1350

EST OA4BG worked W8QYD on i.c.w. The cross-country MUF was above 45 mc with W7QLZ and W7QAP both reporting stations near that frequency.

Oct. 15—W9QKM, Glenview, Ill., heard and definitely established that it was the harmonic of HCJB on 49.8 mc. that everyone was hearing. He heard it from 1400 to 1905 EST peaking S9 and very steady over long periods. A c-w signal was heard on 50.2 mc which was not identified—although XE1KE believes that it was LU9EV. W7QLZ heard harmonics and FM broadcasts up to 47.8 mc while W5LCZ heard a c-w harmonic on 49.5 mc from the east at 1033 EST. At 1100 a signal on 49.75 mc was heard with the W5LCZ beam to the southeast. At 1105 a "rebound" type scatter signal was heard and worked from W5JLY and at 1116 EST W5VY was also worked. These were both on c.w. During this period the noise (antenna or thermal) was about 5 S units above normal, which didn't sound like solar static and may have been associated with the minor ionosphere storm that day. W9ALU heard a rebound scatter from W8ZVY at 1231 EST and the harmonic of HCJB on 49.8 mc. Ferrell in Philadelphia heard KALW on 44.5 mc for the first time this year. They were audible for over three hours beginning at 1232 EST.

Oct. 16—The cross-country MUF was very high with W7QLZ reporting signals up to 49.1 mc and saying they were the loudest heard in years. Ferrell also agrees with Clyde's observations with KALW again heard for over 6 hours on 44.5 mc. WWV was sending an ionosphere storm warning. No 6-meter DX was reported.

Oct. 17—W5LCZ in Benton, Arkansas, heard the harmonic of a commercial c-w transmitter on 49.5 at 1045 EST. At 1055 a weak broadcast harmonic was heard on 49.8 mc which was coming from the southeast. At 1120 EST a solar static burst was heard with the peaks reaching over 10 db above S9. W7QLZ heard harmonics up to 44.4 mc while Ferrell heard the SBA beacons from Europe, including VJ on 37.2 mc and LR on 39.6 mc. These are all 20-watt transmitters. The London TV sound on 41.5 mc was also heard and a French radiotelephone station on 43.0 mc was heard with an S9 signal at 1145 EST. However, KALW on 44.5 mc was not heard.

Oct. 18—This was the day that J9AAO and CE1AH outdid themselves by working over 11,000 miles on 50 mc. The contact appears to have been one of those lucky accidents that happen to one in ten million. The way we hear the story: CE1AH and J9AAO were in contact on 10 meters. When someone called J9AAO to come outside and look at some equipment, Al told CE1AH to listen for his automatically keyed transmitter on 50 mc. CE1AH complied and immediately picked up the c-w signal and returned to 10 meters to get J9AAO on 6 meters. Fortunately, two-way contact was made at about 1002 Okinawa time. J9AAO had just completed a new 3-element wide-spaced beam, 50 feet high, and found that he could hear CE1AH only when this beam and another at a height of 30 feet were used simultaneously. The signal from CE1AH was inaudible when J9AAO tried each beam antennas individually. The transmitter at Okinawa is the Navy job originally used by J9AAK. It has an 80-watt input an 829B in the final. The receiver is an S-27 with an R-9er ahead and the output used as a converter to a Super-Pro. Many harmonics and FM stations were heard in the States up to 46 mc, but no 6-meter DX has been reported as the column is written.

Oct. 19—F2-layer conditions went suddenly down during this day and Ferrell says the highest thing

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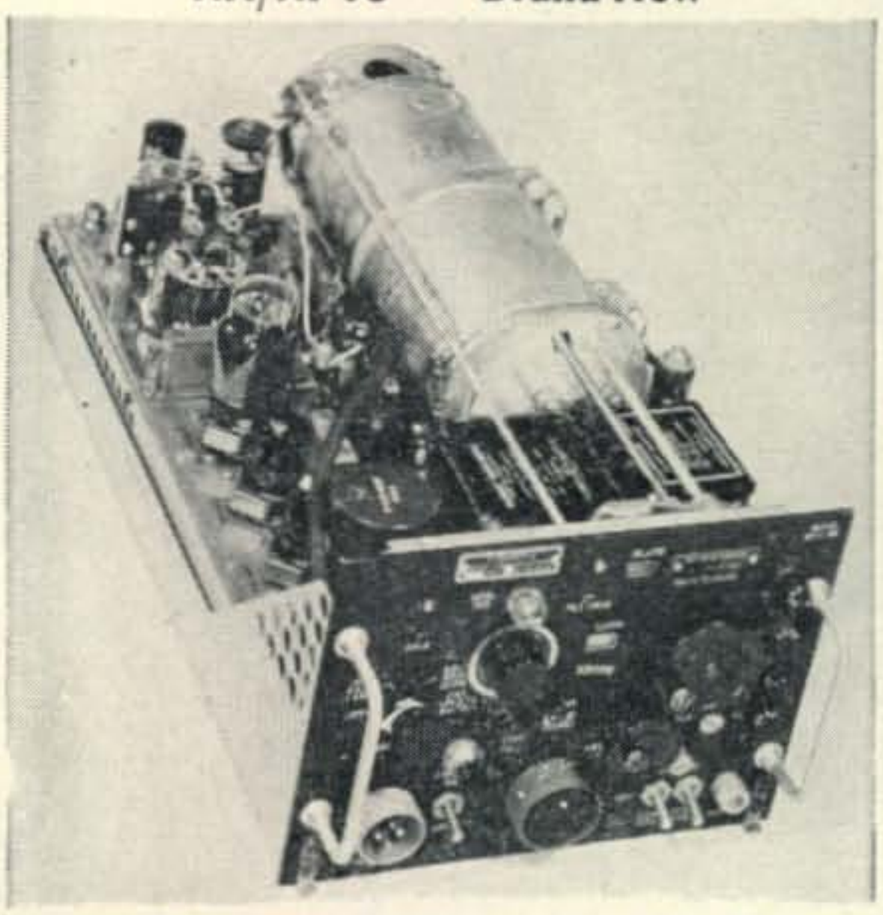

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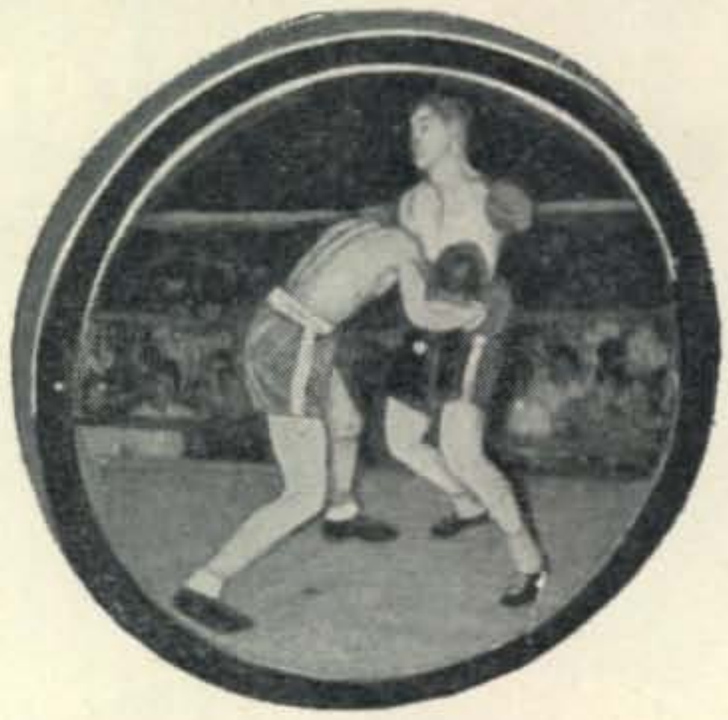

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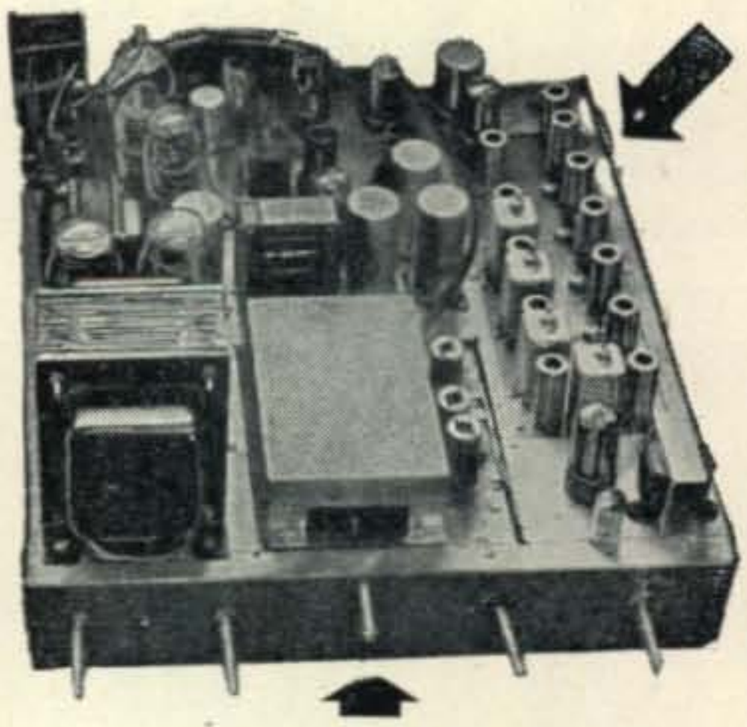

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heard was on 39.1 mc. XE1KE thought that the good conditions from the day before might persist and arose to work into Europe on 6 meters. Instead he heard and worked W4GJO, W5LCZ, W5FSC, W5HTZ, W5FRD, W5LEI and W5AJG for some good sporadic-E contacts. XE1KE also heard W1HMZ/3 on c.w. for a brief period at 1200 EST.

Active 6-meter Argentina Staticns

Call	Frequency	Power	Call	Frequency	Power
LU4DX	50040 kc	50 watts	LU3BAC	50400 kc	80 watts
LU9EV	50100 kc	100 watts	LU6DO	50410 kc	45 watts
LU5CK	50106 kc	100 watts	LU8BQ	50420 kc	65 watts
LU7CB	50120 kc	2 watts	LU8BF	50450 kc	35 watts
LU5CK	50130 kc	80 watts	LU7AZ	50460 kc	35 watts
LU8AT	50130 kc	80 watts	LU5ET	50640 kc	50 watts
LU9AX	50150 kc	350 watts	LU1DQ	50700 kc	35 watts
LU3AS	50160 kc	80 watts	LU5DJH	50750 kc	80 watts
LU3BD	50170 kc	25 watts	LU3DD	50780 kc	100 watts
LU4CD	50180 kc	200 watts	LU4DI	50800 kc	80 watts
LU1AM	50190 kc	15 watts	LU1BW	50810 kc	25 watts
LU5DO	50200 kc	250 watts	LU3EL	51000 kc	100 watts
LU9MA	50210 kc	80 watts	LU4DD	51030 kc	80 watts
LU4AK	50230 kc	40 watts	LU8DJE	51240 kc	120 watts
LU6DR	50250 kc	35 watts	LU2BC	51300 kc	40 watts
LU1DO	50300 kc	80 watts	LU3DH	51600 kc	80 watts
LU9AS	50320 kc	45 watts	LU4BO	52000 kc	25 watts
			LU2AO	53000 kc	30 watts

(Frequencies and power are those most commonly used.)
Countries worked from Argentina:
LU9EV—W, CE, OA, PY, XE, TG, and LU
LU5CK—CE, OA, PY, XE, TG and LU
LU1AM, LU9AX, LU8DJE, LU6DO, LU9AS—CE, OA, PY, XE and LU
(Compiled by Ed. Poledo, LU5CK.)

Sorry OM because of the large number of last minute reports received suffiicient space is not available for the 50-mc Honor Roll.

MORE SIGNAL-LESS NOISE!

(*from page 17*)

to a common ground point on the baffle to which all other circuit grounds likewise terminate. Mounting the tube horizontally with the socket connections coming out into the grid compartment permits the shortest leads even though it does bring the "hot" output plate lead in proximity to the input grid connections. It will be well to provide a grommet in the baffle close to the plate terminal on the socket to permit this lead to pass directly through into the adjacent plate section with a minimum of exposure.

If regeneration is to be incorporated, a few remarks will be in order. Assuming the regeneration coil to be wound in the same direction as the grid coil (and that both coils are coaxial) the *outside* end of the regeneration coil will go to capacitor C_4. The *inside* lead will be connected to chassis through the shaft of the coupling adjustment. For u-h-f work it will undoubtedly be necessary to shorten this return path by providing a more direct grounding lead. The number of turns in the regeneration coil is not particularly critical—our 14-mc coil has several turns so that coupling to the grid coil does not have to be close and in that way cause capacitive unbalance to one side of the winding.

It can readily be seen that the degree of input coupling will have a very great effect upon the setting of the regeneration coil, the antenna coupling, in fact, being one very old method of varying re-

generation level. In the double-triode circuit used, the tuning of the output plate circuit will have a very definite effect upon the stability of the circuit. When the output plate circuit is tuned so as to have inductive reactance (tuned to the low frequency side of resonance), a negative resistance will be reflected back into the grid circuit. If this negative resistance becomes greater than the positive loss resistance of the input circuit, oscillation will result. On the other hand, a capacitive reactance plate load will reflect positive resistance thus tending to make the stage degenerative. The particular setting of the antenna coupling will raise or lower the effective Q of the input circuit and the degree of coupling to the plate circuit (from the link to the receiver input), will likewise have an effect upon the stability of the circuit. Since the gain of the output stage is dependent upon the Q of the output circuit (for a fixed value of LC), the effective Q of this latter circuit should be maintained at a reasonably high value for maximum gain. As a general rule, however, stability is more important than gain so that the output link coupling may therefore be set to a point yielding a stable amplifier.

The mere fact that the experimental unit has four controls does not necessarily mean that all of them must be constantly manipulated. Once set, antenna and regeneration normally do not require more than occasional touchup. Unless the antenna coupling is extremely loose, tuning in the grid circuit is not excessively critical thus permitting the receiver to be tuned over some reasonable portion of the band without retuning the preselector. Once a desirable signal is heard, both grid and plate can be "touched up" for maximum response. By this we do not mean to infer broadband characteristics since the gain will definitely drop off if either grid or plate are substantially removed from the resonant frequency of the receiver. Even so, the over-all gain without retuning should still be adequate for reception of of any but the weakest signals.

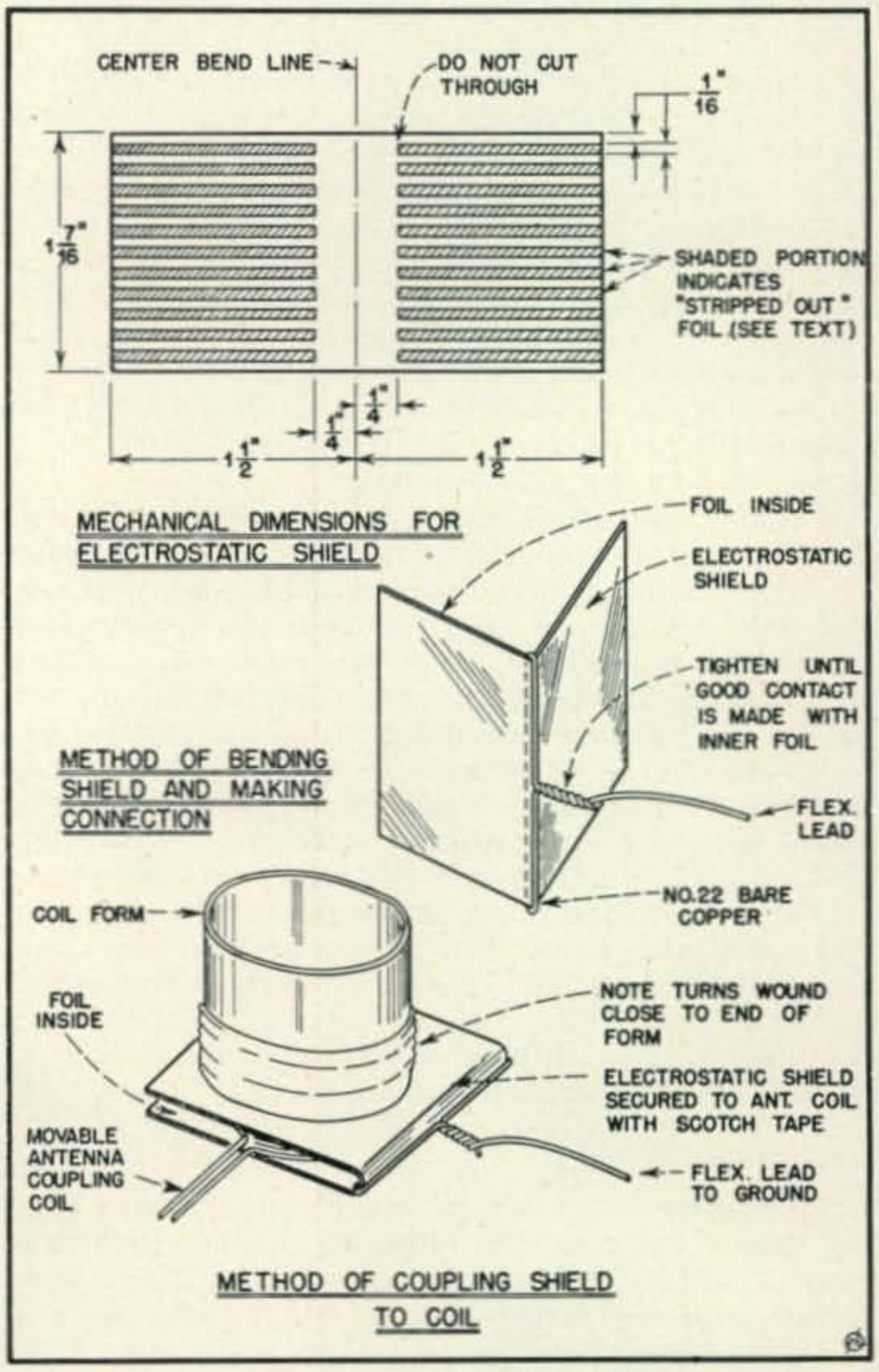
Electrostatic Shield

An effective electrostatic shield can be rather simply constructed in the following manner. Select a piece of stiff Bristol board, preferably with a smooth surface, approximately 4" long and 2" wide with a thickness approximating 1/64". We use white illustration board, Strathmore, two-ply weight commonly available in any store handling artist drawing materials. Additionally, pick up a small tube of rubber cement, as it also is used in the construction. The third necessity is a smooth piece of paper-backed tinfoil. Here we have found nothing better than a piece of this material removed from a cigarette package. The foil should be removed carefully and a section approximately 2" x 4" selected that is completely free from wrinkles or bends. The foil may be further smoothed out by laying the material on a a very smooth surface such as a piece of glass and carefully rubbing out any remaining vestige of wrinkle.

Coat one face of the Bristol board with rubber cement; this being easily done by squeezing a blob of the rubber cement from the tube and covering the entire surface with a thin layer, using a piece of cardboard as a trowel. Repeat this same operation with the *paper-side* of the tin-foil. Allow both pieces to dry thoroughly. When dry, cement the two surfaces together in the following manner; *CAUTION!* Do not let the two coated surfaces touch anywhere until you are ready to complete the job. Once they touch they are very apt to stick permanently and the foil will tear in an attempt to straighten them out. Start with the two outer edges and gradually

smooth out the foil as you lay it until the full surface is down. The foil surface should then be further smoothed.

Mark the surface lightly with a sharp pencil being careful not to score or tear the foil. The illustration should be followed for layout dimensions. They are based on the use of an antenna pickup coil 1⅛" in diameter. The finished shield when folded in half will completely cover this diameter.



Detail sketches for construction and coupling of electrostatic shield.

Using a metal-backed razor blade cut through the foil into the Bristol board in accordance with the drawing. Be careful to avoid cutting too deeply since the cardboard backing must remain in one piece. Use a metal straightedge to cut against so that the cuts will run parallel. Finally, nick the inner ends of the pieces to be removed and carefully pry up one end so that a small tab will be available to permit the undesired pieces to be stripped out. When the stripping is complete you will have, in effect a double edged comb and it is *very important* that all of the teeth be open on the outer edges and closed on the inner ones. In knicking the "pull-out" pieces take pains to avoid cutting through the adjacent tooth which is to remain.

The entire piece may now be trimmed to size with a pair of scissors. Mark the center of the piece on the 3" face on the rear face of the assembled piece (opposite the foil), and just score this center with the razor blade. This will permit the Bristol board to be bent in the center so that the two faces come parallel with either end of the antenna pickup loop. The connection to the shield can be a problem

since the tinfoil surface is far from mechanically rugged. We simply place a piece of bare copper wire completely around the folded center and tighten it sufficiently to have the wire "bite" into the two opposite of the shield. A flexible lead is then fastened to this heavier wire connection. Note that his shield remains permanently in position outside the antenna coil and moves in and out with this coil as the coupling is varied. It can be fastened to the pickup coil with Scotch tape thus insuring that it will not pull away.

SLUG TUNED COILS

(*from page 41*)

EXAMPLE 2. A 10.0-mc crystal oscillator is to be operated with 30 $\mu\mu$f across the tank coil. Referring to the graph, we find that we need a coil between "C" and "D" in inductance. Since the slug lets us vary inductance over a range of about 1.5 to 1, we are probably pretty safe in starting out with a coil of approximately 30 turns of No. 28.

In these assemblies, the shell is grounded through the No. 1 pin on the base, while the tuning slug is tied to pin No. 2. In most applications, the slug should be grounded, by putting a jumper between pins No. 1 and No. 2 on the socket, to avoid feedback; if it is desired to keep the capacity from coil to ground at a minimum, however, and if regeneration is not a factor (as might be true with a broadband doubler, for instance), the slug and tuning screw may be allowed to float, and adjustments made with a non-metallic screwdriver.

If coil "Q" is important, it is preferable to have the slug enter the coil from the base end of the assembly, rather than from the top of the form, as passing the brass screw through the coil drops the Q slightly. If the length of the screw projecting from the bottom of the socket is objectionable, due to the use of a shallow chassis, the screw can be cut short and the slotted hex head replaced on the stub. Be particularly careful with the screw threads, as the screw is a non-standard 6-40, and cannot be cleaned up by the usual trick of running a 6-32 nut on the screw.

THE AMATEUR NEWCOMER

(*from page 34*)

the photographs and it would be well to follow approximately the same set-up.

As may be seen in the wiring diagram the coils and coil socket are wired in such a way that when the broadcast coil is in the socket, both C_3 and C_4 are connected in parallel with the bandspread tuning capacitor, C_2. The purpose of this arrangement is to permit tuning of the entire broadcast band. By simply changing coils the amateur bands are set by means of C_3 and tuning is accomplished with C_2. The band-set capacitor, C_3, is one section of a dual capacitor from a broadcast receiver; in the case of the set pictured C_3 is about 170 $\mu\mu$f, and C_4 is about 365 $\mu\mu$f. If a capacitor of this description is not available it would be just as satisfactory to use a tuning capacitor with equal sections of 365-$\mu\mu$f capacity each, removing about half of the rotor plates from one section.

No primary coil is used in conjunction with the grid coil, L_1; the antenna is coupled into the grid

circuit through a small capacitor. This method is employed because it is not possible to match all types of antennas for all bands conveniently with inductive coupling. Differences between antennas may be compensated by adjustment of the coupling capacitor, C_1.

There are three coils for the receiver, one for the broadcast band, one covering 80 and 40 meters, and the third for 20 meters. Data for winding coils is given in *Table 1*, but some explanation concerning the broadcast coil is necessary. If possible, a coil is obtained that is intended for use in a broadcast set, and it is modified. It is unlikely that the coil will have a tap and if not, this will have to be placed at a point above 10% of the total number of turns from the grounded end. The coil may then be mounted upon a regular 5-prong coil form or upon a sawed-off 5-prong tube base. The other two coils for the receiver are wound on 5-prong coil forms. Although it is not expected that any adjustments will have to be made in the sizes of the coils if the dimensions are followed, it is possible that some adjustment may be necessary under certain conditions. The 80-meter coil should place the amateur band in the center of the vernier dial with the band-set capactior at about maximum capacity (plates fully meshed). On this same coil the 40-meter band should be found in the center of the vernier dial with the band-set capacitor at minimum capacity. With the 20-meter coil in place, the amateur band will be found in the center of the dial with the band-set capacitor at about 25% of the maximum capacity; on 20 meters the amount that the amateur band is spread over the tuning dial will be somewhat less than on the other two bands.

Operation of the Receiver

For the first trials of the receiver it would probably be well to use headphones and to put it in operation on the broadcast band. For connecting the receiver to the power supply two positive leads will be required from the plate supply; the detector will require about 100 volts, which may be obtained from the voltage divider, and the audio amplifier will require about 250 to 350 volts, which may be obtained by using the entire supply voltage.

With the receiver connected to the power supply, evidence of its functioning will be in the nature of a squeal when the regeneration control, R_2, is advanced. As this control is advanced, without any station being tuned in, the operator will notice a slight rushing sound before the squeal commences; it is at this point that the regeneration begins and further advance of the control is neither necessary nor desirable. If the band-set capacitor is tuned, the reception of broadcast stations should be possible. If there is a whistle as each station is approached and passed, the receiver is oscillating slightly; for reception of a modulated carrier, such as that of the broadcast station or amateur 'phone, the amount of regeneration should be reduced until the detector is on the verge of, but is not quite, oscillating.

After satisfactory operation in the broadcast band has been accomplished, plug in the 80-40-meter coil. Adjust the regeneration control until the rushing sound is heard and at the same time tune with

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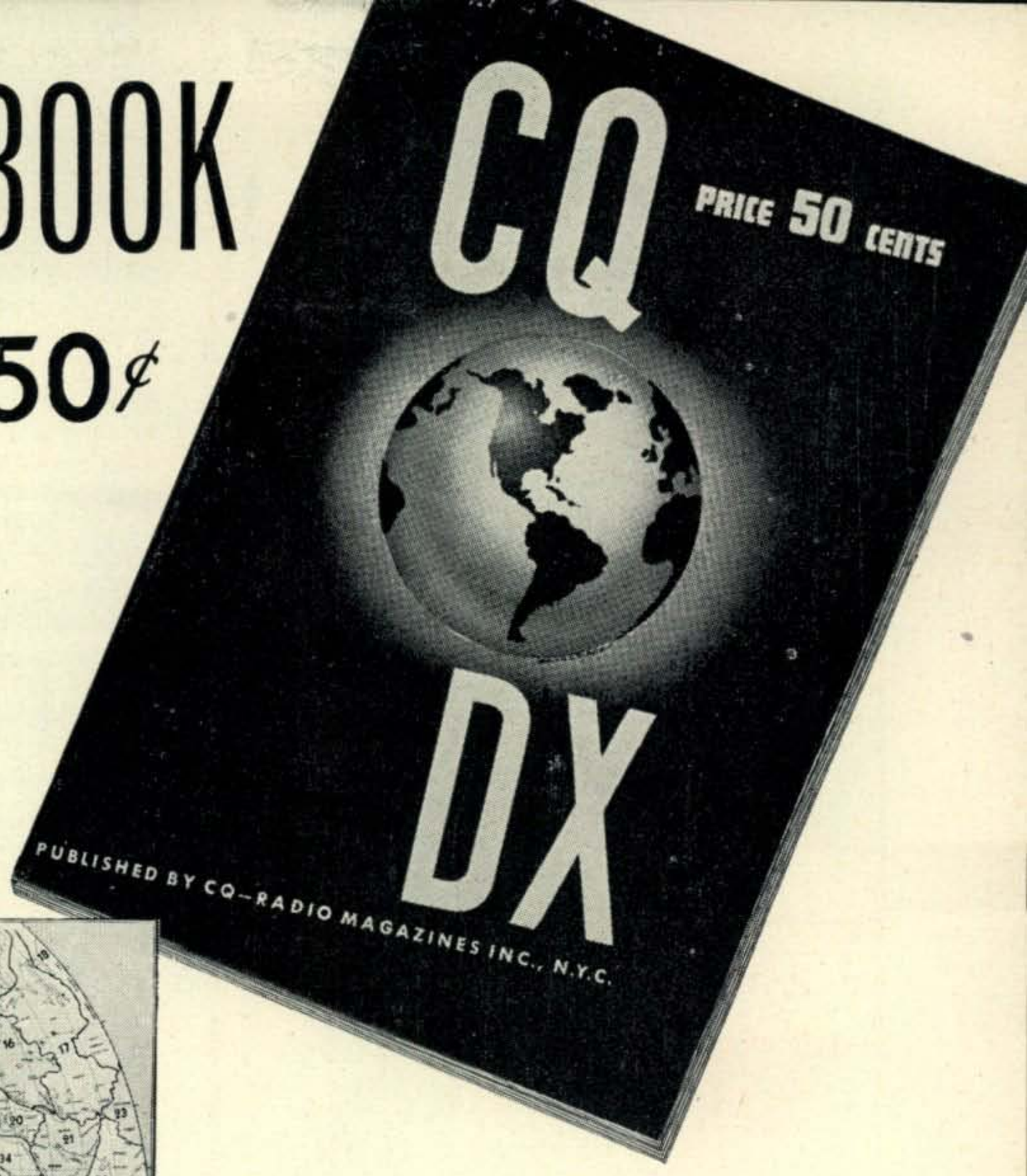

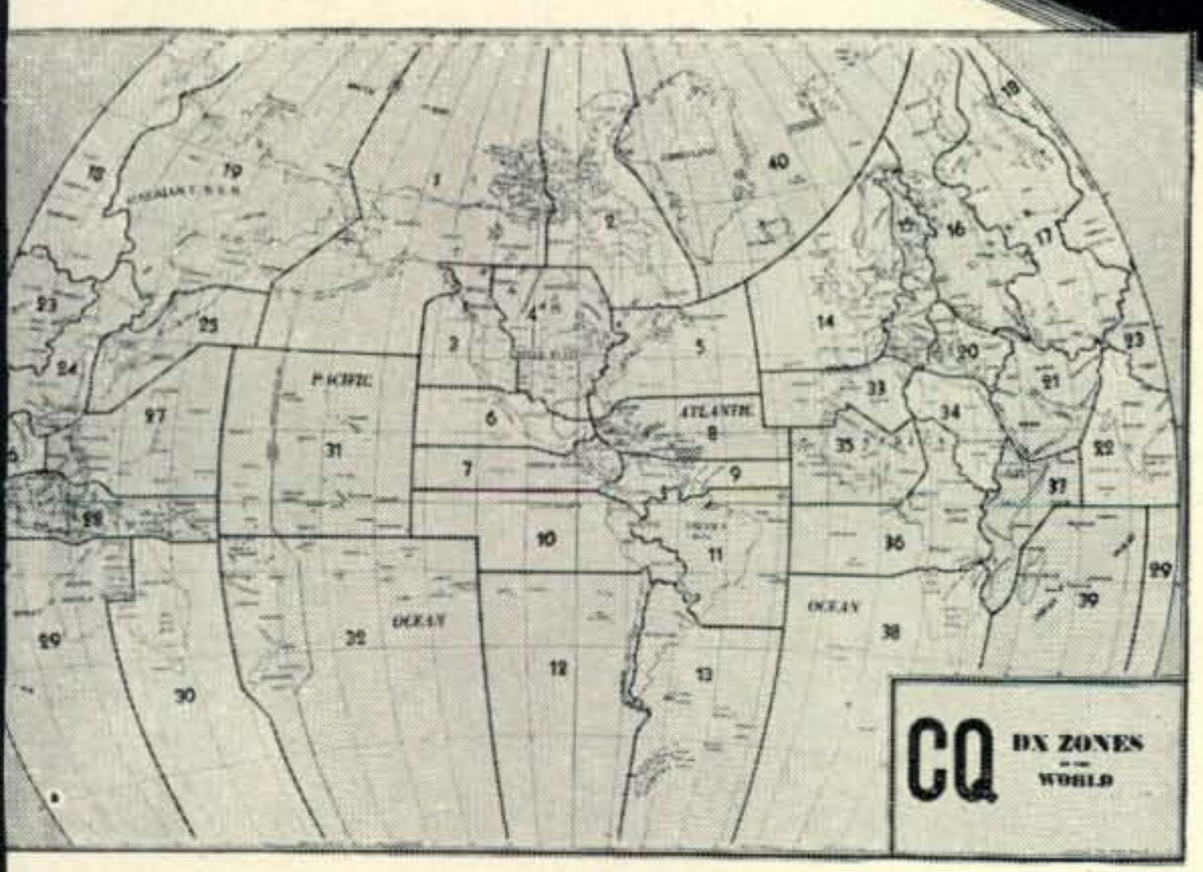

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the band-set capacitor until a whistle is heard. This whistle, of course, will indicate the presence of a signal. If modulated, the signal may be heard distinctly by reducing the regeneration to the point where no oscillation occurs. If the station heard is transmitting c.w., readjustment of the regeneration control may be necessary, but to receive c.w. it will be necessary to have the detector just oscillating; the tone of the c-w station heard will depend upon the frequency of the heterodyne produced by beating the detector against the incoming signal and may be varied by adjustment of the tuning.

It will be wise to determine just what settings of the band-set capacitor establish the limits of the bands, as nearly as these can be found. When these limits are found they should be marked on the aluminum panel or on a paper scale cemented to the panel, so that the bands can be located for future use. When the band limits are located the receiver is ready for operation.

Bibliography

"RCA Receiving Tube Manual," pp, 26-29.
Keith Henny, "Principles of Radio", Fifth Ed., John Wiley & Sons, 1945, Chapters 15, 16.
W. L. Everitt and others, "Fundamentals of Radio," Prentice-Hall, Inc., 1942, Chapter 10.

10-METER CONVERTER

(*from page 29*)

suggested means of switching the converter in and out, it is not part of the converter and therefore is not shown in the photographs.

Adjustment and Installation

The plate voltage to the converter is not critical and any voltage available in the car radio between 150 and 250 volts will be satisfactory.

Adjustment of the converter is extremely simple. If the oscillator coils are wound as shown and the oscillator trimmers *C13*, *C14* are the value called for, the plate circuit of the oscillator will tune only to the fourth harmonic of the crystal, so it is only necessary to peak them up for maximum output, with the converter connected to the receiver. The trimmers *C2* and *C8* are peaked in the same manner. With the receiver tuned to a signal in the center of the band, *L1* and *L2* should be adjusted to maximum gain, whereupon it may be necessary to go back and readjust *C2* and *C8*. A final adjustment of *L1* and *C2* should be made after the converter is connected to the automobile antenna at the time it is being installed in the car. If these adjustments are made with the receiver tuned to the middle of the band the gain will be practically uniform over the entire tuning range, falling off only slightly on each end of the band.

With the converter as described, the band of frequencies from 28,500 kc to 29,450 kc is received on a car radio with the usual 1500 kc to 550-kc tuning range. It is the author's contention that for average mobile use this is all that is really necessary.

However, for the amateur who desires reception of the DX portion of the band and the last 250

kilocycles on the high end, the addition of a relay and the use of two crystals will permit full coverage from 28 to 29.7 megacycles. In this case the band is covered in two steps, 28,000 kc to 28,950 kc and 28,750 kc to 29,700 kc, switching from one range to the other simply by switching crystals with the aid of the additional SPDT relay. Using two crystals, one 7375 kc quadrupling to 29,500 kc and the other 7562.5 kc quadrupling to 30,250 kc, the entire 10-meter band is covered with a 200-kilocycle overlap. The tuning of L_3 and L_4 is sufficiently broad that no retuning is necessary when L_3 and L_4 are tuned approximately midway between the two frequencies.

ZERO BIAS

(*from page 11*)

Shared frequencies might also be open to wideband f.m. for experimental purposes, frequency shift telegraphy, p.m., etc. There is much valuable work that the hams could do in all these fields. Furthermore, the military services would develop a class of specialists fully competent to handle much higher power gear.

We can see disadvantages to such a plan, but to our way of thinking they are overshadowed by the gains. You might point out that it would be eminently unfair if these super kilowatts started to compete with the average ham. The answer to this perhaps is in assigning 10-kw stations fixed frequencies, although we are inclined to believe that simply placing an upper and lower frequency limit would be sufficient. Americans wouldn't want to operate directly under these boys, but their very existence might keep those whole portions of the band open, so a little QRM dodging could easily be tolerated. Broadcast interference? That could be a problem of serious magnitude and that, coupled with the threat of adjacent and harmonic interference could easily be the principal reasons for any objection by the F.C.C. But if you issue those 10-kw licenses carefully, you could establish geographic requirements, i.e., no one in an area with more than 10,000 people per square mile is eligible, or set extremely high technical requirements. No one wants to create more work for an already overburdened F.C.C. staff by establishing another class of amateur examination. But even the Commission might recognize the desirability for such a permit if it meant keeping channels clear for their full utilization in an emergency by hams, or allied services.

Ideas such as these are bound to create great controversy and it is from frank and open discussion that some workable plan will emerge. The proponents of low power, who even today are desirous of establishing a lower maximum power limit, are, we feel, out of step with the times. It is clearly stated in the F.C.C. rules and regulations that minimum power must be used to effect reliable communications between two stations. Minimum power on the frequency of some of these shortwave broadcasters is certainly going to be 10 kw or better. Low power might be compared to a man trying to stop a Sherman tank with a .22 rifle. The simile is all too

real, for if the international shortwave stations go unfettered it will surely lead men down the path of enmity. It is the ham, with no political axe to grind, uncensored throughout the world, who could well point the way to better understanding and peace between men. We feel strongly that the amateur can make a magnificent contribution to world peace and he needs all his frequencies to do it. If we don't share our bands on an equal basis we won't even have that privilege after the next conference.

ART/13 SPEECH AMPLIFIER

(*from page 21*)

Operating Adjustments

The output transformer connections shown are for directly feeding the grids of the modulator tubes. For feeding a line, an output impedance of approximately 600 ohms may be obtained by joining terminal *3* to *5*, and *4* to *6*. Connect the line to *3* and *4*. The unit used at the writer's station is located six feet from the transmitter and is fed directly to the 811 grids through shielded wire. The plate voltage source is the same as that of the r-f driver stages. No trouble is experienced from r-f pickup, nor is there any difficulty with oscillations or motorboating within the amplifier itself, even though no special precaution was exercised in the wiring layout.

The gain controls should be set with the aid of an oscilloscope for determining the percentage of modulation and for observing the waveform with and without clipping. Aproximate waveforms are shown in *Fig. 5* where *A* is the output of the 6V6 with no clipping. *B* is the output of the second half of the 6SN7 with clipping, and *C* is the same clipped signal at the output of the 6V6. In the latter case the clipped wave top slopes slightly due to the attenuation of the low frequencies through the small coupling condenser *C11*. (*QSY to page 91*)

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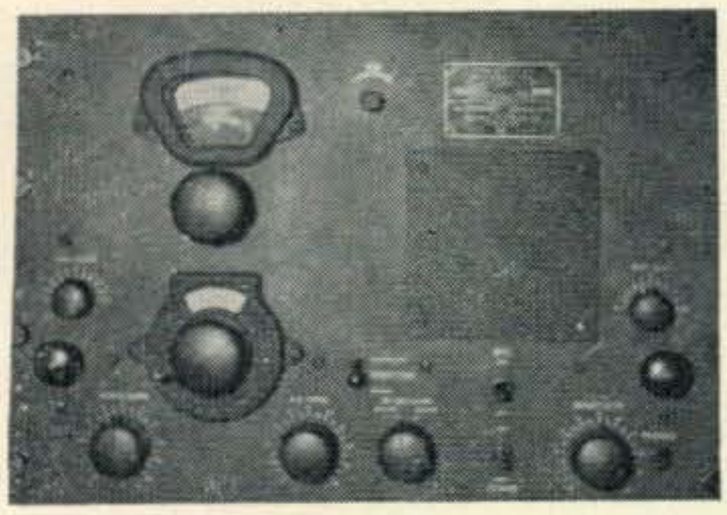

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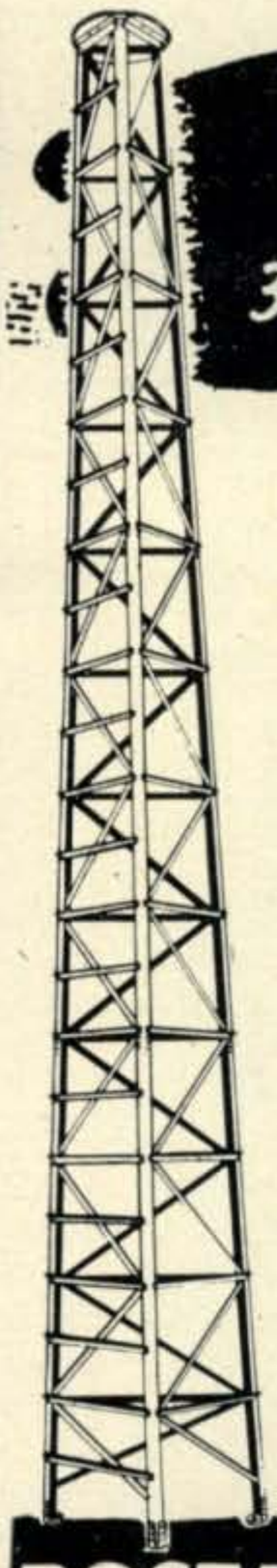

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IN STOCK: New and used Hallicrafters, National, Hammarlund, Collins, Millen, RME, Sonar, Meissner, Temco, Meck, Pierson, other receivers, transmitters, parts, etc. Lowest prices. World's best terms. Reconditioned S38 $35.00, S2OR $49.00, S40 $59.00 RME84 $69.00, RME45 $99.00, ARR7 $89.00, DB20 $29.00, Meck T60 $99.00, NC240D $169.00, HQ120X $99.00, SPC400SX $199.00, SPC400X $249.00, KP81 $249.00, S22R, SX25, SX16. SX28A, SX42, HQ129X, NC173, HRO, HT9, Temco 75GA, other receivers, transmitters, etc. Shipped on approval. Write. Henry Radio, Butler, Mo.

SELSYN, 115V 60C. Make from surplus dynamotor in hour. Nothing added. No rewinding. Excellent performance. Instructions for simple wiring changes 50c. Paul Hawkins, 1306 E. 27th, Kansas City, Mo.

500 WATT bandswitching fone, ECO, 4 supplies, flexible conservative design. C. Karzmark, Crane, Indiana.

COLORTONE QSLs! Smart! Different! Reasonable! See for yourself! Colortone Press, Tupelo, Miss.

2 METER EQUIPMENT, receivers, low power transmitters, tuners, Write free catalog. Constant Electric, 112 Cornelia St., Brooklyn 21, N. Y.

AMATEUR RADIO LICENSES. Complete code and theory preparation for passing amateur radio examinations. Home study courses. American Radio Institute, 101 West 63rd Street, New York City.

ERECO BEAM ROTATOR: 110 vac, heavy duty, variable speed, selsyn indicator, weatherproofed. Complete indicator and rotator ready to operate—$49.95. Satisfied users all over the country. Write for free literature. ERECO 2912 Hewitt, Everett 8, Washington.

BEAM ROTATORS, propelling pitch changing mechanisms, 1 RPM, $10. W9UTL, R.R.3, Box 560 Indianapolis, Ind.

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QSLs? SWLs? Samples 10c. VHF-152A? DB-22A? Sackers, W8DED, Holland, Mich.

PREWAR HRO 1.7-30 mc. bandspread coils in good condition with power supply and speaker—$145. W8MSG, Cleveland, Ohio.

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CRYSTAL KIT: Includes 4 low drift, highly active crystals, 2 holders, abrasive, instructions, treatise. State band preferences from 3500 to 8500 kilocycles. $1.00 complete. Mounted crystals—your specified frequency—$1.00 each. Ereon Laboratories, Williamsport, Penna.

QSLs, SWLs, Ham Xmas cards, stationery etc. Beautiful stock. Write W9BHV QSL factory, 857 Burlington, Frankfort, Indiana.

FOR SALE: New rack mounted BC-779 Hammarlund Super-Pro receiver with power supply and 8″ Jensen PM speaker. In excellent condition and alignment. Used less than 10 hours. $196.00. Also 12 volt input d.c. power supply consisting of a 750 v @ ¼ amp output dynamotor plus 300 v @ 100 ma. Mallory Vibrapack VP-G556 mounted on chassis with two heavy duty relays and fuses for remote control operation. $29.00 f.o.b. W2MYE, William H. Vogel, Jr. 51-01 39th Avenue, Long Island City 4, N.Y.

ALUMINUM TUBING for antennas: rigid, lightweight, 12 foot lengths x ⅝ inch OD x .035 wall, 24ST: 75 cents per length: located in St. Louis, will ship Express COD. Write Box 327, Edgemont, Ill. or phone Express 1441.

SELL perfect Temco 500GA $1200. Reason: Marriage. W3ILD, 4912 Quebec NW, Washington, DC. Fone EMerson 4341.

SELLING OUT: Hallicrafters HT-9, complete, coils all bands $295; National NC-173 with speaker, $159; Meissner VFO (latest model) with built in NBFM, $120. All equipment less than 1 year old. Price f.o.b. W5KVM, Box 779, Galveston, Tex. Deposit required before shipment.

PANORAMIC ADAPTERS, latest army models, 3″ C.R.T. center freq. control on front panel, 455 kc. input, 200 kc. sweep, no effect on receiver sensitivity. Complete with cabinet—$95. Kit, with wiring 80% completed—$75. Instructions and tubes included. H. Abrams, 214 E. 168 ST., Bronx 56, New York.

FOR SALE: Millen 50 watt transmitter exciter with coils and tubes—$35; Millen variarm for 80-40 meters—$35.00 Thordarson bandswitching 100 watt transmitter kit, complete with coils and tubes TZ40, 6L6, 83, 866 Jrs.—$75. RME-45 calomatic dial, etc.—$150. All guaranteed perfect. R.B. Cooper, W8AQA, 132 Guild, Grand Rapids, Mich.

BC-455 B EASILY CONVERTED to hot 10 meter receiver, fixed or mobile. Instructions schematics $100. Brown, 3327 Geronimo, Tucson, Ariz.

R15 should be set for slightly less than 100% modulation with *R5* set at the point at which clipping commences. For this adjustment *R5* will be set around "2 or 3 o'clock," and *R15* will end up between "3 and 4 o'clock" depending upon the modulator tubes in service. For 10 db of clipping *R5* will be at about "4 o'clock," and "full on" will result in 15 to 20 db of clipping. These settings, of course, depend upon the microphone and the modulating voice.

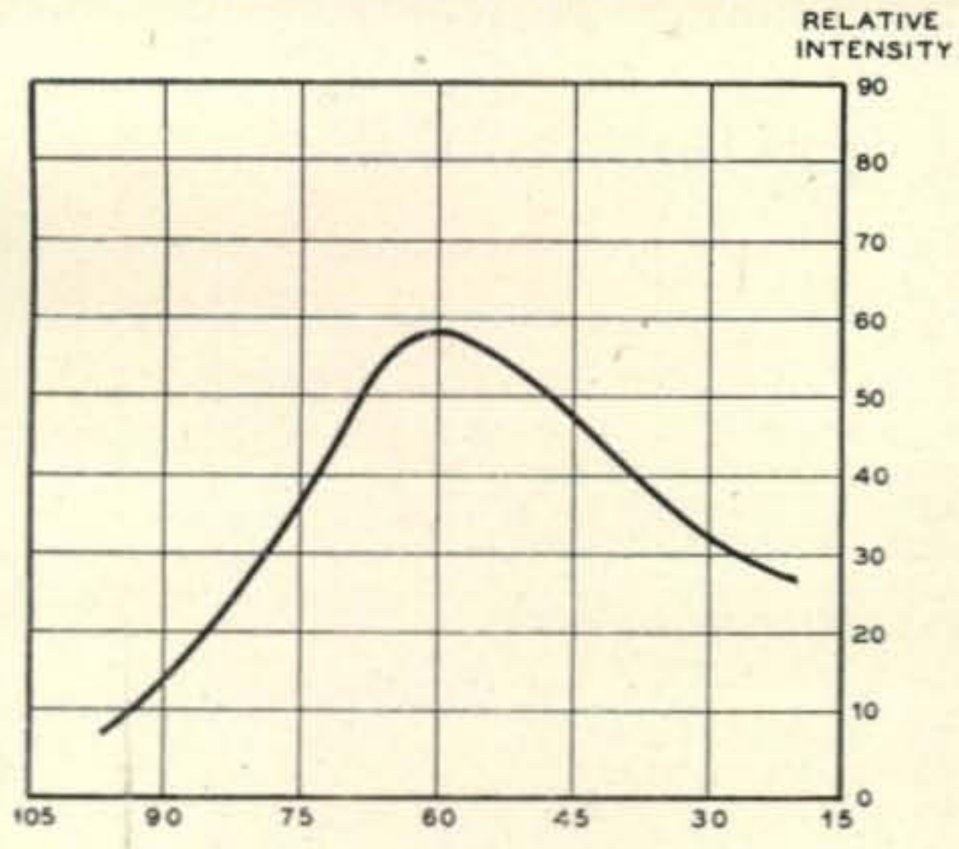
Note that the feedback resistor, *R16*, is connected to the arm of the 6V6 input potentiometer *R15*, resulting in less feedback with lower settings of this control. This is not detrimental as the setting of the potentiometer is nearly maximum for high output levels where feedback is beneficial.

THE SID AND THE HISS

(from page 29)

A solar static of low intensity is present at all times on the daylight side of the earth. The distribution of the *hiss* is shown in the accompanying illustration. It will be noted that maximum intensity is centered around 60.0 mc. Although the sensitivity of receiving equipment is much higher in the microwave spectrum (accompanied by higher noise factors in the receivers), experiments show that hiss level is normally very low. Below 25.0 mc the problem of ionospheric absorption limits the hiss intensity to a large degree. During the SID fadeouts the solar static intensity rises sharply to abnormal values. On occasions the intensity has been recorded as high as 15 to 25 microvolts per meter.

DISTRIBUTION OF SOLAR STATIC



The more intense bursts of solar static associated with the SIDs do not occur simultaneously at all radio frequencies. Instead, the bursts follow a sequence beginning at the higher levels of the v-h-f band. Recently Australian observers have reported that solar static or hiss bursts at 60.0 mc are generally two seconds after similar bursts at 75.0 mc. Bursts on 30.0mc were also recorded several seconds after these observed at 60.0 mc. Solar static bursts of exceptionally high intensities may be delayed by several minutes. This was noted on March 8, 1947,

(Continued on page 93)

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when bursts on 100.0 mc were observed two minutes after those on 200.0 mc, while those on 60.0 mc occurred over four minutes later than the similar bursts at 100.0 mc.

No entirely satisfactory theory has been proposed to show why the sun should radiate these tremendous amounts of radio energy. The delayed action of the bursts does indicate that the radio signals are generated at different levels of the sun's atmosphere. The velocities of propagation involved closely approximate those assumed in the generation of the prolonged ionosphere storm and aurora borealis.

O. P. F.

ALL BAND ANTENNA

(*from page 18*)

immediately apparent that any action governed by preceding third item was quite impractical.

In the agenda of deliberations the preceding second item was ignored.

As the right of eminent domain had been established by erection of the aforementioned 28-mc beam, it was decided, as a compromise, to utilize this antenna for operation on the 7 and 14-mc bands. The only remaining question was how this would be accomplished.

Inspection of the antenna revealed that the total length of each of the two wires was 61′2″. While this length was somewhat shorter than the 64 to 66′ required, for full-wave 14 or half-wave 7-mc Zepp antennas, past experience with the type of radiator had shown that it would perform well even when slightly shortened.

With this thought in mind the antenna was hauled down and the feed line changed to the three wire arrangement shown in *Fig. 1*. After replacing the antenna, the old 7 and 14-mc transmitter was reconditioned and installed with antenna switching and tuning equipment.

Voltage and current distribution along the antenna and feed line for 28, 14, and 7 mc, together with connections, is shown by *Figs. 1A, 1B, and 1C.*

On 28 mc the antenna performs as a bi-directional, end-fire beam and is series tuned.

On 14 mc the antenna performs as a full-wave Zepp with half-wave feeders and is parallel tuned.

On 7-mc the antenna performs as a half-wave Zepp with quarter-wave feeders and is series tuned.

With the methods of tuning shown, loading on the three mentioned bands is excellent. The actual performance of this antenna on 40 and 20 is surprisingly good. It has been noticed that even on these bands the antenna has marked directional characteristics approximately at right angles to the axis of the radiator.

Spacing of feeders is not at all critical. It is suggested that these wires be spaced approximately 3″ apart and that triangular feeder spreaders be used. These spreaders can be conveniently made from plexiglass or cellulose acetate.

By connecting all feeder lines together and operating the antenna in conjunction with a good ground system, good performance can be obtained on frequencies in the 3.5-mc region if the antenna height is fifty feet or so.

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Issues of Vol. 3, Nos. 1 through 12, for the year 1947

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